rosemann & ASSOCIATES P.C.

ARCHITECTURE
INTERIOR DESIGN
ENGINEERING
PLANNING

Specifications

For:

The Village at Discovery-Lot 1

221 NE Alura Way
Lee's Summit, MO 64064

Owner:
Intrinsic Development
3622 Endeavor Ave. Ste 101
Columbia, MO 65201

Project No.: 23096
November 20, 2024

1526 GRAND BOULEVARD KANSAS CITY, MO 64108-1404 P. 816.472.1448

DENVER ▲ KANSAS CITY ▲ ST. LOUIS ▲ ATLANTA

TABLE OF CONTENTS

DIVISION 00 - PROCUREMENT AND CONTRACTING REQUIREMENTS

000001 TABLE OF CONTENTS
000005 ARCHITECT CERTIFICATION PAGE
000007 STRUCTURAL CERTIFICATION PAGE
000008 MEP CERTIFICATION PAGE
003000 INFORMATION AVAILABLE TO BIDDERS
GEOTECH ENGINEERING REPORT
004000 AGREEMENT
005436 BUILDING INFORMATION MODELING EXHIBIT
007000 GENERAL CONDITIONS
A201-2017 GENERAL CONDITIONS OF THE CONTRACT FOR CONSTRUCTION

DIVISION 01 - GENERAL REQUIREMENTS

011000 SUMMARY
012100 ALLOWANCES
012300 ALTERNATES
012500 SUBSTITUTION PROCEDURES
012600 CONTRACT MODIFICATION PROCEDURES
012900 PAYMENT PROCEDURES
013000 ADMINISTRATIVE REQUIREMENTS
013100 PROJECT MANAGEMENT AND COORDINATION
013300 SUBMITTAL PROCEDURES
014000 QUALITY REQUIREMENTS
014533 CODE REQUIRED SPECIAL INSPECTIONS
015000 TEMPORARY FACILITIES AND CONTROLS
015850 PROJECT SIGNS
016000 PRODUCT REQUIREMENTS
017300 EXECUTION
017700 CLOSEOUT PROCEDURES
017823 OPERATION AND MAINTENANCE DATA
017839 PROJECT RECORD DOCUMENTS
017900 DEMONSTRATION AND TRAINING

DIVISION 03 - CONCRETE

030130 MAINTENANCE OF CIP CONCRETE
031100 CONCRETE FORMWORK
031500 CONCRETE ACCESSORIES
032000 CONCRETE REINFORCEMENT

033000 CAST IN PLACE CONCRETE
035410 GYPSUM CEMENTITIOUS UNDERLAYMENT

DIVISION 04 - MASONRY

042000 UNIT MASONRY
047200 CAST STONE MASONRY

DIVISION 05 - METALS

051200 STRUCTURAL STEEL
053100 METAL DECKING
055213 PIPE AND TUBE RAILINGS

DIVISION 07 - THERMAL AND MOISTURE PROTECTION

072100.01 THERMAL INSULATION
072110 ACOUSTIC INSULATION
072100 THERMAL INSULATION
072126 BLOWN INSULATION
072129 SPRAYED INSULATION
072419 EXTERIOR INSULATION AND FINISH SYSTME WITH MOISTURE DRAINAGE
072500 WEATHER BARRIERS
072600 SLAB ON-GRADE VAPOR RETARDER
072726 FLUID APPLIED MEMBRANE AIR BARRIERS – VAPOR PERMEABLE
075423 THERMOPLASTIC POLYOLEFIN (TPO) ROOFING
076200 SHEET METAL FLASHING AND TRIM
076500 FLEXIBLE FLASHING AND UNDERLAYMENT
077200 ROOF ACCESSORIES
077233 ROOF HATCHES
078100 APPLIED FIRE PROTECTION
078123 INTUMESCENT FIRE PROTECTION
078400 FIRESTOPPING
078413 PENETRATION FIRESTOPPING
079200 JOINT SEALANTS
079513 EXPANSION JOINT COVER ASSEMBLIES

DIVISION 08 - OPENINGS

081113 HOLLOW METAL DOORS AND FRAMES
081416 FLUSH WOOD DOORS
083113 ACCESS DOORS AND FRAMES
083343 ELEVATOR OVERHEAD COILING DOOR SMOKE CONTAINMENT SYSTEM

084113 ALUMINUM-FRAMED ENTRANCES AND STOREFRONTS
087100 DOOR HARDWARE
088000 GLAZING

DIVISION 09 - FINISHES
092116 GYPSUM BOARD SHAFT WALL ASSEMBLIES
092900 GYPSUM BOARD
095113 ACOUSTICAL PANEL CEILINGS
096500 RESILIENT FLOORING
096513 RESILIENT WALL BASE AND ACCESSORIES
096813 TILE CARPETING
099123 INTERIOR PAINTING

DIVISION 10 - SPECIALTIES
101400 SIGNAGE
104400 FIRE PROTECTION SPECIALTIES
105500 POSTAL SPECIALTIES
105550 KEY KEEPER ENTRY SPECIALTIES
107313 AWNINGS
108213 EXTERIOR GRILLES AND SCREENS

DIVISION 12 - FURNISHINGS
124813 ENTRANCE FLOOR MATS AND FRAMES
129313 BICYCLE RACKS

DIVISION 14 - CONVEYING EQUIPMENT
142100 ELECTRIC TRACTION ELEVATORS

DIVISION 31 - EARTHWORK
312113 RADON MITIGATION
313116 TERMITE CONTROL

SECTION 000005
ARCHITECT CERTIFICATION PAGE

ARCHITECT CERTIFICATION

I, DAVID E. HENDRIKSE, HEREBY SPECIFY, PURSUANT TO THE STATE OF MISSOURI THAT THE DOCUMENTS INTENDED TO BE AUTHORIZED BY MY SEAL ARE LIMITED TO:

SPECIFICATION SECTIONS

00 0001	TABLE OF CONTENTS
00 0005	ARCHITECT CERTIFICATION PAGE
00 3100	AVAILABLE PROJECT INFORMATION
----------	GEOTECHNICAL ENGINEERING REPORT: DISCOVERY PARK LOT 4
00 4000	CONTRACT FOR CONSTRUCTION
00 5000	CONDITIONS OF THE CONTRACT
00 7000	GENERAL CONDITIONS
----------	A201-2017 – GENERAL CONDITIONS OF THE CONTRACT FOR CONSTRUCTION
011000	SUMMARY
012100	ALLOWANCES
012300	ALTERNATES
012500	SUBSTITUTION PROCEDURES
012600	CONTRACT MODIFICATION PROCEDURES
012900	PAYMENT PROCEDURES
013000	ADMINISTRATIVE REQUIREMENTS
013100	PROJECT MANAGEMENT AND COORDINATION
013300	SUBMITTAL PROCEDURES
014000	QUALITY REQUIREMENTS
015000	TEMPORARY FACILITIES AND CONTROLS
015850	PROJECT SIGNS
016000	PRODUCT REQUIREMENTS
017300	EXECUTION
017700	CLOSEOUT PROCEDURES
017823	OPERATION AND MAINTENANCE DATA
017839	PROJECT RECORD DOCUMENTS
017900	DEMONSTRATION AND TRAINING
035400	CAST UNDERLAYMENTS
035410	GYPSUM CEMENTITIOUS UNDERLAYMENT
042000	UNIT MASONRY

047200	CAST STONE MASONRY
055213	PIPE AND TUBE RAILINGS
072100.01	THERMAL INSULATION
072110	ACOUSTIC INSULATION
072100	THERMAL INSULATION
072126	BLOWN INSULATION
072129	SPRAYED INSULATION
072419	ERIOR INSULATION AND FINISH SYSTEM WITH MOISTURE DRAINAGE
072500	WEATHER BARRIERS
072600	SLAB ON-GRADE VAPOR RETARDER
072726	ID APPLIED MEMBRANE AIR BARRIERS – VAPOR PERMEABLE
075423	THERMOPLASTIC POLYOLEFIN (TPO) ROOFING
076200	SHEET METAL FLASHING AND TRIM
076500	FLEXIBLE FLASHING AND UNDERLAYMENT
077200	ROOF ACCESSORIES
077233	ROOF HATCHES
078100	APPLIED FIRE PROTECTION
078123	INTUMESCENT FIRE PROTECTION
078400	FIRESTOPPING
078413	PENETRATION FIRESTOPPING
079200	JOINT SEALANTS
079513	EXPANSION JOINT COVER ASSEMBLIES
081113	HOLLOW METAL DOORS AND FRAMES
081416	FLUSH WOOD DOORS
083113	ACCESS DOORS AND FRAMES
083343	VATOR OVERHEAD COILING DOOR SMOKE CONTAINMENT SYSTEM
084113	ALUMINUM-FRAMED ENTRANCES AND STOREFRONTS
088000	GLAZING
092116	GYPSUM BOARD SHAFT WALL ASSEMBLIES
092900	GYPSUM BOARD
095113	ACOUSTICAL PANEL CEILINGS
096500	RESILIENT FLOORING
096513	RESILIENT WALL BASE AND ACCESSORIES

096813	TILE CARPETING
099123	INTERIOR PAINTING
101400	SIGNAGE
104400	FIRE PROTECTION SPECIALTIES
105500	POSTAL SPECIALTIES
105550	KEY KEEPER ENTRY SPECIALTIES
107313	AWNINGS
108213	EXTERIOR GRILLES AND SCREENS
124813	ENTRANCE FLOOR MATS AND FRAMES
129313	BICYCLE RACKS
142100	ELECTRIC TRACTION ELEVATORS
312113	RADON MITIGATION
313116	TERMITE CONTROL

DRAWINGS

G-001 TITLE SHEET
G-002 GENERAL INFORMATION
G-003 PLAN GENERAL NOTES
G-004 GENERAL INFORMATION
G-005 GENERAL INFORMATION
G-006 GENERAL INFORMATION
G-100 CODE ANALYSIS
G-101 ASSEMBLIES
G-200 UL ASSEMBLIES - U423
G-201 UL ASSEMBLIES - U415 (1)
G-202 UL ASSEMBLIES - U415 (2)
G-203 UL ASSEMBLIES - D916
G-204 UL ASSEMBLIES - D916
G-205 UL ASSEMBLIES - AER 09038 (1)
G-206 UL ASSEMBLIES - AER 09038 (2)
G-300 ACCESSIBILITY STANDARDS
G-301 ACCESSIBILITY STANDARDS
G-302 ACCESSIBILITY STANDARDS
G-303 ACCESSIBILITY STANDARDS

AS-100 ARCHITECTURAL SITE AMENITIES
A-101 FIRST FLOOR PLAN
A-102 SECOND FLOOR PLAN

A-105 ROOF PLAN
A-106 ROOFING & FLASHING DETAILS
A-120 REFLECTED CEILING PLANS
A-200 EXTERIOR ELEVATIONS
A-300 SECTIONS
A-301 ELEVATOR SECTION & DETAILS
A-302 STAIR PLANS & SECTIONS
A-500 WALL DETAILS
A-501 BRICK DETAILS
A-502 ELEVATOR DETAILS
A-503 WATERPROOFING DETAILS
A-600 DOOR / FINISH SCHEDULES
A-601 STOREFRONT ELEVATIONS & DETAILS
A-602 DOOR DETAILS

AND DISCLAIM ANY RESPONSIBILITY FOR ALL OTHER PLANS, SPECIFICATIONS, REPORTS OR OTHER DOCUMENTS OR INSTRUMENTS RELATING TO OR INTENDED TO BE USED FOR ANY PART OR PARTS FOR THE VILLAGE AT DISCOVERY PARK LOT #1 IN LEES SUMMIT MISSOURI.
SEAL:

BY: _____ **DATE:**_____

END OF SECTION 000005

SECTION 000007

STRUCTURAL CERTIFICATION PAGE

STRUCTURAL CERTIFICATION

I, CELESTE KAY SPICKERT, HEREBY SPECIFY, PURSUANT TO THE STATE OF MISSOURI THAT THE DOCUMENTS INTENDED TO BE AUTHORIZED BY MY SEAL ARE LIMITED TO:

SPECIFICATION SECTIONS

014533 – CODE REQUIRED SPECIAL INSPECTIONS
030130 – MAINTENANCE OF CIP CONCRETE
031100 – CONCRETE FORMWORK
031500 – CONCRETE ACCESSORIES
032000 – CONCRETE REINFORCEMENT
033000 – CAST IN PLACE CONCRETE
051200 – STRUCTURAL STEEL
053100 – METAL DECKING

DRAWINGS

S001 – GENERAL NOTES
S002 – GENERAL NOTES
S003 – STRUCTURAL SPECIAL INSPECTIONS SCHEDULES
S100 – FOUNDATION PLAN
S101 – LEVEL 2 FRAMING PLAN
S102 – ROOF FRAMING PLAN
S103 – WIND GIRT FRAMING PLAN
S200 – STEEL BRACED FRAME ELEVATIONS
S201 – STEEL BRACED FRAME DETAILS
S500 – FOUNDATION DETAILS
S510 – FLOOR FRAMING DETAILS
S511 – FLOOR FRAMING DETAILS
S520 – ROOF FRAMING DETAILS
S521 – ROOF FRAMING DETAILS
S530 – STEEL TYPICAL DETAILS
S541 – MASONRY TYPICAL DETAILS

AND DISCLAIM ANY RESPONSIBILITY FOR ALL OTHER PLANS, SPECIFICATIONS, REPORTS OR OTHER DOCUMENTS OR INSTRUMENTS RELATING TO OR INTENDED TO BE USED FOR ANY PART OR PARTS FOR TOWNPLACE SUITES.

SEAL:

11/20/2024

BY: CELESTE KAY SPICKERT **DATE: NOVEMBER 20, 2024**

END OF SECTION 000007

SECTION 000008

MEP CERTIFICATION PAGE

MEP CERTIFICATION

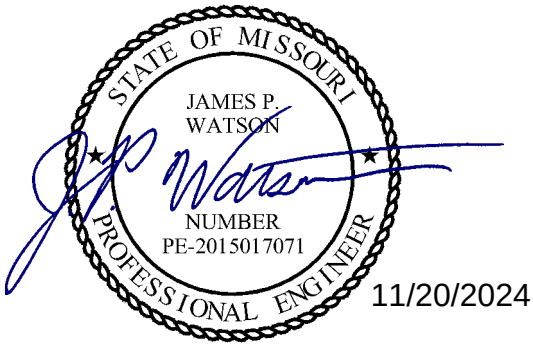
I, JP WATSON, HEREBY SPECIFY, PURSUANT TO THE STATE OF MISSOURI THAT THE DOCUMENTS INTENDED TO BE AUTHORIZED BY MY SEAL ARE LIMITED TO:

DRAWINGS

MEP1 – MECHANICAL ELECTRICAL PLUMBING COVER SHEET
MEP2 – SITE UTILITIES PLAN
MEP3 – SITE LIGHTING PLAN
MEP4 – MEP PLAN – ROOF
M101 – HVAC PLAN – FIRST FLOOR
M102 – HVAC PLAN – SECOND FLOOR
M501 – HVAC DETAILS & SCHEDULES
EP101 – POWER PLAN – FIRST FLOOR
EP102 – POWER PLAN – SECOND FLOOR
EL101 – LIGHTING PLAN – FIRST FLOOR
EL102 – LIGHTING PLAN – SECOND FLOOR
FA101 – FIRE ALARM PLAN
E501 – ELECTRICAL DETAILS & SCHEDULES
P101 – PLUMBING PLAN – FIRST FLOOR
P102 – PLUMBING PLAN – SECOND FLOOR
P501 – PLUMBING DETAILS & SCHEDULES

AND DISCLAIM ANY RESPONSIBILITY FOR ALL OTHER PLANS, SPECIFICATIONS, REPORTS OR OTHER DOCUMENTS OR INSTRUMENTS RELATING TO OR INTENDED TO BE USED FOR ANY PART OR PARTS FOR THE VILLAGE AT DISCOVERY PARK LOT #1 IN LEES SUMMIT MISSOURI.

SEAL:



BY: JP WATSON, PE **DATE: November 20, 2024**

END OF SECTION 000008

SECTION 003000
INFORMATION AVAILABLE TO BIDDERS

1.01 A COPY OF THE GEOTECHNICAL ENGINEERING REPORT

A. Title: GEOTECHNICAL ENGINEERING REPORT DISCOVERY PARK LOT 1
   1. PREPARED FOR:
   2. INTRINSIC DEVELOPMENT
   3. LEE'S SUMMIT, MISSOURI

B. Date: April 1, 2024

C. 3. Prepared by: OWN, Inc

D. This report identifies properties of below-grade conditions and offers recommendations for the design of foundations, prepared primarily for the use of Rosemann & Associates, P.C. and consultants.

E. This report, by its nature, cannot reveal all conditions that exist on the site. Conditions may be found to vary substantially from this report. The Contractor shall be responsible for performing site investigations to determine if any discrepancies exist between the Geotechnical Report and actual site conditions. Any design changes resulting from the Contractor’s investigations should be brought to the immediate attention of the Architect prior to submitting the bid. The Contractor shall be responsible for including, as part of the original bid and scope of work, any and all necessary costs to properly prepare the site including removal and disposal of any unacceptable materials found and properly preparing subgrade per the Geotechnical Engineering Report.

END OF SECTION 003000

OWN

Engineering beyond.™

April 15, 2024

Geotechnical Report

Intrinsic Development

Brian Maenner
3622 Endeavor Ave. Ste. 101
Columbia, MO

The Village at Discovery Park Lot 1

At the intersection of NE Douglas & NW Colbern Rd
Lee's Summit, MO

OWN Proposal SP31-24-018
OWN Project 24SP30033

Report Prepared By:
OWN, Inc.
3213 S. West Bypass
Springfield, MO 65807
417.866.2741

WeAreOwn.com
866.866.2741
info@weareown.com

Intrinsic Development
Brian Maenner
3622 Endeavor Ave. Ste. 101
Columbia, MO

Re: Geotechnical Report
The Village at Discovery Park Lot 1
At the intersection of NE Douglas & NW Colbern Rd
Lee's Summit, MO

OWN Proposal: SP31-24-018 / Project: 24SP30033

Dear Brian,

OWN Inc. (hereinafter referred to as "OWN") appreciates the opportunity to provide this Geotechnical Report for the above referenced project. We look forward to working on future projects with you.

Please contact Cody White, or myself with any questions. Thank you for the opportunity to be of service.

Sincerely,

OWN, Inc.

04/15/2024

Haleigh Stephenson
Project Geologist
hstephenson@weareown.com
417.665.9932

Cody R. White
Ozark Regional Leader
cwhite@weareown.com
417.825.4729

Copy

John Snider, jsnider@weareown.com, 417.540.2992
Derek Forbis, forbis@weareown.com, 417.866.4721
Jeff Bartz, jbartz@weareown.com, 913-961-9349

INTRODUCTION

This is the report on the results of a geotechnical investigation for the proposed project:

New two-story mixed use building with parking and paving in **Lot 1** of The Village at Discovery Park (The Village), Lee's Summit, Missouri

The purpose of this investigation was to perform an exploration of the subsurface soil conditions on the site and compile a report giving the findings of the exploration, logs of the borings, recommendations for the project above, and foundation design.

This investigation was performed for our client. The scope of our geotechnical investigation was detailed in our proposal and was to include drilling and sampling:

- The project proposal for the soils exploration includes 2 borings to 20 feet or auger refusal.
- An engineering report will be issued with the findings of the exploration and recommendations for site development, foundation design, and pavement design.
- An electronic copy of the report will be issued.

To accomplish the intended purpose of the geotechnical investigation, a study was conducted which consisted of (1) on-site borings to describe the subsurface conditions encountered in the borings with sampling of in-place soils; (2) laboratory analysis of the soil and rock samples obtained; and (3) an engineering analysis of the field drilling and laboratory data with an engineering report.

PROPOSED CONSTRUCTION

We understand the project will be located: see the attached sketch, and as described above. We understand or assume greater details about the development include:

- Buildings: Building 1 is planned to be a two-story, mixed use structure. The building is planned to have a footprint of about 27,000 square feet.
- Structure: Building 1 is planned to be a wood or steel framed structure with masonry exterior.
- Cut and fill: cut is assumed to be about 5 to feet with no fill according to preliminary grading plans.
- Foundations: shallow spread with assumed footing widths of 3-4 feet with concrete slab-on-grade.

The analysis and recommendations contained in this report are based upon the above-mentioned information regarding the proposed structures. If these assumptions are not correct, OWN, Inc. should be contacted to review the recommendations in light of the correct structural information.

WORK PERFORMED

ON-SITE BORINGS: The borings were generally drilled per our proposal referenced above. The borings were laid out in the field by our personnel based on the preliminary site plan and boring locations as provided by you. A sketch showing the general locations of the borings was prepared from this information and is included in the attachments as a boring location sketch.

If elevations are shown on the boring logs they are approximate elevations only taken from the topographic survey for the site and rounded to the nearest 0.5 to 1 foot based on field observations. Boring locations should be verified prior to the beginning of construction.

Representative soil and rock samples were taken of the different soil and rock encountered in the borings. These soil and rock samples were tested for moisture content, Atterberg Limits, penetrometer strength readings, and/or unconfined compressive strength readings.

The logs of borings drilled in this exploration program show descriptions of soil and rock units encountered, as well as results of field and laboratory tests presented in the attachments.

Soil samples obtained during drilling activities were taken using the split spoon sampler. This sampler is used while performing the standard penetration test. This test, described in ASTM D1586, consists of driving a two-inch diameter split spoon sampler using a weight of 140 pounds with a free fall of 30 inches. The number of blows to drive the sampler each of three successive 6-inch increments of depth in advance of drilling was recorded and is presented on the boring logs. The sum of the last two blow counts is normally taken as the penetration value expressed in blows per foot. The soil sample obtained from the sampler is considered disturbed, however, it is useful for strata identification, natural moisture content, Atterberg Limits, penetrometer strength values, and/or occasional unconfined compressive strength values.

For this project we used: CME-550X, with an automatic hammer - for purposes of our assessment of penetration resistance, we used approximately 80% efficiency, if required, in transferring energy for hammer blows per foot. This would allow us to compare to industry standard correlations developed for hammer blow resistance if required.

LABORATORY TESTING

All samples were transported to OWN's materials laboratory for further evaluation and testing. Laboratory soil testing included the determination of natural soil moisture content, Atterberg limit values, penetrometer strength readings, and permeability. Laboratory test results on soil samples recovered from the borings are recorded on the Boring Log contained in the attachments.

GEOLOGY OF THE SITE

A review of geologic maps of the area reveal the site is underlain by the Kansas City Group. Late Pennsylvanian - Missourian Series - This geologic formation consists primarily of shale and limestone with minor constituents of coal and sandstone.

SOIL MAPS

The County Soil Resource Survey (from our OWN online GIS) and the USDA Web Soil Survey were researched for the project and the soils onsite generally agree with the natural soils found during the investigation. See the attachments for soil information found.

SOIL
County Soil Resource Survey for the site is primarily mapped as:
Greeton silty clay loam, 5 to 9 percent slopes: 30080
Sampsel silty clay loam 5 to 9 percent slopes: 10117
Sharpsburg silt loam 2 to5 percent slopes: 10120

Parent Material, developed from:
Greeton: loess over residuum weathered from limestone and shale
Sampsel: residuum weathered from shale
Sharpsburg: loess

Restrictive features, bedrock:
Greeton: more than 80 inches
Sampse: more than 80 inches
Sharpsburg: more than 80 inches

Depth to water table:
Greeton: 12 to 30 inches
Sampse: 0 to 18 inches
Sharpsburg: 45 to 50 inches

Engineering properties for natural soils:
Greeton;
0 to 12 inches: silty clay loam
12 to 28 inches: silty clay loam, silty clay
28 to 30 inches: silty clay, silty clay loam
30 to 79 inches: clay, gravelly silty clay, silty clay

Sampse;
0 to 13 inches: silty clay loam
13 to 80 inches: silty clay loam, silty clay, clay
Sharpsburg;
0 to 6 inches: silt loam
6 to 16 inches: silty clay loam

16 to 46 inches: silty clay loam, silty clay
46 to 58 inches: silty clay loam, silty loam
58 to 79 inches: silt loam, silty clay loam

We drilled a nearby geotechnical project:
Project# 20KC10057: Highland Meadows, dated December, 2020.

In general we found:
Building Development Areas:

- Topsoil: dark brown topsoil damp to moist, medium firm to stiff, from 0 to 1 feet.
- Fill material: yellowish brown, lean to fat clay, CL-CH, with gray mottling damp to moist, stiff to very stiff, from 1 to 9.75-17 feet, Atterberg limits test showed LL= 45-61% with PI= 28-40%.
- 2nd deeper soil: yellowish brown shale, this was encountered in a weathered state, dense to very dense when fresh, from 5-15 feet to boring termination.
- 3rd deeper material: gray limestone fresh moderately strong moderately hard to hard, from 9.75-18.5 feet to boring termination.
- Groundwater was not encountered during drilling.

This past OWN project is generally similar to what the county soil survey reports.

VISUAL/ MAP AERIAL

The surface of the planned project area is generally:

- The site for The Village is approximately 40 acres, but is part of a much larger development. Building 1 is only one of the planned 14 structures to be built as part of The Village.
- At the time of drilling, the topsoil had been stripped and cuts were actively being completed in various locations of The Village. The pad site of Lot 1 had been cut approximately 5-7 feet prior to our arrival. Extensive grading activities were taking place during drilling operations.

QUAD MAP; AERIALS PHOTOS, GOOGLE STREET VIEW

A review of the Quadrangle Map and past aerial photos shows the site:

- Quadrangle maps show drainage to the northwest in the area of Lot 1. There is also a swale mapped to the west of Lot 1.
- According to historical aerials and quadrangle maps, this site was generally used for farming purposes from about the late 1950's to about 2018.
- It appears that hay was cut in several areas of the site in the past. Crops may have also been grown on site. Discing fields can increase the depth of softer soils.
- Significant changes in elevation were shown on topographic maps prior to the start of construction on the site.

GENERAL SUBSURFACE CONDITIONS

The subsurface conditions encountered at the boring locations are shown on the boring logs. The stratification lines shown on the boring log represent the approximate boundary lines between the soil layers; in-situ, the transition may be gradual. Characterizations of the soil layers on the boring log were made from observations of the auger cuttings and split spoon samples.Below is a **generalized** description of the conditions encountered in the borings. The reader must refer to the boring logs and other attachments included with this report; there is more specific information in the logs and those documents. This information has been **simplified** to make it easier for the reader to grasp similarities in the borings; it should not be construed that this represents conditions throughout the site as soil conditions were only observed at the locations sampled and the soil conditions will vary from below, not only laterally but vertically from what is below and in the boring logs:

In general, we found: (see logs for details)

Building Development Areas:

- Surface material: Yellowish brown and gray fat clay, CH, with reddish brown and black mottles, moist, stiff to very stiff, Residual surface soils were removed prior to drilling.
- 2nd deeper soil: Yellowish brown shaley fat clay, CH, damp, very stiff to hard from about 5 to 13 feet
- 3rd deeper soil: Yellowish brown and gray shale, damp, weathered to hard soil from 8.5-13 to 13-14 feet
- 4th deeper material: Limestone, extremely weathered, extremely weak, friable rock, over limestone bedrock. The limestone was generally encountered at depths between 13 and 15 feet and extended to the bottom of the borehole.
- Groundwater was not encountered during drilling.

Unified soil class was visually inspected during drilling activities and determined considering the Atterberg Limits and estimates of percent granular material present.

GROUNDWATER CONDITIONS

Groundwater was not encountered during drilling and should be planned for, especially in any deeper excavations, and in or near any drainage swales or near top of bedrock. It must be emphasized that the presence of perched groundwater in these soils can be encountered at any time and depth especially in fill soils, at the soil/rock interface, and near drainage swales. Rainfall and regional runoff will affect the groundwater conditions and the depths at which groundwater can be encountered will vary seasonally. As a result, the groundwater conditions encountered during construction may vary from those observed during this investigation.

The above is a generalized description of the conditions encountered in the borings. For more specific information, the reader should refer to the boring logs included in this report.

SUMMARY OF KEY SITE CONDITIONS AND CONCLUSIONS

A summary of the site and subsurface conditions considered pertinent to the site development and foundation design for the proposed facility are as follows:

1. Prior to construction, this site was generally used for farming purposes from about the late 1950's to about 2018 and situated on a broad hill.

2. Fat clays, CH, and shaley fat clays, CH, were encountered at potential footing depths and have a medium to high swelling or expansive potential.

3. Damp, weathered to hard shale was encountered in both borings at depths between 8.5 to 13 feet, with slaking properties. The shale has been classified as damp, hard, and friable in place. Upon disturbance, this material may lose its strength and become more unstable. Care should be taken to make sure this material stays dry.

4. Limestone was encountered in both borings between 13 and 15 feet.

Considering the above and information we know about this site, the following conclusions are of concern to us:

1. It appeared that earthwork operations were actively taking place over nearly the entire area of Lot 1. As such, any unstable soils related to the past swales and farming operations were not encountered. These soils were removed by the earthwork contractor, under the supervision of the materials testing firm.

2. No rock coring was conducted on the subject property. We suspect the limestone encountered in the bottom of the borings is massive bedrock beneath the overburden onsite. If foundations into rock become an option you must complete rock coring to establish bearing values and help identify the presence of voids, shelfs and pinnacles in the rock foundations are to be founded in.

3. Fat clay, CH, soil with medium to high swelling potential was encountered in the borings, and if encountered near slabs on grade, it should be removed according to the recommendations of the geotechnical engineer. Depending on final site grades, sufficient separation between slabs and fat clays, CH, may be present without requiring additional over excavation. During excavations for structures and over-excavations of footings, this fat clay, CH, soil should not be allowed to dry out during construction. Highly plastic soils that are allowed to dry out will shrink and swell considerably. This will affect and may damage the overlying structure. One should retain us to assist you with the earthwork and construction testing inspections.

4. Based on the slake testing, care should be taken not to expose the weathered shales to water during excavation and construction. If the shales are exposed to water in an excavation or trench, they will become unstable. These unstable materials will then be required to be removed from the foundation excavations.

Based on soil sampling and laboratory testing and assuming that the site development recommendations provided below are followed, we conclude that the proposed development could be constructed on the subject property with conventional earthwork methods and use of spread foundations for buildings **if ground stabilization improvements are completed in the area where buildings will be located.**

RECOMMENDATIONS

SITE DEVELOPMENT

1. All site grading and excavations should be carefully observed for any DISTURBED soils, UNDOCUMENTED UNSTABLE FILL material, buried structures and/or soft/medium firm, unstable soils. Unstable soils often also include moist, medium firm soils.

2. Fat clays (CH) and Lean to Fat clays (CL-CH) with a plasticity index of 30 or more may be encountered at elevations where concrete slabs and pavements are anticipated to bear. If encountered, these soils should be removed for a depth of 24 inches below basestone for concrete slabs on grade and 12 inches below basestone for concrete pavements and should be replaced per the site development recommendations of this report.

3. All pavement, topsoil/surface soil, any DISTURBED soils, any UNDOCUMENTED FILL soils, surface soil with grass and roots, any buried root balls, tree roots, buried topsoil, and loose/soft/medium firm, and/or unstable soils should be stripped and removed from the construction areas down to stiff/medium dense, undisturbed, stable soils.

4. Controlled, compacted soil structural fill or granular base stone should be installed to bring the area to the proposed subgrade elevations. These materials should be submitted to OWN for approval.

5. Provisions must be made during construction to remove any water entering the excavation.

6. The shallow clays encountered in the borings contain considerable silt content. These soils can become unstable and pump under construction loads depending on their moisture condition at the time of construction. If pumping and/or rutting occur during work on the site, activity should be halted until the affected area can be over-excavated to firm soil or stabilized. Stabilization can normally be accomplished with aeration and re-compaction, the use of ground stabilization fabric, a working mat of existing clean coarse crushed stone, or admixture incorporation. The need for these measures will depend on the location, the soil, moisture, and weather conditions at the time of earthwork and can best be evaluated at that time. Due to the variability of encountered soils and a limited number of borings performed, provisions should be made in the construction documents to provide for some over-excavation of these soils depending on the time of year that the construction is performed for site development, foundations, and pavements.

7. Site work required to obtain final subgrade elevations for the proposed development should be performed using the following criteria. This may not be completely practical due to the narrow area to work in. You should contact us if alternative recommendations are needed:

    a. After the removal of any topsoil, existing UNDOCUMENTED FILL, any debris, concrete, and any soft/medium firm and unstable soils and soils described in the Conclusions and paragraphs 1, 2, and 3 above, the subgrade should be proof rolled with a fully loaded tandem axle dump truck weighing at least 20 tons and examined by a representative of the Geotechnical Engineer prior beginning filling operation. Should soft, unstable or spongy areas be found in the subgrade at that point, they should be removed and replaced with controlled, compacted fill or shot rock.

        If soft, unstable, or spongy areas are found during proof rolling the geotechnical engineer of record should be retained to provide recommendations for repair.

    b. After proof rolling, and examined by a representative of the Geotechnical Engineer (OWN, Inc.), and approval, the upper 6 inches of exposed subgrade should be scarified, adjusted to -1 to +3 percent above optimum moisture, and compacted to at least 95 percent of maximum dry density as determined by Standard Proctor procedures as outlined in ASTM D698. This step is very important to minimize possible future softening and or swelling of subgrade soils.

    c. Compacted fill could consist of structural soil fill, of low to moderate plasticity silty clays. The inorganic silty clay soils should have liquid limits less than 55 and a plasticity index of less than 35; except, as discussed in the Summary, for upper 24 inches below basestone for concrete slabs on grade and 12 inches below basestone for concrete pavements, it should have a liquid limit than 45 and plasticity index less than 25 - this is LVC (Low Volume Change) material. For foundations, if exposed soil cannot be maintained in a moist condition, as verified by us, before concrete placement, then the upper 18 inches below the foundation should be LVC also.

        On a case by case basis, soil with up to 30% or more chert content not meeting the above plasticity requirements can be considered for use as structural fill and approval by us. (It will require gradation and Atterberg Limits testing as a minimum; swell tests may also be required plus submittal to OWN)

    d. Large size rock greater than 3 inches inhibits fill compaction and should be generally excluded from structural fill.

    e. Structural fill for the building pad should be placed in no greater than 8 inch loose lifts and compacted to at least 98 percent of maximum dry density as determined by Standard Proctor procedures as outlined in ASTM D698. The compacted structural fill placed for the building pad should extend a minimum of 10 ft. beyond the outside edge of the footings.

Structural fill for the parking and drive areas should be placed in no greater than 8 inch loose lifts and compacted to at least 98 percent of maximum dry density as determined by Standard Proctor procedures as outlined in ASTM D698.

A testing frequency of at least one field density for each 2500 square feet of fill lift, but no less than 3 tests per lift is recommended within building areas. In pavement areas, the testing frequency may be one field density for each 5000 square feet of fill lift, but no less than 3 tests per lift.

f. Moisture content of fill material should generally be controlled between 1% below and 3% above optimum as determined by ASTM D698.

g. Continuous field inspection and field density and moisture content tests should be performed on each lift of the fill to help ensure compliance with project specifications.

8. Because the surficial soils, without chert rock, on the site will become “spongy" under construction loads, they should be protected from either inundation or drying out. The entire area should be graded to provide adequate slopes and drainage systems to ensure movement of water around the site and away from the building and parking areas.

9. The soils at the site are silty in nature and susceptible to erosion. Appropriate erosion control measures, such as site contouring during grading operations and siltation fences, should be used to keep eroded material on the site.

10. All discharge from the guttering system of the proposed building and any off site discharges should not be allowed to soak into grassy areas by the building but should be carried away from the building areas. We recommend 5% slopes away from the building for the first 10 feet of grassed or landscaped areas.

11. Grading, ditches, and drains must be designed into the site plan to move surface water rapidly around and away from the building area.

12. Fall and spring seasons in this area normally receive considerable rainfall and can present difficult drying conditions when periods of rainy, overcast weather persist. The workability of the silty clay soils found on the site that is suitable for use in fill construction is greatly affected by their moisture content. Every effort should be made to seal fill areas and grade them to drain before rainfall occurs. Areas that become wet will require effort and time to disc and aerate the soils to get them back to a workable condition. Depending on the weather conditions, it may be necessary for these areas to be cut out and replaced with suitable soils or soil and shot-rock combinations.

13. Construction performed during summer months which is typically drier weather would reduce subgrade preparation difficulties and associated costs.

FOUNDATION DESIGN

Foundation design for the proposed structures must consider two factors. Foundations should be designed so that maximum possible stresses transmitted to foundation soils and rock will not exceed allowable bearing pressures as computed from reliable shear strength data on the soil and/or rock.

In addition, foundations should be sized and founded to limit the maximum anticipated total or differential movements to magnitudes which can be tolerated by the planned structural system. Construction factors such as the installation of foundation units, excavation and fill placement difficulties and surface and groundwater conditions must also be considered.

1. For buildings where footings are bearing entirely on properly compacted fill and or on moist, stiff residual clay, may use a maximum allowable soil bearing pressure of up to 2,500 psf assuming that the site is prepared as recommended in this report.

2. Footing excavations should be examined to verify bearing capacity before the soil is compacted and reinforcing steel is placed.

3. After the footing excavations are completed and inspected by a representative of the Geotechnical Engineer, the bottom of the footing excavation should be cleaned of all loose soil. After inspection and cleaning, the bottom of the footing excavation should be thoroughly compacted with a mechanical tamper prior to installing reinforcing steel.

4. The recommended bearing pressure listed above, based on following the recommendations made in this report, should provide a minimum factor of safety of approximately 3 against bearing capacity failure.

5. Minimum footing dimensions of 30 inches for spread footings and 18 inches for continuous footings should be used.

6. Exterior footings should be found a minimum of 36 inches or 3 feet below finished exterior grade to help ensure being below frost penetration.

7. All footing excavations should be flat or level and well cleaned of all loose, wet soil or rock prior to concreting.

8. We recommend the ultimate coefficient of sliding friction between concrete foundations and natural, stiff clay soils or properly compacted clay soils is 0.35. The ultimate passive pressure for depths lower than 3 feet is 250 pcf, equivalent fluid pressure. We recommend you neglect the passive pressure from shallower depths due to environmental effects.

9. Removal of groundwater accumulated in excavations should be required prior to placement of concrete.

10. Careful inspection of excavations should be performed during construction to detect any unanticipated conditions such as voids, soft zones of soil, debris, filled mine prospect hole excavations, structures or other conditions that could affect the

performance of the proposed structure foundation system. If such conditions are found, the project engineer should be notified before proceeding.

11. The strength and shrink-swell properties of the soil in the footing excavations will change if exposed to weather extremes. Every effort should be made to place concrete the same day as footing excavations. If protective measures are not taken on exposed footing excavations, additional excavation of disturbed soil may be required. Highly plastic, expansive clay that is allowed to dry, will often become stronger at that time, but the potential for excessive swell becomes more likely after the footing is placed.

EARTHWORK DURING INCLEMENT WEATHER

1. If wet conditions are encountered during the construction period, in addition to disking and aerating soils, or shot rock, chemical stabilization consisting of fly ash or a lime kiln dust such as Calciment could be used to stabilize the soil subgrade beneath the building pad and the parking areas.

2. Chemical stabilization should not take place if the ambient temperature is less than 45 degrees Fahrenheit.

EXCAVATIONS

1. Excavations into the soil overburden at the site should be able to be performed by conventional excavation techniques and heavy equipment available in this area although considerable effort and possible drilling and breaking may be required in hard or very dense layers of soil.

2. All excavation work should be carefully observed for soft, unstable soils and/or debris especially in any deep cut areas.

3. The contractor shall be responsible for designing the excavation slopes and/or temporary shoring and bracing. All trench excavations should meet the requirements specified in federal, state, and/or local safety regulations (e.g. the latest version of OSHA Health and Safety Standards for Excavations, 29 CFR Part 1926). The effects of surcharge loads should also be considered in the design.

4. Soil types A, B, and C, as classified by OSHA Standards, are present at the project site.

5. The contractor should perform periodic inspections of all excavations to check for stability. Tension cracking, sloughing of the soils, unusually soft soil zones, or the bulging of soil at the toe of the slope indicate stability problems that should be investigated and corrected immediately. The contractor shall be responsible for the training and safety of all individuals entering trenches and working by excavated slopes.

6. Groundwater was not encountered during drilling and/or at the completion of drilling. NRCS reports shallow water, which may be perched. Groundwater can be encountered at any time and depth especially in these soils. As a result, the groundwater conditions encountered during construction may vary from those observed during this investigation.

7. Deeper cuts may require excavated slopes to be benched. The maximum height of the cut at the up-slope ridge of the bench is 4 feet. The overall slope should still comply with OSHA requirements.

8. Any highly plastic, CH subgrades, if encountered, should be excavated and covered the same day and not be allowed to dry out. Highly plastic soils that are allowed to dry out will shrink and swell considerably. This will affect and may damage overlying structures built over it. In our experience in this area, the depth of foundations at frost depth levels are generally deep enough to keep moisture levels relatively uniform from environmental changes. However, there is risk with putting slabs and other structures over highly plastic, CH soils (discussed earlier and below).

PAVEMENT DESIGN

1. Parking lots should be designed per the requirements of Lee's Summit *Unified Development Ordinance (UCO), Section 8.620. - Parking Lot Design.* Minimum pavement sections for Parking Lot Paving are provided in this section. For asphalt pavement, minimum pavement sections also include a stabilized subgrade consisting of six inches of granular base over geogrid OR six inches of granular base over six inches of chemically stabilized soil.
2. If chemical stabilization is chosen, pavement subgrades should generally be prepared as outlined in the City of Lee's Summit Design and Construction Manual *Section 2200 - APPENDIX for CHEMICAL STABILIZATION OF SOIL using CEMENT or LIME KILN DUST* and the SITE DEVELOPMENT section of this report.
    a. For planning purposes, it is recommended that cement or lime kiln dust be applied at a rate of 10 percent by dry weight.
    b. A chemical stabilization design could be conducted to determine the minimum amount of chemical product needed to meet a specified strength requirement. This would require a sample of the desired chemical additive be provided for laboratory testing.
3. Just prior to paving, the pavement areas should be rough graded and then proof rolled with a loaded tandem axle dump truck. Subgrade areas that are disturbed and/or rutted during construction and backfilled trenches should be carefully observed during the proof rolling operations. Areas, where unstable or unsuitable conditions are found, should be cut out and replaced with controlled, compacted fill and re-proof rolled.
4. Minimum recommended pavement thicknesses per Section 8.620 are as follows:

Standard Duty Pavement:

Asphaltic Concrete: 1.5 Inches of Plant Mix Bituminous Surface Pavement

4.0 Inches of Plant Mix Bituminous Base Pavement
6.0 Inches of Crushed Limestone Base Rock
Geogrid or 6.0 inches of stabilized subgrade

Concrete: 6.0 inches of Concrete
4.0 inches of Crushed Limestone Base Rock

Heavy Duty Pavement:

Asphaltic Concrete: 1.5 Inches of Plant Mix Bituminous Surface Pavement
5.0 Inches of Plant Mix Bituminous Base Pavement
6.0 Inches of Crushed Limestone Base Rock
Geogrid or 6.0 inches of stabilized subgrade

Concrete: 6.0 inches of Concrete
4.0 inches of Crushed Limestone Base Rock

Heavy Duty Dumpster Pad Pavement:

Concrete: 7.0 Inches of Concrete
Concrete strength at 28 days should be a minimum of 4,000 psi.
7.0 Inches of Crushed Limestone Base Rock

The base rock sections above are based on the required Structural Number for the planned development traffic; they do not take into account the need for additional base rock thickness to facilitate construction. Additional base rock, especially for concrete sections, may need to be thicker to be able to support construction traffic prior to paving. Also, if specific traffic is known, these pavement sections should be checked. The minimums may need to be increased.

5. The Plant Mix Bituminous Pavement should meet the requirements of the Missouri Department of Transportation (MoDOT), Standard Specifications for Plant Mix Bituminous Pavement surface course (structural number coefficient = 0.42) as described in Section 401-Type BP-2. The Plant Mix Bituminous Base mix should meet the requirements of Section 401 Plant Mix Bituminous Base (structural number coefficient = 0.34). The base rock (structural number coefficient = 0.14) can be constructed of compacted crushed limestone meeting the requirements of Section 304 for Aggregate Base Course. The maximum compacted thickness of any one layer of base rock material shall not exceed 6 inches with each lift compacted to 100% of maximum dry density as determined by ASTM D698 (Standard Proctor). The compacted thickness of a single layer of Plant Mix Bituminous Base Course shall be between 3 and 4 1/4 inches (except when a thinner layer thickness is specified) with each layer compacted to 95% of 50 blow Marshall Density (ASTM D1559). The compacted thickness of a single layer of Plant Mix Bituminous Pavement shall not exceed 2 inches for the surface course with each layer compacted to 98% of a laboratory specimen made in the proportions of the job-mix formula in accordance with AASHTO T167 or 96% of a laboratory specimen made in proportions of the job-mix formula in accordance with AASHTO T245.

6. Concrete pavements should meet the requirements of Section 502 of the MODOT standard specifications for Portland Cement concrete pavements. Concrete strength at 28 days should be a minimum of 4,000 psi.

7. Truck pad areas, where heavy trucks travel and park such as loading dock areas and areas in front of trash dumpsters should be constructed of 7 inches of concrete over 7 inches of base rock. For trash dumpsters, the concrete pad should be extended far enough to include the front and rear axles when lifting trash dumpsters.

8. Care must be taken to develop positive drainage across and from around the pavement edges. Water allowed to pond on or adjacent to pavements would increase the potential for moisture intrusion into the subgrade soils and could result in premature pavement failure.

9. The pavement sections given above are minimums for the design criteria. Periodic maintenance of the pavement is anticipated in the designs. A maintenance program that includes surface sealing, joint cleaning and sealing, and timely repair of cracks and deteriorated areas will increase the pavement's life.

SEISMIC CONDITIONS

1. For IBC 2018 purposes, this site should be considered a Site Class “D”.

CONCRETE FLOOR SLAB SUBGRADE PREPARATION

1. The concrete floor slab and other concrete slabs should be underlain by a minimum of 6 inches of compacted granular base course material having a maximum aggregate size of 1 ½ inches and no more than 10% passing the #200 sieve. This granular layer should be compacted to at least 98% of maximum dry density and within 2% of optimum moisture content, as determined by a Standard Proctor test, ASTM D 698.

   The concrete slab stone subgrade should be smooth and free from irregularities in surface elevations, such as tire rutting, differences in surface elevations from passes of compaction equipment, and or use of open-graded stone without sand infilling or “choking” layer, etc. These surface elevation variations will provide areas for passive resistance to develop in the concrete during curing and restrained shrinkage cracks may occur.

2. Even after preparing the subgrade as detailed in the Site Development section of this report, it has been our experience that the concrete slab subgrades are often disturbed between completion of grading and slab construction due to weather, footing, and utility line installation, and other construction activities. For this reason, the subgrade should be evaluated by a geotechnical engineer just prior to installing

the reinforcing for the slab. Areas judged by the geotechnical engineer to be unacceptable should be undercut and replaced with compacted crushed stone.

3. Highly plastic soils, if encountered, should not be within 24 inches below basestone for concrete slabs on grade and 12 inches below basestone for concrete pavements. Depending on final floor elevations, this may require over-excavation of highly plastic clays. Soils used to bring the area to subgrade should meet the criteria of the Site Development section.

4. Backfill against stem walls inside buildings should be made with a crushed limestone conforming to ASTM C33, Size 57, or equal, to minimize settlement potential. The stone should be wetted and compacted until no further consolidation is observed.

5. A vapor barrier consisting of a minimum of 6 mil polyethylene on the 6 inches of crushed base rock should be used immediately below the concrete floor slab.

6. The modulus of subgrade reaction for controlled, compacted fill of these silty clay soils with the above recommended granular base, and site development performed as recommended in this report would be 150 psi/in.

LIMITATIONS

This report has been prepared for the exclusive use of our client for specific application to the project discussed in accordance with generally accepted soils engineering practices common to the local area. This report must be read in its entirety. No other warranty, express or implied, is made. Issues beneath the ground are a significant source of issues in construction projects where risk cannot always be removed, though it can be handled. This geotechnical investigation is provided to aid in handling these risks.

Geotechnical investigation reports are unique to the specific project for which they are written. Factors considered in the preparation of this geotechnical investigation report include, but are not limited to, specific project information, specific site information, the soils encountered in the borings, and the client's risk level. This report is specifically prepared for this project and any change in project or site information should be brought to our attention so that adjustments to recommendations can be made, if necessary. Also, this report should not be relied upon by anyone other than the client for which it is written without our prior approval.

The analyses and recommendations contained in this report are preliminary and are based on the data obtained from the referenced subsurface explorations. The borings indicate subsurface conditions only at the specific locations and time, and only to the depths penetrated. They do not necessarily reflect strata variations that may exist between such locations. Inferences are made between the conditions encountered in the borings and the validity of the recommendations is based in part on assumptions about the stratigraphy made by the geotechnical engineer. Such assumptions may be confirmed only during earthwork and foundation construction. If subsurface conditions different from those

described are noted during construction, recommendations in this report must be re-evaluated.

It is advised that OWN be retained to consult with design team members and to review portions of drawings that are applicable to this geotechnical investigation report to limit the possibility of recommendations in this report being misunderstood by other members of the design team. It is advised that OWN, Inc., be retained to observe foundation installation and earthwork construction in order to help confirm that our assumptions and preliminary recommendations are valid or to modify them accordingly. OWN, Inc., cannot assume responsibility or liability for the adequacy of recommendations if it does not observe construction.

The scope of this evaluation was limited to an evaluation of the load carrying capacity and stability of the subsoils. Oil, hazardous waste, radioactivity, irritants, pollutants, molds, or other dangerous substances and conditions in the soil, groundwater or surface water within or beyond the site studied were not the subject of this report. Their presence and/or absence are not implied or suggested by this report, and should not be inferred. Any statements in this report regarding odors, staining of soils, or other unusual conditions observed are strictly for the information of our client.

In the event that any changes in the nature, design, or location of the facilities are planned, the conclusions and recommendations contained in this report should not be considered valid unless the changes are reviewed and conclusions of this report modified or verified in writing by OWN, Inc. OWN, Inc., is not responsible for any claims, damages, or liability associated with the interpretation of subsurface data or reuse of the subsurface data or engineering analyses without the express written authorization of OWN, Inc. An especially potent method for handling risks related to underground concerns, especially those that stem from unforeseen factors, is to retain the engineer who authored the report for inspections, observations, and or additional investigations. Before a client seeks to use a geotechnical report, they should always ask the geotechnical engineer to determine if the geotechnical report is still reliable in light of present site conditions.

Appendix I

Site Location Sketch
Soil Boring Location
Current Aerial Photograph

Appendix II

Log Legend
Unified Soil Classification System
Boring Logs

Appendix IIA

Research
Photos, etc. (if available)
Site Checklist (if included)
Additional Information (if available)

OWN

Engineering beyond.™

Appendix I

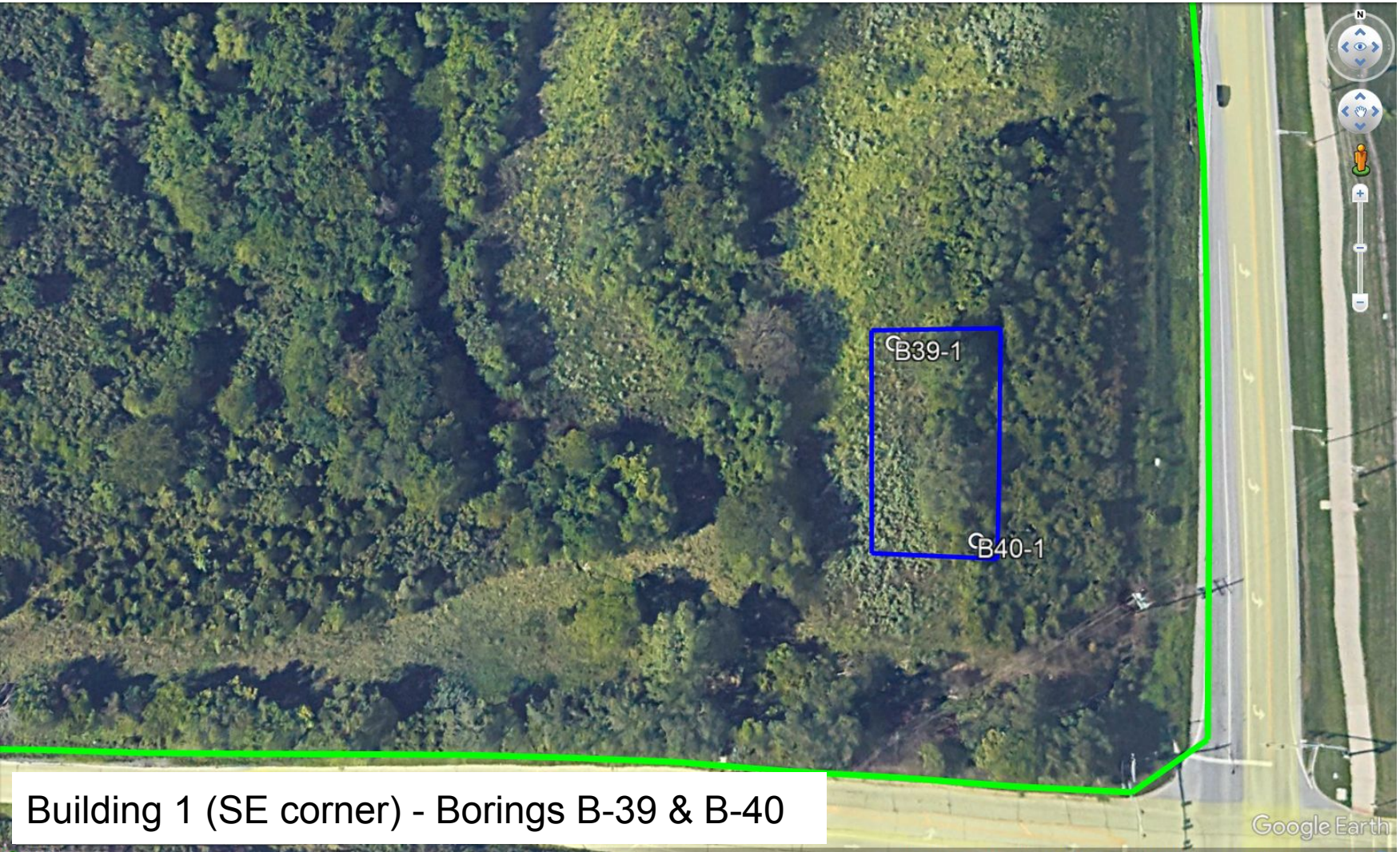
Figures

- **Site Location Sketch**
- **Soil Boring Location**

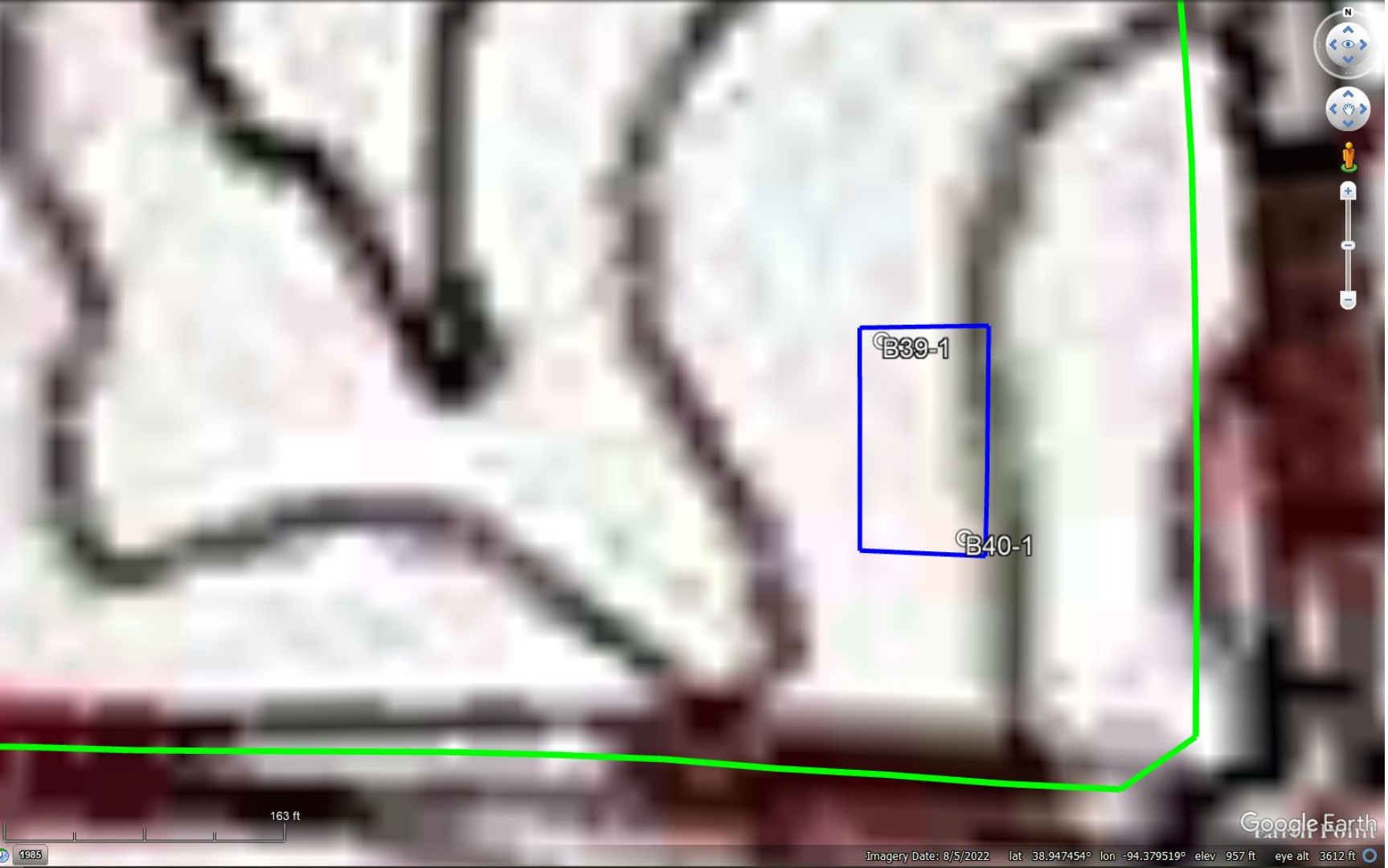
OWN

Engineering beyond.™


4/2024
1985
2023
NE Douglas St
B39-1
B40-1
Image © 2024 Airbus
597 ft
The Gardens at Unity Village
Google Earth
Imagery Date: 5/1/2023 lat 38.951488° lon -94.383520° elev 928 ft eye alt 5366 ft



Building 1 (SE corner) - Borings B-39 & B-40


B39-1
B40-1
163 ft
1985
Imagery Date: 8/5/2022 lat 38.947454° lon -94.379519° elev 957 ft eye alt 3612 ft
Google Earth

Appendix II

Borings

- Log Legend
- Unified Soil Classification System
- Boring Logs

OWN

Engineering beyond.™

BORING LOG LEGEND

DRILLING & SAMPLING SYMBOLS

OWN, Inc.
3213 S. West Bypass
Springfield, MO 65807
417-866-2741

LITHOLOGIC SYMBOLS
(Unified Soil Classification System)

		FILL
		UNSTABLE SOIL
	CL	LOW PLASTICITY CLAY
	CH	HIGH PLASTICITY CLAY
	ML	LOW PLASTICITY SILT
	MH	HIGH PLASTICITY SILT
	SW	WELL GRADED SAND
	SP	POORLY GRADED SAND
	SM	SILTY SAND
	SC	CLAYEY SAND
	GW	WELL GRADED GRAVEL
	GP	POORLY GRADED GRAVEL
	GM	SILTY GRAVEL
	GC	CLAYEY GRAVEL

DRILLING

- HOLLOW STEM AUGER (HSA)
- SOLID STEM / POWER AUGER (SA / PA)
- ROCK BIT (RB)
- ROCK CORE (RC)

SAMPLING

- SPLIT SPOON (SS)
- SHELBY TUBE (ST)
- AUGER
- GRAB/BULK (GS/BS)
- ROCK CORE (RC)

WELLS

- SAND PACK
- W/SLOTTED CASING
- CONC-GROUT/FILL
- BENT-GROUT/SEAL
- CEMENT/BENT GROUT

AUGERS: Hollow Stem (HSA), Solid Stem (SSA), ROCK BIT: RB,
HAND AUGER: HA
ROCK CORE: with Diamond Bit (DB),
SPLIT SPOON: 2" O.D., SHELBY TUBE: 3" O.D.

___ LBS or ____ PSI next to DRILLING METHOD OR SHELBY TUBE SAMPLER is down pressure to advance or sample at depth shown.

GENERAL NOTES

1. Classifications are based on the United Soil Classification System and ASTM D-2487 and D-2488. They include consistency, moisture, and color. field descriptions have been modified to reflect results of laboratory tests where deemed appropriate.

Fine grained soils have less than 50% of their dry weight retained on a #200 sieve; they are described as: clays, if they are plastic, and silts if they are slightly plastic or non-plastic. Coarse grained soils have more than 50% of their dry weight retained on a #200 sieve; they are described as: sand, gravel, cobbles, or boulders. Other descriptions include: color, moisture, consistency for clays and silts, and relative density for granular soils. Geologic description of bedrock if encountered is also shown.

2. Surface elevations and horizontal locations, for borings, test pits, mapped data, GIS information, if provided, should be considered approximate or estimated. They are provided to illustrate the relative location of a sample location to other sample locations. Their accuracy for survey grade location should not be relied upon, unless they have been surveyed and specifically noted.

3. Descriptions on these boring logs apply only at the specific boring locations and at the time the borings were made. They are not guaranteed to be representative of subsurface conditions at other locations or times. Graphic descriptions are for illustrative purposes only. Authorized users must read the boring log, legend, and report.

ABBREVIATIONS

N	- BLOWS PER FOOT
LL	- LIQUID LIMIT (%)
PL	- PLASTIC LIMIT (%)
PI	- PLASTIC INDEX (%)
LI	- LIQUIDITY INDEX (%)
W	- MOISTURE CONTENT (%)
DD/WD	- DRY/WET DENSITY (PCF)
NP	- NON PLASTIC
-200	- % PASSING # 200 SIEVE
PP	- POCKET PENETROMETER (TSF)
	">" is greater than; "<" is less than
UC	- UNCONFINED COMPRESSION
PID	- PHOTOIONIZATION DETECTOR
ppm	- PARTS PER MILLION

▽ Water Level at Time Drilling, or as Shown

▼ Water Level After Drilling, or as Shown

⧩ Water Level After 24 Hours, or as Shown

Water levels indicated on the Boring Logs are the levels measured in the borings at the time indicated. In pervious soils, the indicated levels may reflect the location of groundwater. In low permeability soils, the accurate determination of groundwater levels is not possible with short term observations.

OWN, Inc.
3213 S. West Bypass
Springfield, MO 65807
Telephone: 417-866-2741
Fax: 417-866-2778

Key to Soil Symbols and Terms

TERMS DESCRIBING CONSISTENCY OR CONDITION

COARSE-GRAINED SOILS: Sands and Gravels

Descriptive Terms	Relative Density	SPT Blow Count
Very loose	0 to 15 %	< 4
Loose	15 to 35 %	4 to 10
Medium dense	35 to 65 %	10 to 30
Dense	65 to 85 %	30 to 50
Very dense	85 to 100 %	> 50

FINE-GRAINED SOILS: Silts and Clays

Descriptive Terms	Unconfined Compressive Strength tsf	SPT Blow Count
Very soft	< 0.25	< 2
Soft	0.25 to 0.5	2 to 4
Medium firm	0.5 to 1.0	4 to 8
Stiff	1.0 to 2.0	8 to 15
Very stiff	2.0 to 4.0	15 to 30
Hard	> 4.0	> 30

SPT: Standard Penetration Test: Number of blows of 140 LB hammer falling 30 inches to drive a 2 inch O.D. (1-3/8 inch I.D.) Split-spoon sample (SS) the last 12 inches of an 18-inch drive (ASTM-1586).

COMPOSITION:

Sands and Gravels

Descriptive Terms	% FINES by Dry Weight
Trace	0 to 5 %
With	5 to 15%
Clayey, Silty	> 15%

Silts and Clays

Descriptive Terms	% COARSE by Dry Weight
Trace	0 to 15 %
With	15 to 30%
Sandy, Gravelly	> 30%

PLASTICITY

Descriptive Terms	Liquid Limit
Lean	< 50%
Fat	> 50%

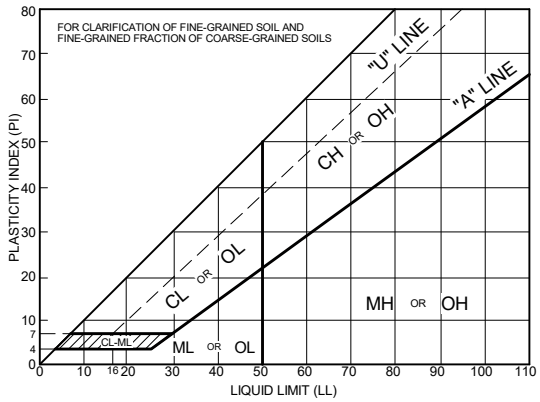
Descriptive Terms	Plasticity Index
Non-plastic	0
Very Low	1 to 10%
Low	11 to 20%
Medium	21 to 30%
High	31 to 40%
Very High	> 40%

Major Divisions			Group Symbols	Typical Names	Laboratory Classification Criteria
Coarse-Grained soils (More than half the material is larger than No. 200 sieve size)	Gravels (More than half of coarse fraction is larger than No. 4 sieve size)	Clean gravel (Little or no fines)	GW	Well-graded gravels, gravel-sand mixtures, little or no fines	Determine percentages of sand and gravel from grain size curve, Depending on percentage of fines (fraction smaller than No. 200 sieve) coarse-grained soils are classified as follows: Less than 5 percent..... GW, GP, SW, SP; More than 12 percent..... GM, GC, SM, SC; 6 to 12 percent..... Borderline cases requiring dual symbols**
			GP	Poorly-graded gravels, gravel-sand mixtures, little or no fines	
		Gravel with fines (Appreciable amount of fines)	GM* d / u	Silty gravels, gravel-sand-silt mixtures	
			GC	Clayey gravels, gravel-sand-silt mixtures	
	Sands (More than half of coarse fraction is smaller than No. 4 sieve size)	Clean sands (Little or no fines)	SW	Well-graded sands, gravelly sands, little or no fines	
			SP	Poorly-graded sands, gravelly sands, little or no fines	
		Sands with fines (Appreciable amount of fines)	SM* d / u	Silty sands, sand-silt mixtures	
			SC	Clayey sands, sand-clay mixtures	
Fine-Grained soils (More than half the material is smaller than No. 200 sieve size)	Silts and Clays (Liquid limit less than 50)		ML	Inorganic silts and very fine sands, rock floor, 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 disto-maceous fine sandy or silty soils, organic silts	
			CH	Inorganic clays of high plasticity, fat clays	
			OH	Organic clays of medium to high plasticity, organic silts	
	Highly Organic Soils		Pt	Peat and other highly organic soils	

Laboratory Classification Criteria:

- $C_U = \frac{D_{60}}{D_{10}}$ greater than 4; $C_C = \frac{(D_{30})^2}{D_{10} \times D_{60}}$ between 1 and 3
- Not meeting all gradation requirements for GW
- Atterberg limits below "A" line or P.I. less than 4
- Atterberg limits above "A" line or P.I. greater than 7
- Above "A" line with P.I. between 4 and 7 are borderline cases requiring use of dual symbols
- $C_U = \frac{D_{60}}{D_{10}}$ greater than 6; $C_C = \frac{(D_{30})^2}{D_{10} \times D_{60}}$ between 1 and 3
- Not meeting all gradation requirements for SW
- Atterberg limits below "A" line or P.I. less than 4
- Atterberg limits above "A" line or P.I. greater than 7
- Above "A" line with P.I. between 4 and 7 are borderline cases requiring use of dual symbols

Particle Size		
Material	Sieve sizes	mm
Sand: Coarse	#10 to #4	2.00 to 4.76
Medium	#40 to #10	0.42 to 2.00
Fine	#200 to #40	0.074 to 0.42
Silt	< # 200 (do hydrometer)	0.002 to 0.074
Clay	-	< 0.002 (< 0.005 for USDA)



Plasticity Chart

Particle Size		
Material	Sieve	mm
Gravel	#4 to 3/4 in.	4.76 to 19.1
Fine	3/4 in. to 3 in.	19.1 to 76.2
Coarse	3 in. to 12 in.	76.2 to 304.8
Cobble	12 in. to 36 in.	304.8 to 914.4
Boulders		

* Division of GM and SM groups into subdivisions of d and u are for roads and airfields only. Subdivision is based on Atterberg Limits: suffix d used when L.L. is 23 or less and the P.I. is 6 or less; the suffix is used when L.L. is greater than 26.

** Borderline classifications used for soils possessing characteristics of two groups are designated by combinations of groups symbols. For example; GW-GC, well-graded gravel-sand mixture with clay binder.

OWN, Inc.
3213 S. West Bypass
Springfield, MO 65807
Telephone: 417-866-2741
Fax: 417-866-2778

Key to Rock Symbols and Terms


LIMESTONE


CHERTY LIMESTONE


DOLOMITE


OOLITIC LIMESTONE


SHALE


CHERTY DOLOMITE


SILTSTONE


SANDSTONE


BROKEN ROCK


CHERT


WEATHERED ROCK


VOID


HIGHLY WEATH. ROCK


COAL

ROCK QUALITY DESIGNATION (RQD)
Description of Rock Quality

Descriptive Terms	% RQD
Very Poor	0 to 25 %
Poor	25 to 50%
Fair	50 to 75%
Good	75 to 90%
Excellent	90 to 100%

RQD is defined as the total length of sound core pieces 4 inches of greater in length, expressed as a % of the total length cored. RQD provides an indication of the integrity of the rock mass and relative extent of seams and bedding planes.

TERMS DESCRIBING WEATHERING, STRENGTH, OR HARDNESS

WEATHERING:

Descriptive Terms	Recognition
Extremely Weathered -	Material can be granulated by hand.
Highly Weathered -	More than half of the rock is decomposed; rock is weakened so that a 2 inch diameter sample can be broken readily by hand across rock fabric.
Moderately Weathered -	Rock is discolored, a minimum 2 inch diameter sample cannot be broken readily by hand across rock fabric.
Slightly Weathered -	Rock is slightly discolored, but not noticeably lower in strength than fresh rock.
Fresh -	Rock shows no discoloration, loss of strength, or other affect of weathering.

STRENGTH:

	Recognition
Extremely Weak Rock -	Can be indented by thumb nail. May be broken by hand readily.
Very Weak Rock -	Can be peeled by pocket knife. Crumbles under firm blow with end of a rock hammer. May be broken by hand with difficulty.
Weak Rock -	Can be peeled by with difficulty with pocket knife.
Moderately Strong Rock -	Can be indented 5 mm (0.2 inches) with sharp end of pick.
Strong Rock -	Requires one hammer blow to fracture.
Very Strong Rock -	Requires many hammer blows to fracture.
Extremely Strong Rock -	Can only be chipped with hammer blows.

SCRATCH HARDNESS:

Descriptive Terms	Recognition
Soft -	Applicable only to plastic materials.
Friable -	Easily crumbled by hand, pulverized, or reduced to powder; to soft to be cut by pocket knife.
Low Hardness -	Can be gouged deeply or carved with a pocket knife.
Moderately Hard -	Can be readily scratched by knife blade; scratch leaves heavy trace of dust and is readily visible after powder has been blown away.
Hard -	Can be scratched with pocket knife only with difficulty; scratch produces little powder; traces of knife steel may be visible.
* Very Hard -	Cannot be scratch with pocket knife; knife steel marks are left on surface.

**

OWN, Inc.
3213 S. West Bypass
Springfield, MO 65807
Telephone: 417-866-2741
Fax: 417-866-2778

BORING NUMBER B-39-1

CLIENT INTRINSIC DEVELOPMENT
PROJECT NAME THE VILLAGE AT DISCOVERY PARK
PROJECT NUMBER 24SP30033
PROJECT LOCATION LEE'S SUMMIT, MO
DATE STARTED 3/6/24 **COMPLETED** 3/6/24
GROUND ELEVATION 962.56 ft **HOLE SIZE** 4 inches
DRILLING CONTRACTOR OWN ATV-17
GROUND WATER LEVELS:
DRILLING METHOD Solid Stem Auger 4"
AT TIME OF DRILLING --- NO WATER
LOGGED BY JS-CH **CHECKED BY** GW
AT END OF DRILLING --- NO WATER
NOTES LOT 1
AFTER DRILLING ---

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	Depth	DRILLING METHOD	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	Unconfined Qu, (tsf)	MOISTURE CONTENT (%)	ATTERBERG LIMITS LIQUID LIMIT	ATTERBERG LIMITS PLASTIC LIMIT	ATTERBERG LIMITS PI / LI
0		YELLOWISH BROWN FAT CLAY WITH REDDISH BROWN AND BLACK MOTTLES, MOIST, STIFF	0		SS		3-3-6 (9)	3		20.5			
1			1										
2		MOIST, VERY STIFF	2		SS		8-10-13 (23)	4		19.7			
3			3										
4		GRAY & YELLOWISH BROWN FAT CLAY, DAMP TO MOIST, VERY STIFF	4		SS		3-5-7 (12)	3.25	3.18	26.5	59	25	34 0.05
5			5										
6			6		SS		7-10-14 (24)	> 4.5		19.8			
7			7										
8			8										
9		YELLOWISH BROWN & GRAY SHALE, DAMP, WEATHERED TO HARD SOIL	9		SS		7-12-19 (31)	> 4.5		19.5			
10			10										
11			11	1000									
12			12										
13		LIMESTONE, DRILLED WITH 1000 PSI PULL DOWN PRESSURE	13		SS		50/1"			23.6			
14			14										

Bottom of borehole at 14.5 feet.

OWN, Inc.
3213 S. West Bypass
Springfield, MO 65807
Telephone: 417-866-2741
Fax: 417-866-2778

BORING NUMBER B-40-1

CLIENT INTRINSIC DEVELOPMENT
PROJECT NAME THE VILLAGE AT DISCOVERY PARK
PROJECT NUMBER 24SP30033
PROJECT LOCATION LEE'S SUMMIT, MO
DATE STARTED 3/6/24 **COMPLETED** 3/6/24
GROUND ELEVATION 964.8 ft **HOLE SIZE** 4 inches
DRILLING CONTRACTOR OWN ATV-17
GROUND WATER LEVELS:
DRILLING METHOD Solid Stem Auger 4"
AT TIME OF DRILLING --- NO WATER
LOGGED BY JS-CH **CHECKED BY** GW
AT END OF DRILLING --- NO WATER
NOTES LOT 1
AFTER DRILLING ---

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	Depth	DRILLING METHOD	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	Unconfined Qu, (tsf)	MOISTURE CONTENT (%)	ATTERBERG LIMITS: LIQUID LIMIT	PLASTIC LIMIT	PI / LI
0		YELLOWISH BROWN FAT CLAY WITH GRAY, DARK RED, AND BLACK MOTTLES, MOIST, STIFF	0		SS		3-4-5 (9)	3.5		24.3			
1			1										
2		MOIST, VERY STIFF	2		SS		5-7-9 (16)	3.5		26.0			
3			3										
4			4		SS		4-6-11 (17)	4		37.5			
5		YELLOWISH BROWN SHALEY FAT CLAY, DAMP, VERY STIFF	5		SS		7-12-12 (24)	4		22.8			
6			6										
7		DAMP, VERY STIFF	7										
8			8										
9		DAMP, HARD	9		SS		9-14-22 (36)	4.5		20.6			
10			10										
11			11										
12			12										
13		GRAY SHALE, DAMP, WEATHERED TO HARD SOIL	13										
14			14	1000	SS		27-40-50/4"	4.5		14.4			
15		EXTREMELY WEATHERED, EXTREMELY WEAK ROCK, FRIABLE	15										
16		LIMESTONE, SLIGHTLY WEATHERED TO FRESH, MODERATELY STRONG ROCK, MODERATELY HARD, DRILLED WITH 1000 PSI PULL DOWN PRESSURE	16										

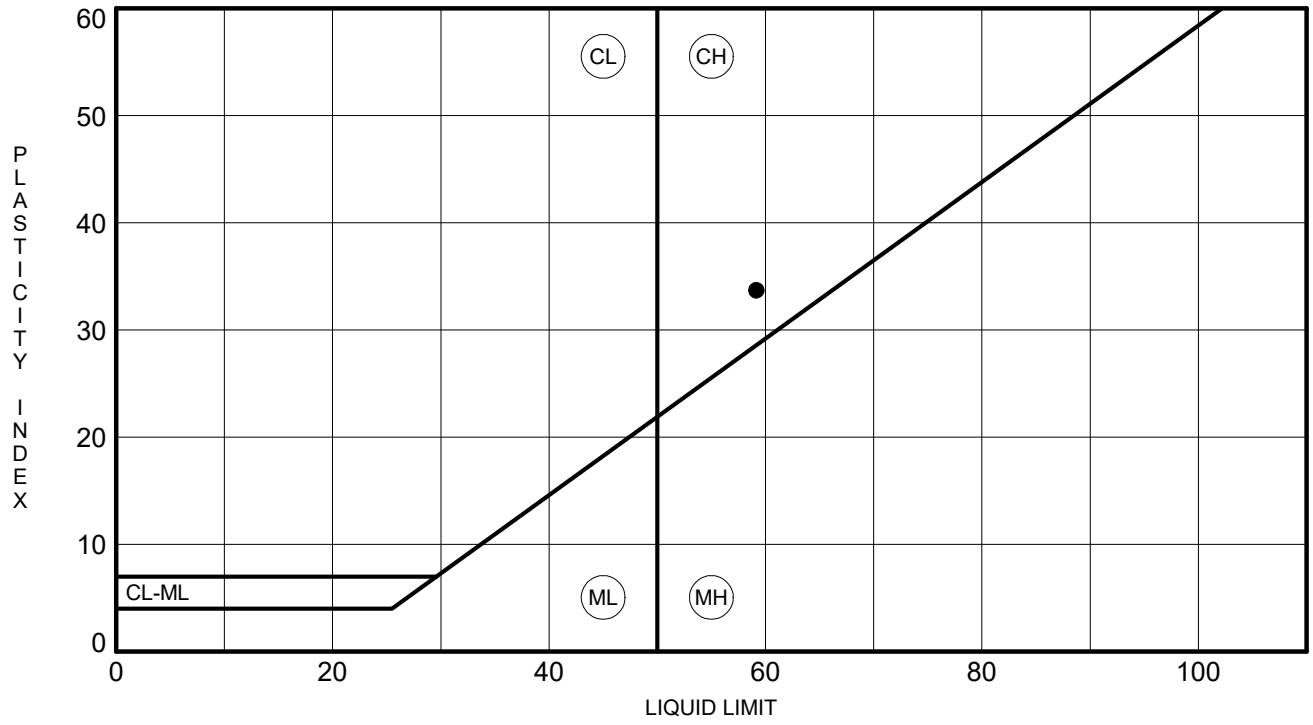
Bottom of borehole at 16.0 feet.

OWN, Inc.
3213 S. West Bypass
Springfield, MO 65807
Telephone: 417-866-2741
Fax: 417-866-2778

ATTERBERG LIMITS' RESULTS

CLIENT INTRINSIC DEVELOPMENT **PROJECT NAME** THE VILLAGE AT DISCOVERY PARK REMAINING LOTS

PROJECT NUMBER 24SP30033 **PROJECT LOCATION** LEE'S SUMMIT, MO



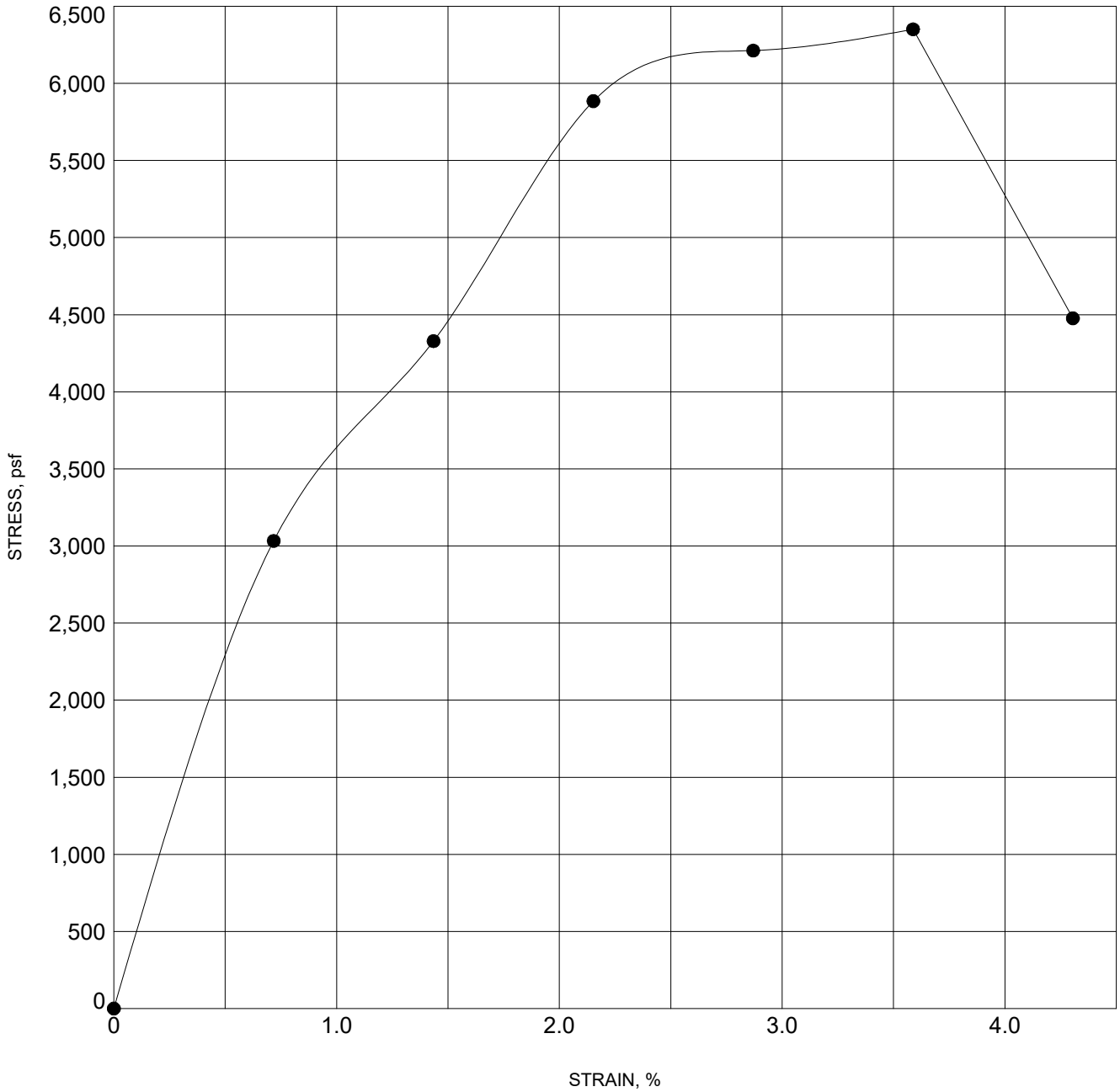
	BOREHOLE	DEPTH	LL	PL	PI	Fines	Classification
●	**B-39-1**	**3.5**	**59**	**25**	**34**		

OWN, Inc.
3213 S. West Bypass
Springfield, MO 65807
Telephone: 417-866-2741
Fax: 417-866-2778

UNCONFINED COMPRESSION TEST

CLIENT INTRINSIC DEVELOPMENT **PROJECT NAME** THE VILLAGE AT DISCOVERY PARK REMAINING LOTS

PROJECT NUMBER 24SP30033 **PROJECT LOCATION** LEE'S SUMMIT, MO



BOREHOLE	DEPTH	Classification	γ_d	MC%	γ_w	Qu (tsf)	% Strain
● **B-39-1**	**3.5**		**95.7**	**26.5**	**121.1**	**3.18**	**3.59**

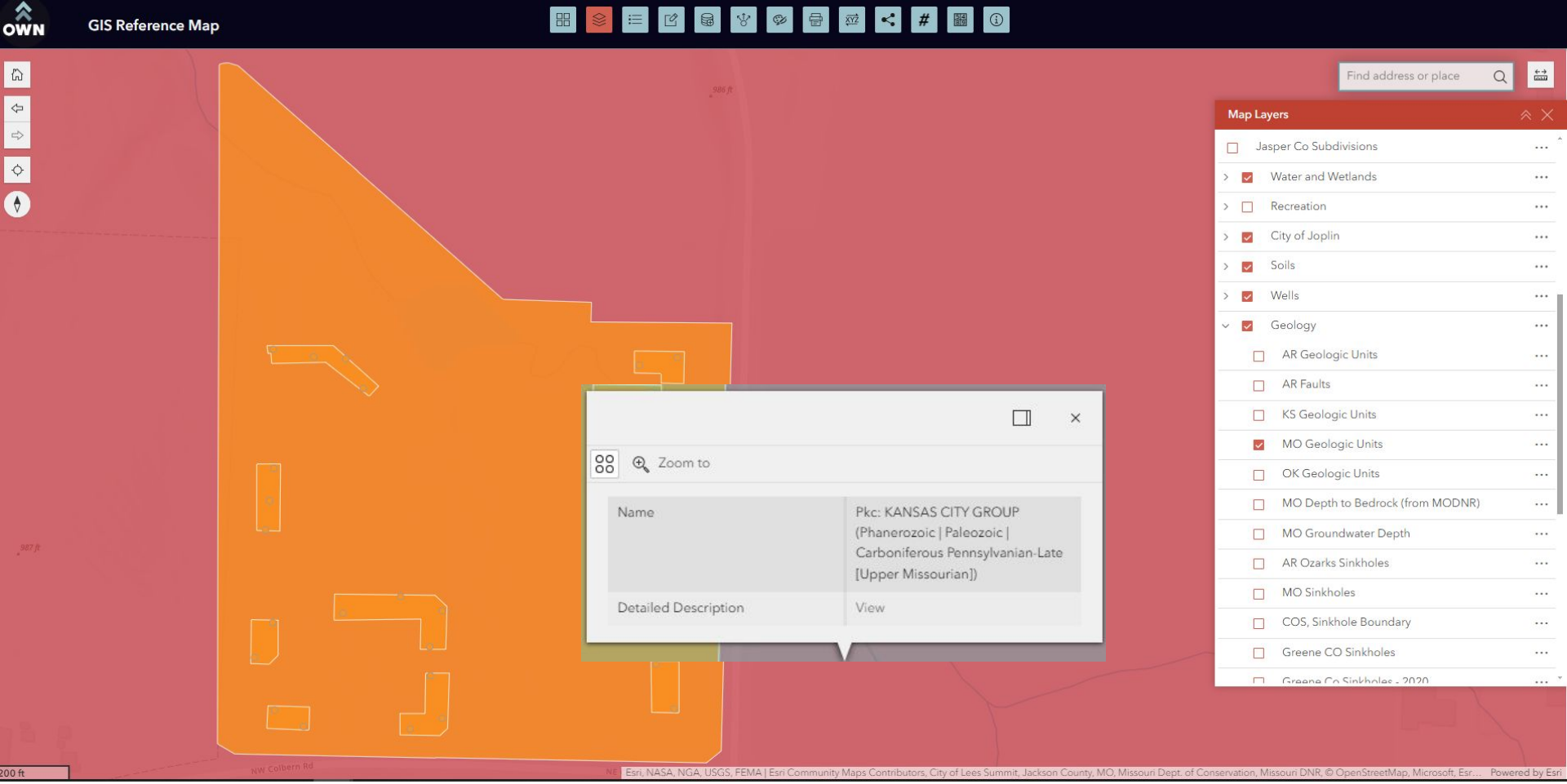
UNCONFINED WITH WET DENSITY - AE CONCRETE.GDT - 3/13/24 11:18 - H:\SHARED DRIVES\03A_GINT\GINT_SP3\PROJECTS\24SP30033 INTRINSIC DEVELOPMENT, THE VILLAGE OF DISCOVERY PARK, REMAINING LOTS, LEE'S SUMMIT, MO.GPJ

Appendix IIa

Research

OWN

Engineering beyond.™


GIS Reference Map
Find address or place
Map Layers
Jasper Co Subdivisions
Water and Wetlands
Recreation
City of Joplin
Soils
Wells
Geology
AR Geologic Units
AR Faults
KS Geologic Units
MO Geologic Units
OK Geologic Units
MO Depth to Bedrock (from MODNR)
MO Groundwater Depth
AR Ozarks Sinkholes
MO Sinkholes
COS, Sinkhole Boundary
Greene CO Sinkholes
Zoom to
Name
Pkc: KANSAS CITY GROUP (Phanerozoic | Paleozoic | Carboniferous Pennsylvanian-Late [Upper Missourian])
Detailed Description
View
200 ft
Esri, NASA, NGA, USGS, FEMA | Esri Community Maps Contributors, City of Lees Summit, Jackson County, MO, Missouri Dept. of Conservation, Missouri DNR, © OpenStreetMap, Microsoft, Esr...
Powered by Esri

XML | JSON | Shapefile

Kansas City Group

Cyclic deposits, limestone and shale with minor sandstone and coal.

State	Missouri
Name	Kansas City Group
Geologic age	Late Pennsylvanian-Upper Series-Missourian Stage
Lithologic constituents	Major Sedimentary > Clastic > Mudstone > Shale *(Bed)* Sedimentary > Carbonate > Limestone *(Bed)* Minor Sedimentary > Coal *(Bed)* Sedimentary > Clastic > Sandstone *(Bed)*
Stratigraphic units	Kansas City Group- (160ft. Max) includes Bronson Subgroup- Hertha FM, Ladore FM, Swope FM, Galesburg FM, Dennis FM. Linn Subgroup- Cherryvale FM, Drum FM, Chanute FM, Iola FM.(includes Raytown Limestone Member), Zarah Subgroup- Lane FM, Wyandotte FM(includes Argentine Limestone Member), Bonner Springs FM.

Search

Map Unit Legend

Legend

Soil Map

Scale (not to scale)

Jackson County, Missouri (MO095)

Jackson County, Missouri (MO095)

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
10117	Sampsel silty clay loam, 5 to 9 percent slopes	2.6	7.2%
10120	Sharpsburg silt loam, 2 to 5 percent slopes	1.4	3.8%
10128	Sharpsburg-Urban land complex, 2 to 5 percent slopes	0.9	2.5%
30080	Greenton silty clay loam, 5 to 9 percent slopes	31.0	86.3%
40108	Snead-Rock outcrop complex, warm, 14 to 30 percent slopes	0.1	0.2%
Totals for Area of Interest		**36.0**	**100.0%**

Report — Map Unit Description

Jackson County, Missouri

10117—Sampsel silty clay loam, 5 to 9 percent slopes

Map Unit Setting

National map unit symbol: 2qkzz
Elevation: 600 to 1,120 feet
Mean annual precipitation: 33 to 41 inches
Mean annual air temperature: 50 to 57 degrees F
Frost-free period: 177 to 220 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

Sampsel and similar soils: 85 percent
Minor components: 15 percent

Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Sampsel

Setting

Landform: Hillslopes
Landform position (two-dimensional): Shoulder
Landform position (three-dimensional): Side slope
Down-slope shape: Concave
Across-slope shape: Convex, concave
Parent material: Residuum weathered from shale

Typical profile

Ap - 0 to 13 inches: silty clay loam
Bt - 13 to 80 inches: silty clay

Properties and qualities

Slope: 5 to 9 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Somewhat poorly drained
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: About 0 to 18 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water supply, 0 to 60 inches: Moderate (about 8.6 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3e
Hydrologic Soil Group: C/D
Ecological site: R109XY010MO - Interbedded Sedimentary Upland Savanna
Other vegetative classification: Grass/Prairie (Herbaceous Vegetation)
Hydric soil rating: No

Report — Map Unit Description

Jackson County, Missouri

10120—Sharpsburg silt loam, 2 to 5 percent slopes

Map Unit Setting

National map unit symbol: 2yy7v
Elevation: 1,000 to 1,300 feet
Mean annual precipitation: 33 to 41 inches
Mean annual air temperature: 50 to 55 degrees F
Frost-free period: 177 to 220 days
Farmland classification: All areas are prime farmland

Map Unit Composition

Sharpsburg and similar soils: 90 percent
Minor components: 10 percent

Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Sharpsburg

Setting

Landform: Hillslopes
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Interfluve
Down-slope shape: Convex
Across-slope shape: Linear
Parent material: Loess

Typical profile

Ap - 0 to 6 inches: silt loam
A - 6 to 16 inches: silty clay loam
Bt1 - 16 to 22 inches: silty clay loam
Bt2 - 22 to 46 inches: silty clay loam
BC - 46 to 58 inches: silty clay loam
C - 58 to 79 inches: silty clay loam

Properties and qualities

Slope: 2 to 5 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Moderately well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately high (0.00 to 0.20 in/hr)
Depth to water table: About 45 to 50 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water supply, 0 to 60 inches: Moderate (about 7.7 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3s
Hydrologic Soil Group: C
Ecological site: R109XY002MO - Loess Upland Prairie
Hydric soil rating: No

Report — Map Unit Description

Jackson County, Missouri

30080—Greenton silty clay loam, 5 to 9 percent slopes

Map Unit Setting

National map unit symbol: 2xjd9
Elevation: 640 to 1,120 feet
Mean annual precipitation: 35 to 41 inches
Mean annual air temperature: 50 to 57 degrees F
Frost-free period: 177 to 209 days
Farmland classification: Not prime farmland

Map Unit Composition

Greenton and similar soils: 90 percent
Minor components: 10 percent

Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Greenton

Setting

Landform: Hillslopes
Landform position (two-dimensional): Shoulder
Landform position (three-dimensional): Interfluve
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Loess over residuum weathered from limestone and shale

Typical profile

Ap - 0 to 12 inches: silty clay loam
Bt - 12 to 28 inches: silty clay
2Bt - 28 to 30 inches: silty clay
2C - 30 to 79 inches: silty clay

Properties and qualities

Slope: 5 to 9 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Somewhat poorly drained
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: About 12 to 30 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 10 percent
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water supply, 0 to 60 inches: High (about 9.6 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3e
Hydrologic Soil Group: C/D
Ecological site: R109XY002MO - Loess Upland Prairie
Hydric soil rating: No

Report — Chemical Soil Properties

Jackson County, Missouri

Map symbol and soil name	Depth	Cation-exchange capacity	Effective cation-exchange capacity	Soil reaction	Calcium carbonate	Gypsum	Salinity	Sodium adsorption ratio
	In	*meq/100g*	*meq/100g*	*pH*	*Pct*	*Pct*	*mmhos/cm*	
10117—Sampsel silty clay loam, 5 to 9 percent slopes								
Sampsel	0-13	26-36	—	5.6-7.3	0	0	0.0-2.0	0
	13-80	18-36	—	5.6-7.8	0	0	0.0-2.0	0
10120—Sharpsburg silt loam, 2 to 5 percent slopes								
Sharpsburg	0-6	21-23	—	5.6-7.3	0	0	0.0-2.0	0
	6-16	22-27	—	5.6-7.3	0	0	0.0-2.0	0
	16-22	27-32	—	5.1-6.5	0	0	0.0-2.0	0
	22-46	27-33	—	5.6-6.5	0	0	0.0-2.0	0
	46-58	19-27	—	5.6-7.3	0	0	0.0-2.0	0
	58-79	19-25	—	5.6-7.3	0	0	0.0-2.0	0
10128—Sharpsburg-Urban land complex, 2 to 5 percent slopes								
Sharpsburg	0-17	18-29	—	5.1-6.5	0	0	0.0-2.0	0
	17-55	19-32	—	4.5-6.0	0	0	0.0-2.0	0
	55-60	17-29	—	5.6-6.5	0	0	0.0-2.0	0
Urban land	—	—	—	—	—	—	—	—
30080—Greenton silty clay loam, 5 to 9 percent slopes								
Greenton	0-12	22-31	—	5.6-6.0	0	0	0.0-2.0	0
	12-28	24-37	—	6.1-6.5	0	0	0.0-2.0	0
	28-30	26-36	—	6.6-7.3	0	0	0.0-2.0	0
	30-79	26-37	—	7.9-8.4	0-10	0	0.0-2.0	0

Report — Engineering Properties

Absence of an entry indicates that the data were not estimated. The asterisk '*' denotes the representative texture; other possible textures follow the dash. The criteria for determining the hydrologic soil group for individual soil components is found in the National Engineering Handbook, Chapter 7 issued May 2007(http://directives.sc.egov.usda.gov/OpenNonWebContent.aspx?content=17757.wba). Three values are provided to identify the expected Low (L), Representative Value (R), and High (H).

Jackson County, Missouri

Map unit symbol and soil name	Pct. of map unit	Hydrologic group	Depth	USDA texture	Classification		Pct Fragments		Percentage passing sieve number—				Liquid limit	Plasticity index
					Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
			In				*L-R-H*	*L-R-H*	*L-R-H*	*L-R-H*	*L-R-H*	*L-R-H*	*L-R-H*	*L-R-H*
10117—Sampsel silty clay loam, 5 to 9 percent slopes														
Sampsel	85	C/D	0-13	Silty clay loam	CL	A-6, A-7, A-7-6	0- 0- 0	0- 0- 0	100-100-100	100-100-100	95-98-100	90-95-100	35-43 -50	15-20-25
			13-80	Silty clay loam, silty clay, clay	CH	A-7-6	0- 0- 0	0- 0- 0	100-100-100	100-100-100	97-99-100	95-98-100	52-64 -75	35-41-47
10120—Sharpsburg silt loam, 2 to 5 percent slopes														
Sharpsburg	90	C	0-6	Silt loam	CL, ML	A-7-6	0- 0- 0	0- 0- 0	100-100-100	100-100-100	97-100-100	93-97-100	41-44 -46	17-18-18
			6-16	Silty clay loam	CH, CL	A-7-6	0- 0- 0	0- 0- 0	100-100-100	100-100-100	97-100-100	93-97-100	41-45 -50	19-21-24
			16-22	Silty clay loam, silty clay	CH, CL	A-7-6	0- 0- 0	0- 0- 0	100-100-100	100-100-100	97-100-100	94-98-100	47-51 -56	26-28-30
			22-46	Silty clay loam, silty clay	CH, CL	A-7-6	0- 0- 0	0- 0- 0	100-100-100	100-100-100	97-100-100	94-98-100	47-51 -56	26-29-32
			46-58	Silty clay loam, silt loam	CL	A-6, A-7-6	0- 0- 0	0- 0- 0	100-100-100	100-100-100	96-100-100	93-99-100	35-41 -47	17-22-26
			58-79	Silt loam, silty clay loam	CL	A-6, A-7-6	0- 0- 0	0- 0- 0	100-100-100	100-100-100	96-99-100	92-97-100	35-40 -44	17-20-23
10128—Sharpsburg-Urban land complex, 2 to 5 percent slopes														
Sharpsburg	60	D	0-17	Silt loam	CL, ML	A-6, A-7-6	0- 0- 0	0- 0- 0	100-100-100	100-100-100	100-100-100	95-98-100	34-44 -46	11-18-18
			17-55	Silty clay loam, silty clay	CH, CL	A-6, A-7-6	0- 0- 0	0- 0- 0	100-100-100	100-100-100	100-100-100	95-98-100	39-50 -56	19-25-30
			55-60	Silt loam, silty clay loam	CH, CL	A-6, A-7-6	0- 0- 0	0- 0- 0	100-100-100	100-100-100	100-100-100	95-98-100	37-51 -52	18-28-28
30080—Greenton silty clay loam, 5 to 9 percent slopes														
Greenton	90	C/D	0-12	Silty clay loam	CH, CL	A-7-6	0- 0- 0	0- 0- 0	100-100-100	100-100-100	88-98-100	86-96- 98	39-53 -56	19-26-28
			12-28	Silty clay loam, silty clay	CH	A-7-6	0- 0- 0	0- 0- 0	100-100-100	100-100-100	87-98-100	85-96-100	45-57 -63	25-33-37
			28-30	Silty clay, silty clay loam	CH, CL	A-7-6	0- 0- 0	0- 0- 0	100-100-100	95-96-100	87-95-100	84-93-100	49-57 -62	28-34-37
			30-79	Clay, gravelly silty clay, silty clay	CH	A-7-6	0- 0- 0	0- 0- 0	77-96-100	61-91-100	54-89-100	52-87- 98	49-61 -64	29-36-38

SECTION 004000
CONTRACT FOR CONSTRUCTION

FORM OF CONTRACT

1.01 AIA DOCUMENT A101, GENERAL CONTRACT FOR CONSTRUCTION. 2017 EDITION, IS HEREBY INCORPORATED BY REFERENCE AND MADE A PART OF THE CONTRACT FOR CONSTRUCTION.

END OF SECTION 004000

SECTION 005000
CONDITIONS OF THE CONTRACT

PART 1 GENERAL

1.01 SCOPE OF WORK

A. The work included under these Specifications consists of furnishing all items, materials, operations, or methods listed, mentioned, indicated, or scheduled on the Drawings and/or in these Specifications, including all labor, materials, equipment transportation temporary facilities, services, and incidentals necessary and required for construction completion of the project named in title page in accordance with Contract Documents.

1.02 FORM OF SPECIFICATIONS

A. Conditions of the Contract, Supplementary General Conditions, and Division 1 apply to every Division of these Specifications.

B. These Specifications are of abbreviated form and contain incomplete sentences. Omissions of words or phrases such as “the Contractor shall”, “shall be”, “as noted on the Drawings”, “according to the Drawings”, “a”, “the”, and “all” are intentional. Omitted words and phrases shall be supplied by inference in the same manner as they are when a “note” occurs on the Drawings.

C. All Specification instructions are directed to the Contractor, and inclusion of any work by mention, note, or itemization, however brief, implies Contractor shall provide same unless specifically directed otherwise.

D. In specifying an item by manufacturer’s name and/or catalog number, unless specifically stated otherwise, such item shall be provided with all standard devices and accessories indicated in latest edition of manufacturer’s catalog or brochure published at date of date of Invitation to Bid: furnished such item complete with component parts necessary for obviously intended use and installation, whether or not description or catalog number contains all supplemental information and/or numbers of such components.

1.03 UNIFORM FEDERAL ACCESSIBILITY STANDARDS

A. General Contractor shall complete all work in accordance with latest printed edition of the Fair Housing Act Guidelines, Section 504 of the Rehabilitation Act of 1973, the Americans with Disabilities Act and/or the Uniform Federal Accessibility Standards as applicable. Where work is required to comply with the standards and conflict exists with the architectural plans and/or specifications, notify Architect immediately of such conflict and request written clarification prior to proceeding with the work.

1.04 AIA GENERAL CONDITIONS

A. AIA Document A201, “General Conditions of the Contract for Construction”, 2017 Edition, 15 Articles, hereinafter referred to as “AIA General Conditions”, is hereby made a part of this Specification. Contractor shall consult this Document and become intimately familiar with its contents. Refer to Section 00700, General Conditions.

1.05 NOT USED

PART 3 - EXECUTION

2.01 SUPPLEMENTS AND AMENDMENTS TO THE AIA GENERAL CONDITIONS

A. The AIA General Conditions are hereinafter supplemented and/or amended. All supplementary provisions shall be considered as added thereto. Where any Article is amended, deleted or superseded hereby, unaltered provisions of such Article shall remain in effect.

2.02 GENERAL PROVISIONS

A. Supplement Subparagraph 1.2.1 as follows:
   1. Drawings, Specifications and Other Contract Documents are not intended as “Shop Drawings” or extensively detailed documents; they are intended to indicate general design concept of Project in sufficient detail that all work required is reasonable inferable there

from and Contractor shall provide all work thus indicated or reasonably inferred as necessary to produce intended results of complete, structurally sound, aesthetically desirable, durable, properly performing work of quality. Should conflict occur between Drawings and Specifications, Contractor shall obtain written decision of same from Architect prior to submitting Bid, Signing Agreement or proceeding with the work.

B. Supplement Subparagraph 1.4.1, Interpretation, as follows:
   1. When a word, “approval”, “approved”, “proper”, “satisfactory”, “equal”, and “as directed” is used, it implies such reference as to the Architect’s approval or direction.
   2. “Approve”, “approval”, or “approved” means the Architect will observe or review items or construction referred to him for such approval and that his review represents his opinion that such item or construction is acceptable for the circumstances and conditions of the project, based on his observations and/or information made available to him by Contractor. However, such review shall not represent that Architect checked item or construction in detail, nor that he thereby waives original requirements or assumes any responsibility for its correctness or performance.
   3. “Equal”, “equivalent”, means the item or constriction possesses similar physical size and characteristics, similar performance qualities and characteristics and fulfills utilitarian functions required by Contract Documents without any decrease in quality, appearance or durability; responsibility for “equal” or equivalent” item of construction to fulfill the Architect’s intent of Contract Documents (expressed or implied) rests with the Contractor.
   4. “Extent” means general checklist or outline of work included: not constructed as all inclusive nor limiting and not relieving Contractor from providing all similar or related work elsewhere indicated or inferable in Contract Documents.
   5. “Indicated” means as indicated on Contract Documents.
   6. “Provide” means furnish and install.

C. ARTICLE 3 CONTRACTOR
   1. Supplement Subparagraph 3.7.1 as follows:
   2. Contractor shall give notices to public or private utility companies and others required to make installations, in ample time for them to complete such installations and not delay the project, whether such installations are under contract or reasonable inferable necessary for completion of project. Contractor is responsible for staking or surveying as may be required to complete the installation of utilities either on or off site by any Utility Companies or by private contract.

D. Supplement Subparagraph 3.12.5 as follows:
   1. By submitting Shop Drawings and samples, Contractor thereby represents he has approved them (whether they bear his approval stamp or not) and he has determined and verified all field measurements, quantities, field construction criteria, materials, catalog numbers, and similar data, or will do so, and he has checked and coordinated Shop Drawings and sample with requirements of work and Contract Documents and with work of all other trades and Contractors on project.

E. Supplement Subparagraph 3.12.8 as follows:
   1. When material or equipment is specified by manufacturer’s name or names, the intent is to establish quality required. Materials other than those specified will be considered after Contract has been executed provided they are submitted in writing by successful bidder with sufficient data to establish that their quality for the use intended is equivalent to the quality of materials specified.
   2. By making request for substitution, the Contractor represents that he has personally investigated the substitute product and determined that it is equal or superior to that specified, that he will provide the same warranty as for that specified, that eh waives all claims for any additional cost related to the substitution, and that he will coordinate the installation of any accepted substitution making changes as may be required such that the work shall be completed in all respects.
   3. Requests for substitutions shall be submitted in sufficient time to allow for proper consideration and so as to cause no delay in the work. All materials and equipment shall

be applied, installed, connected, cleaned and placed in operation in accordance with manufacturer's directions.

4. When material or equipment is required to be installed by manufacturer's approved applicator, it shall be the contractor's responsibility to insure such approval.

F. ARTICLE 4 ADMINISTRATION OF THE CONTRACT
   1. Delete Second Sentence of Subparagraph 4.1.1 and Insert:
   2. The term Architect means Architect or his authorized representative (including his Consulting Engineer). The term Architect/Engineer means Architect and/or his Consulting Engineer.

G. ARTICLE 8 TIME
   1. Add the following Subparagraph:
   2. 8.1.5 As between the Owner and the Contractor: as to all acts of failures to act occurring prior to the relevant Date of Substantial Completion, any applicable statue of limitations shall commence to run and any alleged coarse of action shall be deemed to have accrued in any and all events not later than such Date of Substantial Completion; as to all acts or failures to act occurring subsequent to the relevant Date of Substantial Completion, any applicable statue of limitations shall commence to run and any alleged cause of action shall be deemed to have accrued in any and all events not later than the date of issuance of the final Certificate of Payment.

H. ARTICLE 11 INSURANCE AND BONDS
   1. Supplement Paragraph 11.1 Contractor's liability Insurance, add the following:
   2. 11.1.4 Certificates of Insurance: General Contractor shall, before commencing work under this Contract, submit duplicate copies to Architect and Owner showing evidence that all Certificates of Insurance are in effect, covering Contractor and Owner as their interests may appear, and that these minimum insurance coverage will not be canceled or changed until 30 days after written notice is given to Owner and Architect. Coverage is as follows:
   3. Workmen's Compensation: Statutory for applicable states, except provided $100,000.00 minimum coverage.
   4. Comprehensive General Liability including Contractor's Liability: Contingent Liability; Contractual Liability; Completed Operations and Products Liability all on occurrences with Bodily Injury Coverage and Broad from Property Damage. Remove the XCU exclusion relating to Explosion, Collapse and Underground Property Damage. Completed Operations Liability shall be kept in force for at least 2 years after date of final completion. Provides $500,000.00 minimum coverage.
   5. Comprehensive Automobile Liability including no owner or hired care coverage as well as owned vehicles. Provide $500,000.00 minimum coverage.
   6. Employer's Liability: Provide $100,000.00 minimum coverage.
   7. Builder's Risk Insurance: Contractor will effect and maintain, Fire Insurance with extended coverage and vandalism and malicious mischief insurance upon the entire structure on which the work to be performed under this Contract is to be done to the extent of 100% of the insurable value thereof. Contractor will be responsible for any and all deductible.
   8. In addition to the above minimum coverage, Contractor shall provide $1,000,000.00 umbrella coverage.
   9. Supplement Paragraph 11.4 Performance Bond and Payment Bond as follows:
   10. Performance Bond and Labor and Material Payment Bonds shall be furnished to the Owner, by General Contractor, in an amount equal to 100% of the contract sum as security for the faithful performance of the contract and the payment of all persons performing labor and furnishing material in connection with the contract.
   11. Surety: Bonds furnished shall be written by a Surety approved by the U.S. Treasury Department and licensed to do business in the State where project is to be constructed. No work shall be commenced until bonds are in force. Power of Attorney for the Surety Company Agent must accompany each bond issued, and must be certified to include the date of the bonds.

12. Bid Proposal: Contractor shall include cost of bonds in contract price.

END OF SECTION 005000

SECTION 005436
BUILDING INFORMATION MODELING EXHIBIT

PART 1 GENERAL

1.01 SCOPE OF WORK

A. The work included under these Specifications consists of furnishing all operations, or methods listed, mentioned, indicated or scheduled on the Drawings and/or in these Specifications concerning the preparation of electronic drawings by Architect and/or Architect's Consultants for the Project. This information is being made available to the Contractor, sub-contractor and material suppliers to set forth the basis of design.

B. This Section establishes the terms and protocols governing the reliance upon, and the ownership, development, uses, transmission and sharing of Building Information Models (BIM) and other Digital Data for the Project.

1.02 DEFINITIONS

A. Building Information Model or Model: A BIM or Model is a digital representation of the Project or a subset of the Project. A Model is a collection of one or more Model Portions, each of which is an assemblage of Model Elements.

B. Model Portion: A model Portion, or Portion, is a subset of a Model. The parties may designate a Model Portion by discipline, trade, area, location, phase, or other mutually agreeable distinction.

C. Model Element: A Model Element is a digital representation of a component, system, object, or assembly within a Model.

D. Model Version: A Model Version, is a specific edition of a Model or Model Portion that is sufficiently identifiable as unique and unchanged as of the time it is saved by its Author or the Architect

E. Confidential Digital Data: Unless otherwise stated, Confidential Digital Data is Digital Data containing confidential or business proprietary information that the transmitting party designates as "confidential". For purposes of this Project – all information transmitted by Architect and Architect's Consultants shall be treated as confidential.

F. Contract Document: The term Contract Document shall have the same meaning as in the Agreement between the Owner and Architect and subsequently to the preparation of Drawings between the Owner and Contractor for the construction of the Project. The Model will not be enumerated as part of the Contract Document and should be considered as such.

G. Level of Development: The Level of Development (LOD) establishes the minimum dimensional, spatial, quantitative, and qualitative aspects of a Model Element, and the degree to which Project Participants may rely upon the Model Element when developed to that level in the Model. The Levels of Development is described further below in this Section.

1.03 MODEL USES AND RELIANCE

A. Model Uses, Sharing and Reliance: Project Participants may share, use and rely upon a Model or Model Portion only to the extent set forth in Items in this Section. Model sharing includes sharing within Design Team, with Contractor, and within the Construction Team

B. Model Uses: The Project Participants shall develop Models on the Project for the following uses:
   1. Planning: Examples include programming, site analysis, scheduling, and documentation of existing conditions
   2. Design: Examples include design authoring, design review, 3D coordination, structural analysis, lighting analysis, and engineering analysis.
   3. Any other uses or preparation of supplemental information or drawings utilizing the BIM model may be developed by the Contractor and/or subcontractors at their own discretion, expense, and risk.

C. Model Reliance: A Project Participant may only rely on Models, Model Portions, and Model Elements as indicated in Paragraph A. The Parties agree that the extent of their reliance on any Model Version shall be limited to the uses identified in Paragraph B above. Any reliance on a Model Version not in accordance with this Section shall be at the Project Participant's sole risk.

D. Liability: To the fullest extent permitted by law, the Receiving Party shall indemnify and defend the Architect and Architect's Consultants from and against all claims arising from or related to the Receiving Party's modification to, or unlicensed use of, the Digital Data.

E. Model Coordination: If Project Participants discover or become aware of any discrepancies, inconsistencies, errors, or omissions in any Model Version, consistent with the LOD scope described below, they shall promptly report the discrepancy, inconsistency, error, or omission in writing to the Architect; prior to commencing any work.

1.04 LEVEL OF DEVELOPMENT

A. Level of Development Descriptions: The LOD descriptions below shall be used to identify the minimum required characteristics for each Model Element for the Project. Other Project Participants may only rely on a Model Element consistent with the minimum required characteristics for the designated LOD.

B. LOD 100. The Model Element designated for the Project by the Architect and Architect's Consultants for the Project is established to be LOD 100. The Model Element may be graphically represented in the Model with a symbol or other generic representation. Information related to the Model Element (e.g., cost per square foot, quantity, etc). Model Elements are not required to be an actual representation of a specific product as enumerated in the Construction Documents.

1.05 DIGITAL DATA LICENSING AGREEMENT

A. The purpose of this Agreement will be to grant a license from the Architect or Architect's Consultants (the Transmitting Party) to the Receiving Party for the Receiving Party's use of Digital Data and to set forth the license terms. This Exhibit is anticipated to utilize AIA Document C106-2022 Digital Data Licensing Agreement, and will be required to be executed prior to any data transfer.

B. Transmission of Digital Data: The Transmitting Party grants to the Receiving Party a nonexclusive limited license to use the Digital Data solely and exclusively for the uses, and in accordance with the terms, set forth in this Section, and in the Digital Data Licensing Agreement.

C. Access: Only the Receiving Party is permitted to access and use the Digital Data. Unlicensed and unauthorized access or use by third parties is strictly prohibited.

D. License Conditions: The Receiving Party may use and rely upon the Digital Data to the extent set forth below:

1. The Digital Data is transmitted solely for the Receiving Party's information. Receiving Party acknowledges that any use of the Digital Data shall be at Receiving Party's sole risk. The Receiving Party accepts the Digital Data "as is" without any warranty or representations from the Transmitting Party as to whether the Digital Data is accurate, complete, or fit for use as intended by the Receiving Party. The Receiving Party is solely responsible for verifying whether the Digital Data is accurate, complete, or fit for the Receiving Party's intended use.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

SECTION 007000
GENERAL CONDITIONS

FORM OF GENERAL CONDITIONS

1.01 AIA DOCUMENT A201, GENERAL CONDITIONS OF THE CONTRACT FOR CONSTRUCTION, 2017 EDITION, ATTACHED, IS HEREBY INCORPORATED HEREIN AND MADE A PART OF THE GENERAL CONDITIONS BETWEEN THE OWNER AND THE CONTRACTOR.

1.02 REFER TO SECTION 00 5000 FOR AMENDMENTS AND SUPPLEMENTARY INFORMATION TO THESE GENERAL CONDITIONS

END OF SECTION 007000

AIA® Document A201® – 2017

General Conditions of the Contract for Construction

for the following PROJECT:

The Village at Discovery - Lot 1
Lee's Summit, MO

THE OWNER:

Intrinsic Development, L.L.C.
3622 Endeavor Ave., Ste 101
Columbia, Missouri 65201

THE ARCHITECT:

Rosemann & Associates, P.C., a Missouri professional corporation
1526 Grand Boulevard
Kansas City, MO 64108-1404

TABLE OF ARTICLES

1 GENERAL PROVISIONS

2 OWNER

3 CONTRACTOR

4 ARCHITECT

5 SUBCONTRACTORS

6 CONSTRUCTION BY OWNER OR BY SEPARATE CONTRACTORS

7 CHANGES IN THE WORK

8 TIME

9 PAYMENTS AND COMPLETION

10 PROTECTION OF PERSONS AND PROPERTY

11 INSURANCE AND BONDS

12 UNCOVERING AND CORRECTION OF WORK

13 MISCELLANEOUS PROVISIONS

ADDITIONS AND DELETIONS:
The author of this document may have revised the text of the original AIA standard form. An *Additions and Deletions Report* that notes revisions to the standard form text is available from the author and should be reviewed. A vertical line in the left margin of this document indicates where the author has added to or deleted from the original AIA text.

This document has important legal consequences. Consultation with an attorney is encouraged with respect to its completion or modification.

For guidance in modifying this document to include supplementary conditions, see AIA Document A503™–2017, Guide for Supplementary Conditions.

14 TERMINATION OR SUSPENSION OF THE CONTRACT

15 CLAIMS AND DISPUTES

INDEX
(Topics and numbers in bold are Section headings.)

Acceptance of Nonconforming Work
9.6.6, 9.9.3, **12.3**
Acceptance of Work
9.6.6, 9.8.2, 9.9.3, 9.10.1, 9.10.3, 12.3
Access to Work
3.16, 6.2.1, 12.1
Accident Prevention
10
Acts and Omissions
3.2, 3.3.2, 3.12.8, 3.18, 4.2.3, 8.3.1, 9.5.1, 10.2.5, 10.2.8, 13.3.2, 14.1, 15.1.2, 15.2
Addenda
1.1.1
Additional Costs, Claims for
3.7.4, 3.7.5, 10.3.2, 15.1.5
Additional Inspections and Testing
9.4.2, 9.8.3, 12.2.1, **13.4**
Additional Time, Claims for
3.2.4, 3.7.4, 3.7.5, 3.10.2, 8.3.2, **15.1.6**
Administration of the Contract
3.1.3, **4.2**, 9.4, 9.5
Advertisement or Invitation to Bid
1.1.1
Aesthetic Effect
4.2.13
Allowances
3.8
Applications for Payment
4.2.5, 7.3.9, 9.2, **9.3**, 9.4, 9.5.1, 9.5.4, 9.6.3, 9.7, 9.10
Approvals
2.1.1, 2.3.1, 2.5, 3.1.3, 3.10.2, 3.12.8, 3.12.9, 3.12.10.1, 4.2.7, 9.3.2, 13.4.1
Arbitration
8.3.1, 15.3.2, **15.4**
ARCHITECT
4
Architect, Definition of
4.1.1
Architect, Extent of Authority
2.5, 3.12.7, 4.1.2, 4.2, 5.2, 6.3, 7.1.2, 7.3.4, 7.4, 9.2, 9.3.1, 9.4, 9.5, 9.6.3, 9.8, 9.10.1, 9.10.3, 12.1, 12.2.1, 13.4.1, 13.4.2, 14.2.2, 14.2.4, 15.1.4, 15.2.1
Architect, Limitations of Authority and Responsibility
2.1.1, 3.12.4, 3.12.8, 3.12.10, 4.1.2, 4.2.1, 4.2.2, 4.2.3, 4.2.6, 4.2.7, 4.2.10, 4.2.12, 4.2.13, 5.2.1, 7.4, 9.4.2, 9.5.4, 9.6.4, 15.1.4, 15.2
Architect's Additional Services and Expenses
2.5, 12.2.1, 13.4.2, 13.4.3, 14.2.4
Architect's Administration of the Contract
3.1.3, 3.7.4, 15.2, 9.4.1, 9.5
Architect's Approvals
2.5, 3.1.3, 3.5, 3.10.2, 4.2.7
Architect's Authority to Reject Work
3.5, 4.2.6, 12.1.2, 12.2.1
Architect's Copyright
1.1.7, 1.5
Architect's Decisions
3.7.4, 4.2.6, 4.2.7, 4.2.11, 4.2.12, 4.2.13, 4.2.14, 6.3, 7.3.4, 7.3.9, 8.1.3, 8.3.1, 9.2, 9.4.1, 9.5, 9.8.4, 9.9.1, 13.4.2, 15.2
Architect's Inspections
3.7.4, 4.2.2, 4.2.9, 9.4.2, 9.8.3, 9.9.2, 9.10.1, 13.4
Architect's Instructions
3.2.4, 3.3.1, 4.2.6, 4.2.7, 13.4.2
Architect's Interpretations
4.2.11, 4.2.12
Architect's Project Representative
4.2.10
Architect's Relationship with Contractor
1.1.2, 1.5, 2.3.3, 3.1.3, 3.2.2, 3.2.3, 3.2.4, 3.3.1, 3.4.2, 3.5, 3.7.4, 3.7.5, 3.9.2, 3.9.3, 3.10, 3.11, 3.12, 3.16, 3.18, 4.1.2, 4.2, 5.2, 6.2.2, 7, 8.3.1, 9.2, 9.3, 9.4, 9.5, 9.7, 9.8, 9.9, 10.2.6, 10.3, 11.3, 12, 13.3.2, 13.4, 15.2
Architect's Relationship with Subcontractors
1.1.2, 4.2.3, 4.2.4, 4.2.6, 9.6.3, 9.6.4, 11.3
Architect's Representations
9.4.2, 9.5.1, 9.10.1
Architect's Site Visits
3.7.4, 4.2.2, 4.2.9, 9.4.2, 9.5.1, 9.9.2, 9.10.1, 13.4
Asbestos
10.3.1
Attorneys' Fees
3.18.1, 9.6.8, 9.10.2, 10.3.3
Award of Separate Contracts
6.1.1, 6.1.2
Award of Subcontracts and Other Contracts for Portions of the Work
5.2
Basic Definitions
1.1
Bidding Requirements
1.1.1
Binding Dispute Resolution
8.3.1, 9.7, 11.5, 13.1, 15.1.2, 15.1.3, 15.2.1, 15.2.5, 15.2.6.1, 15.3.1, 15.3.2, 15.3.3, 15.4.1
Bonds, Lien
7.3.4.4, 9.6.8, 9.10.2, 9.10.3
Bonds, Performance, and Payment
7.3.4.4, 9.6.7, 9.10.3, **11.1.2**, 11.1.3, **11.5**
Building Information Models Use and Reliance
1.8
Building Permit
3.7.1
Capitalization
1.3
Certificate of Substantial Completion
9.8.3, 9.8.4, 9.8.5
Certificates for Payment
4.2.1, 4.2.5, 4.2.9, 9.3.3, **9.4**, 9.5, 9.6.1, 9.6.6, 9.7, 9.10.1, 9.10.3, 14.1.1.3, 14.2.4, 15.1.4
Certificates of Inspection, Testing or Approval
13.4.4
Certificates of Insurance
9.10.2
Change Orders

1.1.1, 3.4.2, 3.7.4, 3.8.2.3, 3.11, 3.12.8, 4.2.8, 5.2.3, 7.1.2, 7.1.3, **7.2**, 7.3.2, 7.3.7, 7.3.9, 7.3.10, 8.3.1, 9.3.1.1, 9.10.3, 10.3.2, 11.2, 11.5, 12.1.2
Change Orders, Definition of
7.2.1
CHANGES IN THE WORK
2.2.2, 3.11, 4.2.8, **7**, 7.2.1, 7.3.1, 7.4, 8.3.1, 9.3.1.1, 11.5
Claims, Definition of
15.1.1
Claims, Notice of
1.6.2, 15.1.3
CLAIMS AND DISPUTES
3.2.4, 6.1.1, 6.3, 7.3.9, 9.3.3, 9.10.4, 10.3.3, **15**, 15.4
Claims and Timely Assertion of Claims
15.4.1
Claims for Additional Cost
3.2.4, 3.3.1, 3.7.4, 7.3.9, 9.5.2, 10.2.5, 10.3.2, **15.1.5**
Claims for Additional Time
3.2.4, 3.3.1, 3.7.4, 6.1.1, 8.3.2, 9.5.2, 10.3.2, **15.1.6**
Concealed or Unknown Conditions, Claims for
3.7.4
Claims for Damages
3.2.4, 3.18, 8.3.3, 9.5.1, 9.6.7, 10.2.5, 10.3.3, 11.3, 11.3.2, 14.2.4, 15.1.7
Claims Subject to Arbitration
15.4.1
Cleaning Up
3.15, 6.3
Commencement of the Work, Conditions Relating to
2.2.1, 3.2.2, 3.4.1, 3.7.1, 3.10.1, 3.12.6, 5.2.1, 5.2.3, 6.2.2, 8.1.2, 8.2.2, 8.3.1, 11.1, 11.2, **15.1.5**
Commencement of the Work, Definition of
8.1.2
Communications
3.9.1, **4.2.4**
Completion, Conditions Relating to
3.4.1, 3.11, 3.15, 4.2.2, 4.2.9, 8.2, 9.4.2, 9.8, 9.9.1, 9.10, 12.2, 14.1.2, 15.1.2
COMPLETION, PAYMENTS AND
9
Completion, Substantial
3.10.1, 4.2.9, 8.1.1, 8.1.3, 8.2.3, 9.4.2, 9.8, 9.9.1, 9.10.3, 12.2, 15.1.2
Compliance with Laws
2.3.2, 3.2.3, 3.6, 3.7, 3.12.10, 3.13, 9.6.4, 10.2.2, 13.1, 13.3, 13.4.1, 13.4.2, 13.5, 14.1.1, 14.2.1.3, 15.2.8, 15.4.2, 15.4.3
Concealed or Unknown Conditions
3.7.4, 4.2.8, 8.3.1, 10.3
Conditions of the Contract
1.1.1, 6.1.1, 6.1.4
Consent, Written
3.4.2, 3.14.2, 4.1.2, 9.8.5, 9.9.1, 9.10.2, 9.10.3, 13.2, 15.4.4.2
Consolidation or Joinder
15.4.4
CONSTRUCTION BY OWNER OR BY SEPARATE CONTRACTORS
1.1.4, **6**
Construction Change Directive, Definition of
7.3.1
Construction Change Directives
1.1.1, 3.4.2, 3.11, 3.12.8, 4.2.8, 7.1.1, 7.1.2, 7.1.3, **7.3**, 9.3.1.1
Construction Schedules, Contractor's
3.10, 3.11, 3.12.1, 3.12.2, 6.1.3, 15.1.6.2
Contingent Assignment of Subcontracts
5.4, 14.2.2.2
Continuing Contract Performance
15.1.4
Contract, Definition of
1.1.2
CONTRACT, TERMINATION OR SUSPENSION OF THE
5.4.1.1, 5.4.2, 11.5, **14**
Contract Administration
3.1.3, 4, 9.4, 9.5
Contract Award and Execution, Conditions Relating to
3.7.1, 3.10, 5.2, 6.1
Contract Documents, Copies Furnished and Use of
1.5.2, 2.3.6, 5.3
Contract Documents, Definition of
1.1.1
Contract Sum
2.2.2, 2.2.4, 3.7.4, 3.7.5, 3.8, 3.10.2, 5.2.3, 7.3, 7.4, **9.1**, 9.2, 9.4.2, 9.5.1.4, 9.6.7, 9.7, 10.3.2, 11.5, 12.1.2, 12.3, 14.2.4, 14.3.2, 15.1.4.2, **15.1.5, 15.2.5**
Contract Sum, Definition of
9.1
Contract Time
1.1.4, 2.2.1, 2.2.2, 3.7.4, 3.7.5, 3.10.2, 5.2.3, 6.1.5, 7.2.1.3, 7.3.1, 7.3.5, 7.3.6, 7, 7, 7.3.10, 7.4, 8.1.1, 8.2.1, 8.2.3, 8.3.1, 9.5.1, 9.7, 10.3.2, 12.1.1, 12.1.2, 14.3.2, 15.1.4.2, 15.1.6.1, 15.2.5
Contract Time, Definition of
8.1.1
CONTRACTOR
3
Contractor, Definition of
3.1, 6.1.2
Contractor's Construction and Submittal Schedules
3.10, 3.12.1, 3.12.2, 4.2.3, 6.1.3, 15.1.6.2
Contractor's Employees
2.2.4, 3.3.2, 3.4.3, 3.8.1, 3.9, 3.18.2, 4.2.3, 4.2.6, 10.2, 10.3, 11.3, 14.1, 14.2.1.1
Contractor's Liability Insurance
11.1
Contractor's Relationship with Separate Contractors and Owner's Forces
3.12.5, 3.14.2, 4.2.4, 6, 11.3, 12.2.4
Contractor's Relationship with Subcontractors
1.2.2, 2.2.4, 3.3.2, 3.18.1, 3.18.2, 4.2.4, 5, 9.6.2, 9.6.7, 9.10.2, 11.2, 11.3, 11.4
Contractor's Relationship with the Architect
1.1.2, 1.5, 2.3.3, 3.1.3, 3.2.2, 3.2.3, 3.2.4, 3.3.1, 3.4.2, 3.5.1, 3.7.4, 3.10, 3.11, 3.12, 3.16, 3.18, 4.2, 5.2, 6.2.2, 7, 8.3.1, 9.2, 9.3, 9.4, 9.5, 9.7, 9.8, 9.9, 10.2.6,

10.3, 11.3, 12, 13.4, 15.1.3, 15.2.1
Contractor's Representations
3.2.1, 3.2.2, 3.5, 3.12.6, 6.2.2, 8.2.1, 9.3.3, 9.8.2
Contractor's Responsibility for Those Performing the Work
3.3.2, 3.18, 5.3, 6.1.3, 6.2, 9.5.1, 10.2.8
Contractor's Review of Contract Documents
3.2
Contractor's Right to Stop the Work
2.2.2, 9.7
Contractor's Right to Terminate the Contract
14.1
Contractor's Submittals
3.10, 3.11, 3.12, 4.2.7, 5.2.1, 5.2.3, 9.2, 9.3, 9.8.2, 9.8.3, 9.9.1, 9.10.2, 9.10.3
Contractor's Superintendent
3.9, 10.2.6
Contractor's Supervision and Construction Procedures
1.2.2, 3.3, 3.4, 3.12.10, 4.2.2, 4.2.7, 6.1.3, 6.2.4, 7.1.3, 7.3.4, 7.3.6, 8.2, 10, 12, 14, 15.1.4
Coordination and Correlation
1.2, 3.2.1, 3.3.1, 3.10, 3.12.6, 6.1.3, 6.2.1
Copies Furnished of Drawings and Specifications
1.5, 2.3.6, 3.11
Copyrights
1.5, **3.17**
Correction of Work
2.5, 3.7.3, 9.4.2, 9.8.2, 9.8.3, 9.9.1, 12.1.2, **12.2**, 12.3, 15.1.3.1, 15.1.3.2, 15.2.1
Correlation and Intent of the Contract Documents
1.2
Cost, Definition of
7.3.4
Costs
2.5, 3.2.4, 3.7.3, 3.8.2, 3.15.2, 5.4.2, 6.1.1, 6.2.3, 7.3.3.3, 7.3.4, 7.3.8, 7.3.9, 9.10.2, 10.3.2, 10.3.6, 11.2, 12.1.2, 12.2.1, 12.2.4, 13.4, 14
Cutting and Patching
3.14, 6.2.5
Damage to Construction of Owner or Separate Contractors
3.14.2, 6.2.4, 10.2.1.2, 10.2.5, 10.4, 12.2.4
Damage to the Work
3.14.2, 9.9.1, 10.2.1.2, 10.2.5, 10.4, 12.2.4
Damages, Claims for
3.2.4, 3.18, 6.1.1, 8.3.3, 9.5.1, 9.6.7, 10.3.3, 11.3.2, 11.3, 14.2.4, 15.1.7
Damages for Delay
6.2.3, 8.3.3, 9.5.1.6, 9.7, 10.3.2, 14.3.2
Date of Commencement of the Work, Definition of
8.1.2
Date of Substantial Completion, Definition of
8.1.3
Day, Definition of
8.1.4
Decisions of the Architect
3.7.4, 4.2.6, 4.2.7, 4.2.11, 4.2.12, 4.2.13, 6.3, 7.3.4, 7.3.9, 8.1.3, 8.3.1, 9.2, 9.4, 9.5.1, 9.8.4, 9.9.1, 13.4.2, 14.2.2, 14.2.4, 15.1, 15.2
Decisions to Withhold Certification
9.4.1, **9.5**, 9.7, 14.1.1.3
Defective or Nonconforming Work, Acceptance, Rejection and Correction of
2.5, 3.5, 4.2.6, 6.2.3, 9.5.1, 9.5.3, 9.6.6, 9.8.2, 9.9.3, 9.10.4, 12.2.1
Definitions
1.1, 2.1.1, 3.1.1, 3.5, 3.12.1, 3.12.2, 3.12.3, 4.1.1, 5.1, 6.1.2, 7.2.1, 7.3.1, 8.1, 9.1, 9.8.1, 15.1.1
Delays and Extensions of Time
3.2, **3.7.4**, 5.2.3, 7.2.1, 7.3.1, **7.4**, **8.3**, 9.5.1, **9.7**, 10.3.2, **10.4**, 14.3.2, **15.1.6**, 15.2.5
Digital Data Use and Transmission
1.7
Disputes
6.3, 7.3.9, 15.1, 15.2
Documents and Samples at the Site
3.11
Drawings, Definition of
1.1.5
Drawings and Specifications, Use and Ownership of
3.11
Effective Date of Insurance
8.2.2
Emergencies
10.4, 14.1.1.2, **15.1.5**
Employees, Contractor's
3.3.2, 3.4.3, 3.8.1, 3.9, 3.18.2, 4.2.3, 4.2.6, 10.2, 10.3.3, 11.3, 14.1, 14.2.1.1
Equipment, Labor, or Materials
1.1.3, 1.1.6, 3.4, 3.5, 3.8.2, 3.8.3, 3.12, 3.13, 3.15.1, 4.2.6, 4.2.7, 5.2.1, 6.2.1, 7.3.4, 9.3.2, 9.3.3, 9.5.1.3, 9.10.2, 10.2.1, 10.2.4, 14.2.1.1, 14.2.1.2
Execution and Progress of the Work
1.1.3, 1.2.1, 1.2.2, 2.3.4, 2.3.6, 3.1, 3.3.1, 3.4.1, 3.7.1, 3.10.1, 3.12, 3.14, 4.2, 6.2.2, 7.1.3, 7.3.6, 8.2, 9.5.1, 9.9.1, 10.2, 10.3, 12.1, 12.2, 14.2, 14.3.1, 15.1.4
Extensions of Time
3.2.4, 3.7.4, 5.2.3, 7.2.1, 7.3, 7.4, 9.5.1, 9.7, 10.3.2, 10.4, 14.3, 15.1.6, **15.2.5**
Failure of Payment
9.5.1.3, **9.7**, 9.10.2, 13.5, 14.1.1.3, 14.2.1.2
Faulty Work
(See Defective or Nonconforming Work)
Final Completion and Final Payment
4.2.1, 4.2.9, 9.8.2, **9.10**, 12.3, 14.2.4, 14.4.3
Financial Arrangements, Owner's
2.2.1, 13.2.2, 14.1.1.4
GENERAL PROVISIONS
1
Governing Law
13.1
Guarantees (See Warranty)
Hazardous Materials and Substances
10.2.4, **10.3**
Identification of Subcontractors and Suppliers
5.2.1
Indemnification
3.17, **3.18**, 9.6.8, 9.10.2, 10.3.3, 11.3
Information and Services Required of the Owner

2.1.2, **2.2**, 2.3, 3.2.2, 3.12.10.1, 6.1.3, 6.1.4, 6.2.5, 9.6.1, 9.9.2, 9.10.3, 10.3.3, 11.2, 13.4.1, 13.4.2, 14.1.1.4, 14.1.4, 15.1.4
Initial Decision
15.2
Initial Decision Maker, Definition of
1.1.8
Initial Decision Maker, Decisions
14.2.4, 15.1.4.2, 15.2.1, 15.2.2, 15.2.3, 15.2.4, 15.2.5
Initial Decision Maker, Extent of Authority
14.2.4, 15.1.4.2, 15.2.1, 15.2.2, 15.2.3, 15.2.4, 15.2.5
Injury or Damage to Person or Property
10.2.8, 10.4
Inspections
3.1.3, 3.3.3, 3.7.1, 4.2.2, 4.2.6, 4.2.9, 9.4.2, 9.8.3, 9.9.2, 9.10.1, 12.2.1, 13.4
Instructions to Bidders
1.1.1
Instructions to the Contractor
3.2.4, 3.3.1, 3.8.1, 5.2.1, 7, 8.2.2, 12, 13.4.2
Instruments of Service, Definition of
1.1.7
Insurance
6.1.1, 7.3.4, 8.2.2, 9.3.2, 9.8.4, 9.9.1, 9.10.2, 10.2.5, **11**
Insurance, Notice of Cancellation or Expiration
11.1.4, 11.2.3
Insurance, Contractor's Liability
11.1
Insurance, Effective Date of
8.2.2, 14.4.2
Insurance, Owner's Liability
11.2
Insurance, Property
10.2.5, 11.2, 11.4, 11.5
Insurance, Stored Materials
9.3.2
INSURANCE AND BONDS
11
Insurance Companies, Consent to Partial Occupancy
9.9.1
Insured loss, Adjustment and Settlement of
11.5
Intent of the Contract Documents
1.2.1, 4.2.7, 4.2.12, 4.2.13
Interest
13.5
Interpretation
1.1.8, 1.2.3, **1.4**, 4.1.1, 5.1, 6.1.2, 15.1.1
Interpretations, Written
4.2.11, 4.2.12
Judgment on Final Award
15.4.2
Labor and Materials, Equipment
1.1.3, 1.1.6, **3.4**, 3.5, 3.8.2, 3.8.3, 3.12, 3.13, 3.15.1, 5.2.1, 6.2.1, 7.3.4, 9.3.2, 9.3.3, 9.5.1.3, 9.10.2, 10.2.1, 10.2.4, 14.2.1.1, 14.2.1.2
Labor Disputes
8.3.1
Laws and Regulations
1.5, 2.3.2, 3.2.3, 3.2.4, 3.6, 3.7, 3.12.10, 3.13, 9.6.4, 9.9.1, 10.2.2, 13.1, 13.3.1, 13.4.2, 13.5, 14, 15.2.8, 15.4
Liens
2.1.2, 9.3.1, 9.3.3, 9.6.8, 9.10.2, 9.10.4, 15.2.8
Limitations, Statutes of
12.2.5, 15.1.2, 15.4.1.1
Limitations of Liability
3.2.2, 3.5, 3.12.10, 3.12.10.1, 3.17, 3.18.1, 4.2.6, 4.2.7, 6.2.2, 9.4.2, 9.6.4, 9.6.7, 9.6.8, 10.2.5, 10.3.3, 11.3, 12.2.5, 13.3.1
Limitations of Time
2.1.2, 2.2, 2.5, 3.2.2, 3.10, 3.11, 3.12.5, 3.15.1, 4.2.7, 5.2, 5.3, 5.4.1, 6.2.4, 7.3, 7.4, 8.2, 9.2, 9.3.1, 9.3.3, 9.4.1, 9.5, 9.6, 9.7, 9.8, 9.9, 9.10, 12.2, 13.4, 14, 15, 15.1.2, 15.1.3, 15.1.5
Materials, Hazardous
10.2.4, **10.3**
Materials, Labor, Equipment and
1.1.3, 1.1.6, 3.4.1, 3.5, 3.8.2, 3.8.3, 3.12, 3.13, 3.15.1, 5.2.1, 6.2.1, 7.3.4, 9.3.2, 9.3.3, 9.5.1.3, 9.10.2, 10.2.1.2, 10.2.4, 14.2.1.1, 14.2.1.2
Means, Methods, Techniques, Sequences and Procedures of Construction
3.3.1, 3.12.10, 4.2.2, 4.2.7, 9.4.2
Mechanic's Lien
2.1.2, 9.3.1, 9.3.3, 9.6.8, 9.10.2, 9.10.4, 15.2.8
Mediation
8.3.1, 15.1.3.2, 15.2.1, 15.2.5, 15.2.6, **15.3**, 15.4.1, 15.4.1.1
Minor Changes in the Work
1.1.1, 3.4.2, 3.12.8, 4.2.8, 7.1, **7.4**
MISCELLANEOUS PROVISIONS
13
Modifications, Definition of
1.1.1
Modifications to the Contract
1.1.1, 1.1.2, 2.5, 3.11, 4.1.2, 4.2.1, 5.2.3, 7, 8.3.1, 9.7, 10.3.2
Mutual Responsibility
6.2
Nonconforming Work, Acceptance of
9.6.6, 9.9.3, **12.3**
Nonconforming Work, Rejection and Correction of
2.4, 2.5, 3.5, 4.2.6, 6.2.4, 9.5.1, 9.8.2, 9.9.3, 9.10.4, 12.2
Notice
1.6, 1.6.1, 1.6.2, 2.1.2, 2.2.2., 2.2.3, 2.2.4, 2.5, 3.2.4, 3.3.1, 3.7.4, 3.7.5, 3.9.2, 3.12.9, 3.12.10, 5.2.1, 7.4, 8.2.2 9.6.8, 9.7, 9.10.1, 10.2.8, 10.3.2, 11.5, 12.2.2.1, 13.4.1, 13.4.2, 14.1, 14.2.2, 14.4.2, 15.1.3, 15.1.5, 15.1.6, 15.4.1
Notice of Cancellation or Expiration of Insurance
11.1.4, 11.2.3
Notice of Claims
1.6.2, 2.1.2, 3.7.4, 9.6.8, 10.2.8, **15.1.3**, 15.1.5, 15.1.6, 15.2.8, 15.3.2, 15.4.1
Notice of Testing and Inspections
13.4.1, 13.4.2
Observations, Contractor's

3.2, 3.7.4
Occupancy
2.3.1, 9.6.6, 9.8
Orders, Written
1.1.1, 2.4, 3.9.2, 7, 8.2.2, 11.5, 12.1, 12.2.2.1, 13.4.2, 14.3.1
OWNER
2
Owner, Definition of
2.1.1
Owner, Evidence of Financial Arrangements
2.2, 13.2.2, 14.1.1.4
Owner, Information and Services Required of the
2.1.2, **2.2**, 2.3, 3.2.2, 3.12.10, 6.1.3, 6.1.4, 6.2.5, 9.3.2, 9.6.1, 9.6.4, 9.9.2, 9.10.3, 10.3.3, 11.2, 13.4.1, 13.4.2, 14.1.1.4, 14.1.4, 15.1.4
Owner's Authority
1.5, 2.1.1, 2.3.32.4, 2.5, 3.4.2, 3.8.1, 3.12.10, 3.14.2, 4.1.2, 4.2.4, 4.2.9, 5.2.1, 5.2.4, 5.4.1, 6.1, 6.3, 7.2.1, 7.3.1, 8.2.2, 8.3.1, 9.3.2, 9.5.1, 9.6.4, 9.9.1, 9.10.2, 10.3.2, 11.4, 11.5, 12.2.2, 12.3, 13.2.2, 14.3, 14.4, 15.2.7
Owner's Insurance
11.2
Owner's Relationship with Subcontractors
1.1.2, 5.2, 5.3, 5.4, 9.6.4, 9.10.2, 14.2.2
Owner's Right to Carry Out the Work
2.5, 14.2.2
Owner's Right to Clean Up
6.3
Owner's Right to Perform Construction and to Award Separate Contracts
6.1
Owner's Right to Stop the Work
2.4
Owner's Right to Suspend the Work
14.3
Owner's Right to Terminate the Contract
14.2, 14.4
Ownership and Use of Drawings, Specifications and Other Instruments of Service
1.1.1, 1.1.6, 1.1.7, **1.5**, 2.3.6, 3.2.2, 3.11, 3.17, 4.2.12, 5.3
Partial Occupancy or Use
9.6.6, **9.9**
Patching, Cutting and
3.14, 6.2.5
Patents
3.17
Payment, Applications for
4.2.5, 7.3.9, 9.2, **9.3**, 9.4, 9.5, 9.6.3, 9.7, 9.8.5, 9.10.1, 14.2.3, 14.2.4, 14.4.3
Payment, Certificates for
4.2.5, 4.2.9, 9.3.3, **9.4**, 9.5, 9.6.1, 9.6.6, 9.7, 9.10.1, 9.10.3, 14.1.1.3, 14.2.4
Payment, Failure of
9.5.1.3, **9.7**, 9.10.2, 13.5, 14.1.1.3, 14.2.1.2
Payment, Final
4.2.1, 4.2.9, **9.10**, 12.3, 14.2.4, 14.4.3
Payment Bond, Performance Bond and
7.3.4.4, 9.6.7, 9.10.3, **11.1.2**
Payments, Progress
9.3, **9.6**, 9.8.5, 9.10.3, 14.2.3, 15.1.4
PAYMENTS AND COMPLETION
9
Payments to Subcontractors
5.4.2, 9.5.1.3, 9.6.2, 9.6.3, 9.6.4, 9.6.7, 14.2.1.2
PCB
10.3.1
Performance Bond and Payment Bond
7.3.4.4, 9.6.7, 9.10.3, **11.1.2**
Permits, Fees, Notices and Compliance with Laws
2.3.1, **3.7**, 3.13, 7.3.4.4, 10.2.2
PERSONS AND PROPERTY, PROTECTION OF
10
Polychlorinated Biphenyl
10.3.1
Product Data, Definition of
3.12.2
Product Data and Samples, Shop Drawings
3.11, **3.12**, 4.2.7
Progress and Completion
4.2.2, **8.2**, 9.8, 9.9.1, 14.1.4, 15.1.4
Progress Payments
9.3, **9.6**, 9.8.5, 9.10.3, 14.2.3, 15.1.4
Project, Definition of
1.1.4
Project Representatives
4.2.10
Property Insurance
10.2.5, **11.2**
Proposal Requirements
1.1.1
PROTECTION OF PERSONS AND PROPERTY
10
Regulations and Laws
1.5, 2.3.2, 3.2.3, 3.6, 3.7, 3.12.10, 3.13, 9.6.4, 9.9.1, 10.2.2, 13.1, 13.3, 13.4.1, 13.4.2, 13.5, 14, 15.2.8, 15.4
Rejection of Work
4.2.6, 12.2.1
Releases and Waivers of Liens
9.3.1, 9.10.2
Representations
3.2.1, 3.5, 3.12.6, 8.2.1, 9.3.3, 9.4.2, 9.5.1, 9.10.1
Representatives
2.1.1, 3.1.1, 3.9, 4.1.1, 4.2.10, 13.2.1
Responsibility for Those Performing the Work
3.3.2, 3.18, 4.2.2, 4.2.3, 5.3, 6.1.3, 6.2, 6.3, 9.5.1, 10
Retainage
9.3.1, 9.6.2, 9.8.5, 9.9.1, 9.10.2, 9.10.3
Review of Contract Documents and Field Conditions by Contractor
3.2, 3.12.7, 6.1.3
Review of Contractor's Submittals by Owner and Architect
3.10.1, 3.10.2, 3.11, 3.12, 4.2, 5.2, 6.1.3, 9.2, 9.8.2
Review of Shop Drawings, Product Data and Samples by Contractor

3.12
Rights and Remedies
1.1.2, 2.4, 2.5, 3.5, 3.7.4, 3.15.2, 4.2.6, 5.3, 5.4, 6.1, 6.3, 7.3.1, 8.3, 9.5.1, 9.7, 10.2.5, 10.3, 12.2.1, 12.2.2, 12.2.4, **13.3**, 14, 15.4
Royalties, Patents and Copyrights
3.17
Rules and Notices for Arbitration
15.4.1
Safety of Persons and Property
10.2, 10.4
Safety Precautions and Programs
3.3.1, 4.2.2, 4.2.7, 5.3, **10.1**, 10.2, 10.4
Samples, Definition of
3.12.3
Samples, Shop Drawings, Product Data and
3.11, **3.12**, 4.2.7
Samples at the Site, Documents and
3.11
Schedule of Values
9.2, 9.3.1
Schedules, Construction
3.10, 3.12.1, 3.12.2, 6.1.3, 15.1.6.2
Separate Contracts and Contractors
1.1.4, 3.12.5, 3.14.2, 4.2.4, 4.2.7, 6, 8.3.1, 12.1.2
Separate Contractors, Definition of
6.1.1
Shop Drawings, Definition of
3.12.1
Shop Drawings, Product Data and Samples
3.11, **3.12**, 4.2.7
Site, Use of
3.13, 6.1.1, 6.2.1
Site Inspections
3.2.2, 3.3.3, 3.7.1, 3.7.4, 4.2, 9.9.2, 9.4.2, 9.10.1, 13.4
Site Visits, Architect's
3.7.4, 4.2.2, 4.2.9, 9.4.2, 9.5.1, 9.9.2, 9.10.1, 13.4
Special Inspections and Testing
4.2.6, 12.2.1, 13.4
Specifications, Definition of
1.1.6
Specifications
1.1.1, **1.1.6**, 1.2.2, 1.5, 3.12.10, 3.17, 4.2.14
Statute of Limitations
15.1.2, 15.4.1.1
Stopping the Work
2.2.2, 2.4, 9.7, 10.3, 14.1
Stored Materials
6.2.1, 9.3.2, 10.2.1.2, 10.2.4
Subcontractor, Definition of
5.1.1
SUBCONTRACTORS
5
Subcontractors, Work by
1.2.2, 3.3.2, 3.12.1, 3.18, 4.2.3, 5.2.3, 5.3, 5.4, 9.3.1.2, 9.6.7
Subcontractual Relations
5.3, 5.4, 9.3.1.2, 9.6, 9.10, 10.2.1, 14.1, 14.2.1
Submittals
3.10, 3.11, 3.12, 4.2.7, 5.2.1, 5.2.3, 7.3.4, 9.2, 9.3, 9.8, 9.9.1, 9.10.2, 9.10.3
Submittal Schedule
3.10.2, 3.12.5, 4.2.7
Subrogation, Waivers of
6.1.1, **11.3**
Substances, Hazardous
10.3
Substantial Completion
4.2.9, 8.1.1, 8.1.3, 8.2.3, 9.4.2, **9.8**, 9.9.1, 9.10.3, 12.2, 15.1.2
Substantial Completion, Definition of
9.8.1
Substitution of Subcontractors
5.2.3, 5.2.4
Substitution of Architect
2.3.3
Substitutions of Materials
3.4.2, 3.5, 7.3.8
Sub-subcontractor, Definition of
5.1.2
Subsurface Conditions
3.7.4
Successors and Assigns
13.2
Superintendent
3.9, 10.2.6
Supervision and Construction Procedures
1.2.2, **3.3**, 3.4, 3.12.10, 4.2.2, 4.2.7, 6.1.3, 6.2.4, 7.1.3, 7.3.4, 8.2, 8.3.1, 9.4.2, 10, 12, 14, 15.1.4
Suppliers
1.5, 3.12.1, 4.2.4, 4.2.6, 5.2.1, 9.3, 9.4.2, 9.5.4, 9.6, 9.10.5, 14.2.1
Surety
5.4.1.2, 9.6.8, 9.8.5, 9.10.2, 9.10.3, 11.1.2, 14.2.2, 15.2.7
Surety, Consent of
9.8.5, 9.10.2, 9.10.3
Surveys
1.1.7, 2.3.4
Suspension by the Owner for Convenience
14.3
Suspension of the Work
3.7.5, 5.4.2, 14.3
Suspension or Termination of the Contract
5.4.1.1, 14
Taxes
3.6, 3.8.2.1, 7.3.4.4
Termination by the Contractor
14.1, 15.1.7
Termination by the Owner for Cause
5.4.1.1, **14.2,** 15.1.7
Termination by the Owner for Convenience
14.4
Termination of the Architect
2.3.3
Termination of the Contractor Employment
14.2.2

TERMINATION OR SUSPENSION OF THE CONTRACT
14
Tests and Inspections
3.1.3, 3.3.3, 3.7.1, 4.2.2, 4.2.6, 4.2.9, 9.4.2, 9.8.3, 9.9.2, 9.10.1, 10.3.2, 12.2.1, **13.4**
TIME
8
Time, Delays and Extensions of
3.2.4, 3.7.4, 5.2.3, 7.2.1, 7.3.1, 7.4, **8.3**, 9.5.1, 9.7, 10.3.2, 10.4, 14.3.2, 15.1.6, 15.2.5
Time Limits
2.1.2, 2.2, 2.5, 3.2.2, 3.10, 3.11, 3.12.5, 3.15.1, 4.2, 5.2, 5.3, 5.4, 6.2.4, 7.3, 7.4, 8.2, 9.2, 9.3.1, 9.3.3, 9.4.1, 9.5, 9.6, 9.7, 9.8, 9.9, 9.10, 12.2, 13.4, 14, 15.1.2, 15.1.3, 15.4
Time Limits on Claims
3.7.4, 10.2.8, 15.1.2, 15.1.3
Title to Work
9.3.2, 9.3.3
UNCOVERING AND CORRECTION OF WORK
12
Uncovering of Work
12.1
Unforeseen Conditions, Concealed or Unknown
3.7.4, 8.3.1, 10.3
Unit Prices
7.3.3.2, 9.1.2
Use of Documents
1.1.1, 1.5, 2.3.6, 3.12.6, 5.3
Use of Site
3.13, 6.1.1, 6.2.1
Values, Schedule of
9.2, 9.3.1
Waiver of Claims by the Architect
13.3.2
Waiver of Claims by the Contractor
9.10.5, 13.3.2, **15.1.7**
Waiver of Claims by the Owner
9.9.3, 9.10.3, 9.10.4, 12.2.2.1, 13.3.2, 14.2.4, **15.1.7**
Waiver of Consequential Damages
14.2.4, 15.1.7
Waiver of Liens
9.3, 9.10.2, 9.10.4
Waivers of Subrogation
6.1.1, **11.3**
Warranty
3.5, 4.2.9, 9.3.3, 9.8.4, 9.9.1, 9.10.2, 9.10.4, 12.2.2, 15.1.2
Weather Delays
8.3, 15.1.6.2
Work, Definition of
1.1.3
Written Consent
1.5.2, 3.4.2, 3.7.4, 3.12.8, 3.14.2, 4.1.2, 9.3.2, 9.10.3, 13.2, 13.3.2, 15.4.4.2
Written Interpretations
4.2.11, 4.2.12
Written Orders
1.1.1, 2.4, 3.9, 7, 8.2.2, 12.1, 12.2, 13.4.2, 14.3.1

ARTICLE 1 GENERAL PROVISIONS

§ 1.1 Basic Definitions

§ 1.1.1 The Contract Documents

The Contract Documents are enumerated in the Agreement between the Owner and Contractor (hereinafter the Agreement) and consist of the Agreement, Conditions of the Contract (General, Supplementary and other Conditions), Drawings, Specifications, Addenda issued prior to execution of the Contract, other documents listed in the Agreement, and Modifications issued after execution of the Contract. A Modification is (1) a written amendment to the Contract signed by both parties, (2) a Change Order, (3) a Construction Change Directive, or (4) a written order for a minor change in the Work issued by the Architect. Unless specifically enumerated in the Agreement, the Contract Documents do not include the advertisement or invitation to bid, Instructions to Bidders, sample forms, other information furnished by the Owner in anticipation of receiving bids or proposals, the Contractor's bid or proposal, or portions of Addenda relating to bidding or proposal requirements.

§ 1.1.2 The Contract

The Contract Documents form the Contract for Construction. The Contract represents the entire and integrated agreement between the parties hereto and supersedes prior negotiations, representations, or agreements, either written or oral. The Contract may be amended or modified only by a Modification. The Contract Documents shall not be construed to create a contractual relationship of any kind (1) between the Contractor and the Architect or the Architect's consultants, (2) between the Owner and a Subcontractor or a Sub-subcontractor, (3) between the Owner and the Architect or the Architect's consultants, or (4) between any persons or entities other than the Owner and the Contractor. The Architect shall, however, be entitled to performance and enforcement of obligations under the Contract intended to facilitate performance of the Architect's duties.

§ 1.1.3 The Work

The term "Work" means the construction and services required by the Contract Documents, whether completed or partially completed, and includes all other labor, materials, equipment, and services provided or to be provided by the Contractor to fulfill the Contractor's obligations. The Work may constitute the whole or a part of the Project.

§ 1.1.4 The Project

The Project is the total construction of which the Work performed under the Contract Documents may be the whole or a part and which may include construction by the Owner and by Separate Contractors.

§ 1.1.5 The Drawings

The Drawings are the graphic and pictorial portions of the Contract Documents showing the design, location and dimensions of the Work, generally including plans, elevations, sections, details, schedules, and diagrams.

§ 1.1.6 The Specifications

The Specifications are that portion of the Contract Documents consisting of the written requirements for materials, equipment, systems, standards and workmanship for the Work, and performance of related services.

§ 1.1.7 Instruments of Service

Instruments of Service are representations, in any medium of expression now known or later developed, of the tangible and intangible creative work performed by the Architect and the Architect's consultants under their respective professional services agreements. Instruments of Service may include, without limitation, studies, surveys, models, sketches, drawings, specifications, and other similar materials.

§ 1.1.8 Initial Decision Maker

The Initial Decision Maker is the person identified in the Agreement to render initial decisions on Claims in accordance with Section 15.2. The Initial Decision Maker shall not show partiality to the Owner or Contractor and shall not be liable for results of interpretations or decisions rendered in good faith.

§ 1.2 Correlation and Intent of the Contract Documents

§ 1.2.1 The intent of the Contract Documents is to include all items necessary for the proper execution and completion of the Work by the Contractor. The Contract Documents are complementary, and what is required by one shall be as binding as if required by all; performance by the Contractor shall be required only to the extent consistent with the Contract Documents and reasonably inferable from them as being necessary to produce the indicated results.

§ 1.2.1.1 The invalidity of any provision of the Contract Documents shall not invalidate the Contract or its remaining provisions. If it is determined that any provision of the Contract Documents violates any law, or is otherwise invalid or unenforceable, then that provision shall be revised to the extent necessary to make that provision legal and enforceable. In such case the Contract Documents shall be construed, to the fullest extent permitted by law, to give effect to the parties' intentions and purposes in executing the Contract.

§ 1.2.2 Organization of the Specifications into divisions, sections and articles, and arrangement of Drawings shall not control the Contractor in dividing the Work among Subcontractors or in establishing the extent of Work to be performed by any trade.

§ 1.2.3 Unless otherwise stated in the Contract Documents, words that have well-known technical or construction industry meanings are used in the Contract Documents in accordance with such recognized meanings.

§ 1.3 Capitalization

Terms capitalized in these General Conditions include those that are (1) specifically defined, (2) the titles of numbered articles, or (3) the titles of other documents published by the American Institute of Architects.

§ 1.4 Interpretation

In the interest of brevity the Contract Documents frequently omit modifying words such as "all" and "any" and articles such as "the" and "an," but the fact that a modifier or an article is absent from one statement and appears in another is not intended to affect the interpretation of either statement.

§ 1.5 Ownership and Use of Drawings, Specifications, and Other Instruments of Service

§ 1.5.1 The Architect and the Architect's consultants shall be deemed the authors and owners of their respective Instruments of Service, including the Drawings and Specifications, and retain all common law, statutory, and other reserved rights in their Instruments of Service, including copyrights. The Contractor, Subcontractors, Sub-subcontractors, and suppliers shall not own or claim a copyright in the Instruments of Service. Submittal or distribution to meet official regulatory requirements or for other purposes in connection with the Project is not to be construed as publication in derogation of the Architect's or Architect's consultants' reserved rights.

§ 1.5.2 The Contractor, Subcontractors, Sub-subcontractors, and suppliers are authorized to use and reproduce the Instruments of Service provided to them, subject to any protocols established pursuant to Sections 1.7 and 1.8, solely and exclusively for execution of the Work. All copies made under this authorization shall bear the copyright notice, if any, shown on the Instruments of Service. The Contractor, Subcontractors, Sub-subcontractors, and suppliers may not use the Instruments of Service on other projects or for additions to the Project outside the scope of the Work without the specific written consent of the Owner, Architect, and the Architect's consultants.

§ 1.6 Notice

§ 1.6.1 Except as otherwise provided in Section 1.6.2, where the Contract Documents require one party to notify or give notice to the other party, such notice shall be provided in writing to the designated representative of the party to whom the notice is addressed and shall be deemed to have been duly served if delivered in person, by mail, by courier, or by electronic transmission if a method for electronic transmission is set forth in the Agreement.

§ 1.6.2 Notice of Claims as provided in Section 15.1.3 shall be provided in writing and shall be deemed to have been duly served only if delivered to the designated representative of the party to whom the notice is addressed by certified or registered mail, or by courier providing proof of delivery.

§ 1.7 Digital Data Use and Transmission

The parties shall agree upon written protocols governing the transmission and use of, and reliance on, Instruments of Service or any other information or documentation in digital form.

§ 1.8 Building Information Models Use and Reliance

Any use of, or reliance on, all or a portion of a building information model without agreement to written protocols governing the use of, and reliance on, the information contained in the model shall be at the using or relying party's sole risk and without liability to the other party and its contractors or consultants, the authors of, or contributors to, the building information model, and each of their agents and employees.

ARTICLE 2 OWNER

§ 2.1 General

§ 2.1.1 The Owner is the person or entity identified as such in the Agreement and is referred to throughout the Contract Documents as if singular in number. The Owner shall designate in writing a representative who shall have express authority to bind the Owner with respect to all matters requiring the Owner's approval or authorization. Except as otherwise provided in Section 4.2.1, the Architect does not have such authority. The term "Owner" means the Owner or the Owner's authorized representative.

§ 2.1.2 The Owner shall furnish to the Contractor, within fifteen days after receipt of a written request, information necessary and relevant for the Contractor to evaluate, give notice of, or enforce mechanic's lien rights. Such information shall include a correct statement of the record legal title to the property on which the Project is located, usually referred to as the site, and the Owner's interest therein.

§ 2.2 Evidence of the Owner's Financial Arrangements

§ 2.2.1 Prior to commencement of the Work and upon written request by the Contractor, the Owner shall furnish to the Contractor reasonable evidence that the Owner has made financial arrangements to fulfill the Owner's obligations under the Contract. The Contractor shall have no obligation to commence the Work until the Owner provides such evidence. If commencement of the Work is delayed under this Section 2.2.1, the Contract Time shall be extended appropriately.

§ 2.2.2 Following commencement of the Work and upon written request by the Contractor, the Owner shall furnish to the Contractor reasonable evidence that the Owner has made financial arrangements to fulfill the Owner's obligations under the Contract only if (1) the Owner fails to make payments to the Contractor as the Contract Documents require; (2) the Contractor identifies in writing a reasonable concern regarding the Owner's ability to make payment when due; or (3) a change in the Work materially changes the Contract Sum. If the Owner fails to provide such evidence, as required, within fourteen days of the Contractor's request, the Contractor may immediately stop the Work and, in that event, shall notify the Owner that the Work has stopped. However, if the request is made because a change in the Work materially changes the Contract Sum under (3) above, the Contractor may immediately stop only that portion of the Work affected by the change until reasonable evidence is provided. If the Work is stopped under this Section 2.2.2, the Contract Time shall be extended appropriately and the Contract Sum shall be increased by the amount of the Contractor's reasonable costs of shutdown, delay and start-up, plus interest as provided in the Contract Documents.

§ 2.2.3 After the Owner furnishes evidence of financial arrangements under this Section 2.2, the Owner shall not materially vary such financial arrangements without prior notice to the Contractor.

§ 2.2.4 Where the Owner has designated information furnished under this Section 2.2 as "confidential," the Contractor shall keep the information confidential and shall not disclose it to any other person. However, the Contractor may disclose "confidential" information, after seven (7) days' notice to the Owner, where disclosure is required by law, including a subpoena or other form of compulsory legal process issued by a court or governmental entity, or by court or arbitrator(s) order. The Contractor may also disclose "confidential" information to its employees, consultants, sureties, Subcontractors and their employees, Sub-subcontractors, and others who need to know the content of such information solely and exclusively for the Project and who agree to maintain the confidentiality of such information.

§ 2.3 Information and Services Required of the Owner

§ 2.3.1 Except for permits and fees that are the responsibility of the Contractor under the Contract Documents, including those required under Section 3.7.1, the Owner shall secure and pay for necessary approvals, easements, assessments and charges required for construction, use or occupancy of permanent structures or for permanent changes in existing facilities.

§ 2.3.2 The Owner shall retain an architect lawfully licensed to practice architecture, or an entity lawfully practicing architecture, in the jurisdiction where the Project is located. That person or entity is identified as the Architect in the Agreement and is referred to throughout the Contract Documents as if singular in number.

§ 2.3.3 If the employment of the Architect terminates, the Owner shall employ a successor to whom the Contractor has no reasonable objection and whose status under the Contract Documents shall be that of the Architect.

§ 2.3.4 The Owner shall furnish surveys describing physical characteristics, legal limitations and utility locations for the site of the Project, and a legal description of the site. The Contractor shall be entitled to rely on the accuracy of information furnished by the Owner but shall exercise proper precautions relating to the safe performance of the Work.

§ 2.3.5 The Owner shall furnish information or services required of the Owner by the Contract Documents with reasonable promptness. The Owner shall also furnish any other information or services under the Owner's control and relevant to the Contractor's performance of the Work with reasonable promptness after receiving the Contractor's written request for such information or services.

§ 2.3.6 Unless otherwise provided in the Contract Documents, the Owner shall furnish to the Contractor one copy of the Contract Documents for purposes of making reproductions pursuant to Section 1.5.2.

§ 2.4 Owner's Right to Stop the Work

If the Contractor fails to correct Work that is not in accordance with the requirements of the Contract Documents as required by Section 12.2 or repeatedly fails to carry out Work in accordance with the Contract Documents, the Owner may issue a written order to the Contractor to stop the Work, or any portion thereof, until the cause for such order has been eliminated; however, the right of the Owner to stop the Work shall not give rise to a duty on the part of the Owner to exercise this right for the benefit of the Contractor or any other person or entity, except to the extent required by Section 6.1.3.

§ 2.5 Owner's Right to Carry Out the Work

If the Contractor defaults or neglects to carry out the Work in accordance with the Contract Documents and fails within a ten-day period after receipt of notice from the Owner to commence and continue correction of such default or neglect with diligence and promptness, the Owner may, without prejudice to other remedies the Owner may have, correct such default or neglect. Such action by the Owner and amounts charged to the Contractor are both subject to prior approval of the Architect and the Architect may, pursuant to Section 9.5.1, withhold or nullify a Certificate for Payment in whole or in part, to the extent reasonably necessary to reimburse the Owner for the reasonable cost of correcting such deficiencies, including Owner's expenses and compensation for the Architect's additional services made necessary by such default, neglect, or failure. If current and future payments are not sufficient to cover such amounts, the Contractor shall pay the difference to the Owner. If the Contractor disagrees with the actions of the Owner or the Architect, or the amounts claimed as costs to the Owner, the Contractor may file a Claim pursuant to Article 15.

ARTICLE 3 CONTRACTOR

§ 3.1 General

§ 3.1.1 The Contractor is the person or entity identified as such in the Agreement and is referred to throughout the Contract Documents as if singular in number. The Contractor shall be lawfully licensed, if required in the jurisdiction where the Project is located. The Contractor shall designate in writing a representative who shall have express authority to bind the Contractor with respect to all matters under this Contract. The term "Contractor" means the Contractor or the Contractor's authorized representative.

§ 3.1.2 The Contractor shall perform the Work in accordance with the Contract Documents.

§ 3.1.3 The Contractor shall not be relieved of its obligations to perform the Work in accordance with the Contract Documents either by activities or duties of the Architect in the Architect's administration of the Contract, or by tests, inspections or approvals required or performed by persons or entities other than the Contractor.

§ 3.2 Review of Contract Documents and Field Conditions by Contractor

§ 3.2.1 Execution of the Contract by the Contractor is a representation that the Contractor has visited the site, become generally familiar with local conditions under which the Work is to be performed, and correlated personal observations with requirements of the Contract Documents.

§ 3.2.2 Because the Contract Documents are complementary, the Contractor shall, before starting each portion of the Work, carefully study and compare the various Contract Documents relative to that portion of the Work, as well as the information furnished by the Owner pursuant to Section 2.3.4, shall take field measurements of any existing conditions related to that portion of the Work, and shall observe any conditions at the site affecting it. These obligations are for the purpose of facilitating coordination and construction by the Contractor and are not for the

purpose of discovering errors, omissions, or inconsistencies in the Contract Documents; however, the Contractor shall promptly report to the Architect any errors, inconsistencies or omissions discovered by or made known to the Contractor as a request for information in such form as the Architect may require. It is recognized that the Contractor's review is made in the Contractor's capacity as a contractor and not as a licensed design professional, unless otherwise specifically provided in the Contract Documents.

§ 3.2.3 The Contractor is not required to ascertain that the Contract Documents are in accordance with applicable laws, statutes, ordinances, codes, rules and regulations, or lawful orders of public authorities, but the Contractor shall promptly report to the Architect any nonconformity discovered by or made known to the Contractor as a request for information in such form as the Architect may require.

§ 3.2.4 If the Contractor believes that additional cost or time is involved because of clarifications or instructions the Architect issues in response to the Contractor's notices or requests for information pursuant to Sections 3.2.2 or 3.2.3, the Contractor shall submit Claims as provided in Article 15. If the Contractor fails to perform the obligations of Sections 3.2.2 or 3.2.3, the Contractor shall pay such costs and damages to the Owner, subject to Section 15.1.7, as would have been avoided if the Contractor had performed such obligations. If the Contractor performs those obligations, the Contractor shall not be liable to the Owner or Architect for damages resulting from errors, inconsistencies or omissions in the Contract Documents, for differences between field measurements or conditions and the Contract Documents, or for nonconformities of the Contract Documents to applicable laws, statutes, ordinances, codes, rules and regulations, and lawful orders of public authorities.

§ 3.3 Supervision and Construction Procedures

§ 3.3.1 The Contractor shall supervise and direct the Work, using the Contractor's best skill and attention. The Contractor shall be solely responsible for, and have control over, construction means, methods, techniques, sequences, and procedures, and for coordinating all portions of the Work under the Contract. If the Contract Documents give specific instructions concerning construction means, methods, techniques, sequences, or procedures, the Contractor shall evaluate the jobsite safety thereof and shall be solely responsible for the jobsite safety of such means, methods, techniques, sequences, or procedures. If the Contractor determines that such means, methods, techniques, sequences or procedures may not be safe, the Contractor shall give timely notice to the Owner and Architect, and shall propose alternative means, methods, techniques, sequences, or procedures. The Architect shall evaluate the proposed alternative solely for conformance with the design intent for the completed construction. Unless the Architect objects to the Contractor's proposed alternative, the Contractor shall perform the Work using its alternative means, methods, techniques, sequences, or procedures.

§ 3.3.2 The Contractor shall be responsible to the Owner for acts and omissions of the Contractor's employees, Subcontractors and their agents and employees, and other persons or entities performing portions of the Work for, or on behalf of, the Contractor or any of its Subcontractors.

§ 3.3.3 The Contractor shall be responsible for inspection of portions of Work already performed to determine that such portions are in proper condition to receive subsequent Work.

§ 3.4 Labor and Materials

§ 3.4.1 Unless otherwise provided in the Contract Documents, the Contractor shall provide and pay for labor, materials, equipment, tools, construction equipment and machinery, water, heat, utilities, transportation, and other facilities and services necessary for proper execution and completion of the Work, whether temporary or permanent and whether or not incorporated or to be incorporated in the Work.

§ 3.4.2 Except in the case of minor changes in the Work approved by the Architect in accordance with Section 3.12.8 or ordered by the Architect in accordance with Section 7.4, the Contractor may make substitutions only with the consent of the Owner, after evaluation by the Architect and in accordance with a Change Order or Construction Change Directive.

§ 3.4.3 The Contractor shall enforce strict discipline and good order among the Contractor's employees and other persons carrying out the Work. The Contractor shall not permit employment of unfit persons or persons not properly skilled in tasks assigned to them.

§ 3.5 Warranty

§ 3.5.1 The Contractor warrants to the Owner and Architect that materials and equipment furnished under the Contract will be of good quality and new unless the Contract Documents require or permit otherwise. The Contractor further warrants that the Work will conform to the requirements of the Contract Documents and will be free from defects, except for those inherent in the quality of the Work the Contract Documents require or permit. Work, materials, or equipment not conforming to these requirements may be considered defective. The Contractor's warranty excludes remedy for damage or defect caused by abuse, alterations to the Work not executed by the Contractor, improper or insufficient maintenance, improper operation, or normal wear and tear and normal usage. If required by the Architect, the Contractor shall furnish satisfactory evidence as to the kind and quality of materials and equipment.

§ 3.5.2 All material, equipment, or other special warranties required by the Contract Documents shall be issued in the name of the Owner, or shall be transferable to the Owner, and shall commence in accordance with Section 9.8.4.

§ 3.6 Taxes

The Contractor shall pay sales, consumer, use and similar taxes for the Work provided by the Contractor that are legally enacted when bids are received or negotiations concluded, whether or not yet effective or merely scheduled to go into effect.

§ 3.7 Permits, Fees, Notices and Compliance with Laws

§ 3.7.1 Unless otherwise provided in the Contract Documents, the Contractor shall secure and pay for the building permit as well as for other permits, fees, licenses, and inspections by government agencies necessary for proper execution and completion of the Work that are customarily secured after execution of the Contract and legally required at the time bids are received or negotiations concluded.

§ 3.7.2 The Contractor shall comply with and give notices required by applicable laws, statutes, ordinances, codes, rules and regulations, and lawful orders of public authorities applicable to performance of the Work.

§ 3.7.3 If the Contractor performs Work knowing it to be contrary to applicable laws, statutes, ordinances, codes, rules and regulations, or lawful orders of public authorities, the Contractor shall assume appropriate responsibility for such Work and shall bear the costs attributable to correction.

§ 3.7.4 Concealed or Unknown Conditions

If the Contractor encounters conditions at the site that are (1) subsurface or otherwise concealed physical conditions that differ materially from those indicated in the Contract Documents or (2) unknown physical conditions of an unusual nature that differ materially from those ordinarily found to exist and generally recognized as inherent in construction activities of the character provided for in the Contract Documents, the Contractor shall promptly provide notice to the Owner and the Architect before conditions are disturbed and in no event later than 14 days after first observance of the conditions. The Architect will promptly investigate such conditions and, if the Architect determines that they differ materially and cause an increase or decrease in the Contractor's cost of, or time required for, performance of any part of the Work, will recommend that an equitable adjustment be made in the Contract Sum or Contract Time, or both. If the Architect determines that the conditions at the site are not materially different from those indicated in the Contract Documents and that no change in the terms of the Contract is justified, the Architect shall promptly notify the Owner and Contractor, stating the reasons. If either party disputes the Architect's determination or recommendation, that party may submit a Claim as provided in Article 15.

§ 3.7.5 If, in the course of the Work, the Contractor encounters human remains or recognizes the existence of burial markers, archaeological sites or wetlands not indicated in the Contract Documents, the Contractor shall immediately suspend any operations that would affect them and shall notify the Owner and Architect. Upon receipt of such notice, the Owner shall promptly take any action necessary to obtain governmental authorization required to resume the operations. The Contractor shall continue to suspend such operations until otherwise instructed by the Owner but shall continue with all other operations that do not affect those remains or features. Requests for adjustments in the Contract Sum and Contract Time arising from the existence of such remains or features may be made as provided in Article 15.

§ 3.8 Allowances

§ 3.8.1 The Contractor shall include in the Contract Sum all allowances stated in the Contract Documents. Items covered by allowances shall be supplied for such amounts and by such persons or entities as the Owner may direct,

but the Contractor shall not be required to employ persons or entities to whom the Contractor has reasonable objection.

§ 3.8.2 Unless otherwise provided in the Contract Documents,

.1 allowances shall cover the cost to the Contractor of materials and equipment delivered at the site and all required taxes, less applicable trade discounts;

.2 Contractor's costs for unloading and handling at the site, labor, installation costs, overhead, profit, and other expenses contemplated for stated allowance amounts shall be included in the Contract Sum but not in the allowances; and

.3 whenever costs are more than or less than allowances, the Contract Sum shall be adjusted accordingly by Change Order. The amount of the Change Order shall reflect (1) the difference between actual costs and the allowances under Section 3.8.2.1 and (2) changes in Contractor's costs under Section 3.8.2.2.

§ 3.8.3 Materials and equipment under an allowance shall be selected by the Owner with reasonable promptness.

§ 3.9 Superintendent

§ 3.9.1 The Contractor shall employ a competent superintendent and necessary assistants who shall be in attendance at the Project site during performance of the Work. The superintendent shall represent the Contractor, and communications given to the superintendent shall be as binding as if given to the Contractor.

§ 3.9.2 The Contractor, as soon as practicable after award of the Contract, shall notify the Owner and Architect of the name and qualifications of a proposed superintendent. Within 14 days of receipt of the information, the Architect may notify the Contractor, stating whether the Owner or the Architect (1) has reasonable objection to the proposed superintendent or (2) requires additional time for review. Failure of the Architect to provide notice within the 14-day period shall constitute notice of no reasonable objection.

§ 3.9.3 The Contractor shall not employ a proposed superintendent to whom the Owner or Architect has made reasonable and timely objection. The Contractor shall not change the superintendent without the Owner's consent, which shall not unreasonably be withheld or delayed.

§ 3.10 Contractor's Construction and Submittal Schedules

§ 3.10.1 The Contractor, promptly after being awarded the Contract, shall submit for the Owner's and Architect's information a Contractor's construction schedule for the Work. The schedule shall contain detail appropriate for the Project, including (1) the date of commencement of the Work, interim schedule milestone dates, and the date of Substantial Completion; (2) an apportionment of the Work by construction activity; and (3) the time required for completion of each portion of the Work. The schedule shall provide for the orderly progression of the Work to completion and shall not exceed time limits current under the Contract Documents. The schedule shall be revised at appropriate intervals as required by the conditions of the Work and Project.

§ 3.10.2 The Contractor, promptly after being awarded the Contract and thereafter as necessary to maintain a current submittal schedule, shall submit a submittal schedule for the Architect's approval. The Architect's approval shall not be unreasonably delayed or withheld. The submittal schedule shall (1) be coordinated with the Contractor's construction schedule, and (2) allow the Architect reasonable time to review submittals. If the Contractor fails to submit a submittal schedule, or fails to provide submittals in accordance with the approved submittal schedule, the Contractor shall not be entitled to any increase in Contract Sum or extension of Contract Time based on the time required for review of submittals.

§ 3.10.3 The Contractor shall perform the Work in general accordance with the most recent schedules submitted to the Owner and Architect.

§ 3.11 Documents and Samples at the Site

The Contractor shall make available, at the Project site, the Contract Documents, including Change Orders, Construction Change Directives, and other Modifications, in good order and marked currently to indicate field changes and selections made during construction, and the approved Shop Drawings, Product Data, Samples, and similar required submittals. These shall be in electronic form or paper copy, available to the Architect and Owner, and delivered to the Architect for submittal to the Owner upon completion of the Work as a record of the Work as

constructed.

§ 3.12 Shop Drawings, Product Data and Samples

§ 3.12.1 Shop Drawings are drawings, diagrams, schedules, and other data specially prepared for the Work by the Contractor or a Subcontractor, Sub-subcontractor, manufacturer, supplier, or distributor to illustrate some portion of the Work.

§ 3.12.2 Product Data are illustrations, standard schedules, performance charts, instructions, brochures, diagrams, and other information furnished by the Contractor to illustrate materials or equipment for some portion of the Work.

§ 3.12.3 Samples are physical examples that illustrate materials, equipment, or workmanship, and establish standards by which the Work will be judged.

§ 3.12.4 Shop Drawings, Product Data, Samples, and similar submittals are not Contract Documents. Their purpose is to demonstrate how the Contractor proposes to conform to the information given and the design concept expressed in the Contract Documents for those portions of the Work for which the Contract Documents require submittals. Review by the Architect is subject to the limitations of Section 4.2.7. Informational submittals upon which the Architect is not expected to take responsive action may be so identified in the Contract Documents. Submittals that are not required by the Contract Documents may be returned by the Architect without action.

§ 3.12.5 The Contractor shall review for compliance with the Contract Documents, approve, and submit to the Architect, Shop Drawings, Product Data, Samples, and similar submittals required by the Contract Documents, in accordance with the submittal schedule approved by the Architect or, in the absence of an approved submittal schedule, with reasonable promptness and in such sequence as to cause no delay in the Work or in the activities of the Owner or of Separate Contractors.

§ 3.12.6 By submitting Shop Drawings, Product Data, Samples, and similar submittals, the Contractor represents to the Owner and Architect that the Contractor has (1) reviewed and approved them, (2) determined and verified materials, field measurements and field construction criteria related thereto, or will do so, and (3) checked and coordinated the information contained within such submittals with the requirements of the Work and of the Contract Documents.

§ 3.12.7 The Contractor shall perform no portion of the Work for which the Contract Documents require submittal and review of Shop Drawings, Product Data, Samples, or similar submittals, until the respective submittal has been approved by the Architect.

§ 3.12.8 The Work shall be in accordance with approved submittals except that the Contractor shall not be relieved of responsibility for deviations from the requirements of the Contract Documents by the Architect's approval of Shop Drawings, Product Data, Samples, or similar submittals, unless the Contractor has specifically notified the Architect of such deviation at the time of submittal and (1) the Architect has given written approval to the specific deviation as a minor change in the Work, or (2) a Change Order or Construction Change Directive has been issued authorizing the deviation. The Contractor shall not be relieved of responsibility for errors or omissions in Shop Drawings, Product Data, Samples, or similar submittals, by the Architect's approval thereof.

§ 3.12.9 The Contractor shall direct specific attention, in writing or on resubmitted Shop Drawings, Product Data, Samples, or similar submittals, to revisions other than those requested by the Architect on previous submittals. In the absence of such notice, the Architect's approval of a resubmission shall not apply to such revisions.

§ 3.12.10 The Contractor shall not be required to provide professional services that constitute the practice of architecture or engineering unless such services are specifically required by the Contract Documents for a portion of the Work or unless the Contractor needs to provide such services in order to carry out the Contractor's responsibilities for construction means, methods, techniques, sequences, and procedures. The Contractor shall not be required to provide professional services in violation of applicable law.

§ 3.12.10.1 If professional design services or certifications by a design professional related to systems, materials, or equipment are specifically required of the Contractor by the Contract Documents, the Owner and the Architect will specify all performance and design criteria that such services must satisfy. The Contractor shall be entitled to rely upon the adequacy and accuracy of the performance and design criteria provided in the Contract Documents. The

Contractor shall cause such services or certifications to be provided by an appropriately licensed design professional, whose signature and seal shall appear on all drawings, calculations, specifications, certifications, Shop Drawings, and other submittals prepared by such professional. Shop Drawings, and other submittals related to the Work, designed or certified by such professional, if prepared by others, shall bear such professional's written approval when submitted to the Architect. The Owner and the Architect shall be entitled to rely upon the adequacy and accuracy of the services, certifications, and approvals performed or provided by such design professionals, provided the Owner and Architect have specified to the Contractor the performance and design criteria that such services must satisfy. Pursuant to this Section 3.12.10, the Architect will review and approve or take other appropriate action on submittals only for the limited purpose of checking for conformance with information given and the design concept expressed in the Contract Documents.

§ 3.12.10.2 If the Contract Documents require the Contractor's design professional to certify that the Work has been performed in accordance with the design criteria, the Contractor shall furnish such certifications to the Architect at the time and in the form specified by the Architect.

§ 3.13 Use of Site

The Contractor shall confine operations at the site to areas permitted by applicable laws, statutes, ordinances, codes, rules and regulations, lawful orders of public authorities, and the Contract Documents and shall not unreasonably encumber the site with materials or equipment.

§ 3.14 Cutting and Patching

§ 3.14.1 The Contractor shall be responsible for cutting, fitting, or patching required to complete the Work or to make its parts fit together properly. All areas requiring cutting, fitting, or patching shall be restored to the condition existing prior to the cutting, fitting, or patching, unless otherwise required by the Contract Documents.

§ 3.14.2 The Contractor shall not damage or endanger a portion of the Work or fully or partially completed construction of the Owner or Separate Contractors by cutting, patching, or otherwise altering such construction, or by excavation. The Contractor shall not cut or otherwise alter construction by the Owner or a Separate Contractor except with written consent of the Owner and of the Separate Contractor. Consent shall not be unreasonably withheld. The Contractor shall not unreasonably withhold, from the Owner or a Separate Contractor, its consent to cutting or otherwise altering the Work.

§ 3.15 Cleaning Up

§ 3.15.1 The Contractor shall keep the premises and surrounding area free from accumulation of waste materials and rubbish caused by operations under the Contract. At completion of the Work, the Contractor shall remove waste materials, rubbish, the Contractor's tools, construction equipment, machinery, and surplus materials from and about the Project.

§ 3.15.2 If the Contractor fails to clean up as provided in the Contract Documents, the Owner may do so and the Owner shall be entitled to reimbursement from the Contractor.

§ 3.16 Access to Work

The Contractor shall provide the Owner and Architect with access to the Work in preparation and progress wherever located.

§ 3.17 Royalties, Patents and Copyrights

The Contractor shall pay all royalties and license fees. The Contractor shall defend suits or claims for infringement of copyrights and patent rights and shall hold the Owner and Architect harmless from loss on account thereof, but shall not be responsible for defense or loss when a particular design, process, or product of a particular manufacturer or manufacturers is required by the Contract Documents, or where the copyright violations are contained in Drawings, Specifications, or other documents prepared by the Owner or Architect. However, if an infringement of a copyright or patent is discovered by, or made known to, the Contractor, the Contractor shall be responsible for the loss unless the information is promptly furnished to the Architect.

§ 3.18 Indemnification

§ 3.18.1 To the fullest extent permitted by law, the Contractor shall indemnify and hold harmless the Owner, Architect, Architect's consultants, and agents and employees of any of them from and against claims, damages, losses, and expenses, including but not limited to attorneys' fees, arising out of or resulting from performance of the

Work, provided that such claim, damage, loss, or expense is attributable to bodily injury, sickness, disease or death, or to injury to or destruction of tangible property (other than the Work itself), but only to the extent caused by the negligent acts or omissions of the Contractor, a Subcontractor, anyone directly or indirectly employed by them, or anyone for whose acts they may be liable, regardless of whether or not such claim, damage, loss, or expense is caused in part by a party indemnified hereunder. Such obligation shall not be construed to negate, abridge, or reduce other rights or obligations of indemnity that would otherwise exist as to a party or person described in this Section 3.18.

§ 3.18.2 In claims against any person or entity indemnified under this Section 3.18 by an employee of the Contractor, a Subcontractor, anyone directly or indirectly employed by them, or anyone for whose acts they may be liable, the indemnification obligation under Section 3.18.1 shall not be limited by a limitation on amount or type of damages, compensation, or benefits payable by or for the Contractor or a Subcontractor under workers' compensation acts, disability benefit acts, or other employee benefit acts.

ARTICLE 4 ARCHITECT

§ 4.1 General

§ 4.1.1 The Architect is the person or entity retained by the Owner pursuant to Section 2.3.2 and identified as such in the Agreement.

§ 4.1.2 Duties, responsibilities, and limitations of authority of the Architect as set forth in the Contract Documents shall not be restricted, modified, or extended without written consent of the Owner, Contractor, and Architect. Consent shall not be unreasonably withheld.

§ 4.2 Administration of the Contract

§ 4.2.1 The Architect will provide administration of the Contract as described in the Contract Documents and will be an Owner's representative during construction until the date the Architect issues the final Certificate for Payment. The Architect will have authority to act on behalf of the Owner only to the extent provided in the Contract Documents.

§ 4.2.2 The Architect will visit the site at intervals appropriate to the stage of construction, or as otherwise agreed with the Owner, to become generally familiar with the progress and quality of the portion of the Work completed, and to determine in general if the Work observed is being performed in a manner indicating that the Work, when fully completed, will be in accordance with the Contract Documents. However, the Architect will not be required to make exhaustive or continuous on-site inspections to check the quality or quantity of the Work. The Architect will not have control over, charge of, or responsibility for the construction means, methods, techniques, sequences or procedures, or for the safety precautions and programs in connection with the Work, since these are solely the Contractor's rights and responsibilities under the Contract Documents.

§ 4.2.3 On the basis of the site visits, the Architect will keep the Owner reasonably informed about the progress and quality of the portion of the Work completed, and promptly report to the Owner (1) known deviations from the Contract Documents, (2) known deviations from the most recent construction schedule submitted by the Contractor, and (3) defects and deficiencies observed in the Work. The Architect will not be responsible for the Contractor's failure to perform the Work in accordance with the requirements of the Contract Documents. The Architect will not have control over or charge of, and will not be responsible for acts or omissions of, the Contractor, Subcontractors, or their agents or employees, or any other persons or entities performing portions of the Work.

§ 4.2.4 Communications

The Owner and Contractor shall include the Architect in all communications that relate to or affect the Architect's services or professional responsibilities. The Owner shall promptly notify the Architect of the substance of any direct communications between the Owner and the Contractor otherwise relating to the Project. Communications by and with the Architect's consultants shall be through the Architect. Communications by and with Subcontractors and suppliers shall be through the Contractor. Communications by and with Separate Contractors shall be through the Owner. The Contract Documents may specify other communication protocols.

§ 4.2.5 Based on the Architect's evaluations of the Contractor's Applications for Payment, the Architect will review and certify the amounts due the Contractor and will issue Certificates for Payment in such amounts.

§ 4.2.6 The Architect has authority to reject Work that does not conform to the Contract Documents. Whenever the Architect considers it necessary or advisable, the Architect will have authority to require inspection or testing of the Work in accordance with Sections 13.4.2 and 13.4.3, whether or not the Work is fabricated, installed or completed. However, neither this authority of the Architect nor a decision made in good faith either to exercise or not to exercise such authority shall give rise to a duty or responsibility of the Architect to the Contractor, Subcontractors, suppliers, their agents or employees, or other persons or entities performing portions of the Work.

§ 4.2.7 The Architect will review and approve, or take other appropriate action upon, the Contractor's submittals such as Shop Drawings, Product Data, and Samples, but only for the limited purpose of checking for conformance with information given and the design concept expressed in the Contract Documents. The Architect's action will be taken in accordance with the submittal schedule approved by the Architect or, in the absence of an approved submittal schedule, with reasonable promptness while allowing sufficient time in the Architect's professional judgment to permit adequate review. Review of such submittals is not conducted for the purpose of determining the accuracy and completeness of other details such as dimensions and quantities, or for substantiating instructions for installation or performance of equipment or systems, all of which remain the responsibility of the Contractor as required by the Contract Documents. The Architect's review of the Contractor's submittals shall not relieve the Contractor of the obligations under Sections 3.3, 3.5, and 3.12. The Architect's review shall not constitute approval of safety precautions or of any construction means, methods, techniques, sequences, or procedures. The Architect's approval of a specific item shall not indicate approval of an assembly of which the item is a component.

§ 4.2.8 The Architect will prepare Change Orders and Construction Change Directives, and may order minor changes in the Work as provided in Section 7.4. The Architect will investigate and make determinations and recommendations regarding concealed and unknown conditions as provided in Section 3.7.4.

§ 4.2.9 The Architect will conduct inspections to determine the date or dates of Substantial Completion and the date of final completion; issue Certificates of Substantial Completion pursuant to Section 9.8; receive and forward to the Owner, for the Owner's review and records, written warranties and related documents required by the Contract and assembled by the Contractor pursuant to Section 9.10; and issue a final Certificate for Payment pursuant to Section 9.10.

§ 4.2.10 If the Owner and Architect agree, the Architect will provide one or more Project representatives to assist in carrying out the Architect's responsibilities at the site. The Owner shall notify the Contractor of any change in the duties, responsibilities and limitations of authority of the Project representatives.

§ 4.2.11 The Architect will interpret and decide matters concerning performance under, and requirements of, the Contract Documents on written request of either the Owner or Contractor. The Architect's response to such requests will be made in writing within any time limits agreed upon or otherwise with reasonable promptness.

§ 4.2.12 Interpretations and decisions of the Architect will be consistent with the intent of, and reasonably inferable from, the Contract Documents and will be in writing or in the form of drawings. When making such interpretations and decisions, the Architect will endeavor to secure faithful performance by both Owner and Contractor, will not show partiality to either, and will not be liable for results of interpretations or decisions rendered in good faith.

§ 4.2.13 The Architect's decisions on matters relating to aesthetic effect will be final if consistent with the intent expressed in the Contract Documents.

§ 4.2.14 The Architect will review and respond to requests for information about the Contract Documents. The Architect's response to such requests will be made in writing within any time limits agreed upon or otherwise with reasonable promptness. If appropriate, the Architect will prepare and issue supplemental Drawings and Specifications in response to the requests for information.

ARTICLE 5 SUBCONTRACTORS

§ 5.1 Definitions

§ 5.1.1 A Subcontractor is a person or entity who has a direct contract with the Contractor to perform a portion of the Work at the site. The term "Subcontractor" is referred to throughout the Contract Documents as if singular in number and means a Subcontractor or an authorized representative of the Subcontractor. The term "Subcontractor" does not include a Separate Contractor or the subcontractors of a Separate Contractor.

§ 5.1.2 A Sub-subcontractor is a person or entity who has a direct or indirect contract with a Subcontractor to perform a portion of the Work at the site. The term "Sub-subcontractor" is referred to throughout the Contract Documents as if singular in number and means a Sub-subcontractor or an authorized representative of the Sub-subcontractor.

§ 5.2 Award of Subcontracts and Other Contracts for Portions of the Work

§ 5.2.1 Unless otherwise stated in the Contract Documents, the Contractor, as soon as practicable after award of the Contract, shall notify the Owner and Architect of the persons or entities proposed for each principal portion of the Work, including those who are to furnish materials or equipment fabricated to a special design. Within 14 days of receipt of the information, the Architect may notify the Contractor whether the Owner or the Architect (1) has reasonable objection to any such proposed person or entity or (2) requires additional time for review. Failure of the Architect to provide notice within the 14-day period shall constitute notice of no reasonable objection.

§ 5.2.2 The Contractor shall not contract with a proposed person or entity to whom the Owner or Architect has made reasonable and timely objection. The Contractor shall not be required to contract with anyone to whom the Contractor has made reasonable objection.

§ 5.2.3 If the Owner or Architect has reasonable objection to a person or entity proposed by the Contractor, the Contractor shall propose another to whom the Owner or Architect has no reasonable objection. If the proposed but rejected Subcontractor was reasonably capable of performing the Work, the Contract Sum and Contract Time shall be increased or decreased by the difference, if any, occasioned by such change, and an appropriate Change Order shall be issued before commencement of the substitute Subcontractor's Work. However, no increase in the Contract Sum or Contract Time shall be allowed for such change unless the Contractor has acted promptly and responsively in submitting names as required.

§ 5.2.4 The Contractor shall not substitute a Subcontractor, person, or entity for one previously selected if the Owner or Architect makes reasonable objection to such substitution.

§ 5.3 Subcontractual Relations

By appropriate written agreement, the Contractor shall require each Subcontractor, to the extent of the Work to be performed by the Subcontractor, to be bound to the Contractor by terms of the Contract Documents, and to assume toward the Contractor all the obligations and responsibilities, including the responsibility for safety of the Subcontractor's Work that the Contractor, by these Contract Documents, assumes toward the Owner and Architect. Each subcontract agreement shall preserve and protect the rights of the Owner and Architect under the Contract Documents with respect to the Work to be performed by the Subcontractor so that subcontracting thereof will not prejudice such rights, and shall allow to the Subcontractor, unless specifically provided otherwise in the subcontract agreement, the benefit of all rights, remedies, and redress against the Contractor that the Contractor, by the Contract Documents, has against the Owner. Where appropriate, the Contractor shall require each Subcontractor to enter into similar agreements with Sub-subcontractors. The Contractor shall make available to each proposed Subcontractor, prior to the execution of the subcontract agreement, copies of the Contract Documents to which the Subcontractor will be bound, and, upon written request of the Subcontractor, identify to the Subcontractor terms and conditions of the proposed subcontract agreement that may be at variance with the Contract Documents. Subcontractors will similarly make copies of applicable portions of such documents available to their respective proposed Sub-subcontractors.

§ 5.4 Contingent Assignment of Subcontracts

§ 5.4.1 Each subcontract agreement for a portion of the Work is assigned by the Contractor to the Owner, provided that

.1 assignment is effective only after termination of the Contract by the Owner for cause pursuant to Section 14.2 and only for those subcontract agreements that the Owner accepts by notifying the Subcontractor and Contractor; and

.2 assignment is subject to the prior rights of the surety, if any, obligated under bond relating to the Contract.

When the Owner accepts the assignment of a subcontract agreement, the Owner assumes the Contractor's rights and obligations under the subcontract.

§ 5.4.2 Upon such assignment, if the Work has been suspended for more than 30 days, the Subcontractor's compensation shall be equitably adjusted for increases in cost resulting from the suspension.

§ 5.4.3 Upon assignment to the Owner under this Section 5.4, the Owner may further assign the subcontract to a successor contractor or other entity. If the Owner assigns the subcontract to a successor contractor or other entity, the Owner shall nevertheless remain legally responsible for all of the successor contractor's obligations under the subcontract.

ARTICLE 6 CONSTRUCTION BY OWNER OR BY SEPARATE CONTRACTORS

§ 6.1 Owner's Right to Perform Construction and to Award Separate Contracts

§ 6.1.1 The term "Separate Contractor(s)" shall mean other contractors retained by the Owner under separate agreements. The Owner reserves the right to perform construction or operations related to the Project with the Owner's own forces, and with Separate Contractors retained under Conditions of the Contract substantially similar to those of this Contract, including those provisions of the Conditions of the Contract related to insurance and waiver of subrogation.

§ 6.1.2 When separate contracts are awarded for different portions of the Project or other construction or operations on the site, the term "Contractor" in the Contract Documents in each case shall mean the Contractor who executes each separate Owner-Contractor Agreement.

§ 6.1.3 The Owner shall provide for coordination of the activities of the Owner's own forces and of each Separate Contractor with the Work of the Contractor, who shall cooperate with them. The Contractor shall participate with any Separate Contractors and the Owner in reviewing their construction schedules. The Contractor shall make any revisions to its construction schedule deemed necessary after a joint review and mutual agreement. The construction schedules shall then constitute the schedules to be used by the Contractor, Separate Contractors, and the Owner until subsequently revised.

§ 6.1.4 Unless otherwise provided in the Contract Documents, when the Owner performs construction or operations related to the Project with the Owner's own forces or with Separate Contractors, the Owner or its Separate Contractors shall have the same obligations and rights that the Contractor has under the Conditions of the Contract, including, without excluding others, those stated in Article 3, this Article 6, and Articles 10, 11, and 12.

§ 6.2 Mutual Responsibility

§ 6.2.1 The Contractor shall afford the Owner and Separate Contractors reasonable opportunity for introduction and storage of their materials and equipment and performance of their activities, and shall connect and coordinate the Contractor's construction and operations with theirs as required by the Contract Documents.

§ 6.2.2 If part of the Contractor's Work depends for proper execution or results upon construction or operations by the Owner or a Separate Contractor, the Contractor shall, prior to proceeding with that portion of the Work, promptly notify the Architect of apparent discrepancies or defects in the construction or operations by the Owner or Separate Contractor that would render it unsuitable for proper execution and results of the Contractor's Work. Failure of the Contractor to notify the Architect of apparent discrepancies or defects prior to proceeding with the Work shall constitute an acknowledgment that the Owner's or Separate Contractor's completed or partially completed construction is fit and proper to receive the Contractor's Work. The Contractor shall not be responsible for discrepancies or defects in the construction or operations by the Owner or Separate Contractor that are not apparent.

§ 6.2.3 The Contractor shall reimburse the Owner for costs the Owner incurs that are payable to a Separate Contractor because of the Contractor's delays, improperly timed activities or defective construction. The Owner shall be responsible to the Contractor for costs the Contractor incurs because of a Separate Contractor's delays, improperly timed activities, damage to the Work or defective construction.

§ 6.2.4 The Contractor shall promptly remedy damage that the Contractor wrongfully causes to completed or partially completed construction or to property of the Owner or Separate Contractor as provided in Section 10.2.5.

§ 6.2.5 The Owner and each Separate Contractor shall have the same responsibilities for cutting and patching as are described for the Contractor in Section 3.14.

§ 6.3 Owner's Right to Clean Up

If a dispute arises among the Contractor, Separate Contractors, and the Owner as to the responsibility under their respective contracts for maintaining the premises and surrounding area free from waste materials and rubbish, the Owner may clean up and the Architect will allocate the cost among those responsible.

ARTICLE 7 CHANGES IN THE WORK

§ 7.1 General

§ 7.1.1 Changes in the Work may be accomplished after execution of the Contract, and without invalidating the Contract, by Change Order, Construction Change Directive or order for a minor change in the Work, subject to the limitations stated in this Article 7 and elsewhere in the Contract Documents.

§ 7.1.2 A Change Order shall be based upon agreement among the Owner, Contractor, and Architect. A Construction Change Directive requires agreement by the Owner and Architect and may or may not be agreed to by the Contractor. An order for a minor change in the Work may be issued by the Architect alone.

§ 7.1.3 Changes in the Work shall be performed under applicable provisions of the Contract Documents. The Contractor shall proceed promptly with changes in the Work, unless otherwise provided in the Change Order, Construction Change Directive, or order for a minor change in the Work.

§ 7.2 Change Orders

§ 7.2.1 A Change Order is a written instrument prepared by the Architect and signed by the Owner, Contractor, and Architect stating their agreement upon all of the following:

- **.1** The change in the Work;
- **.2** The amount of the adjustment, if any, in the Contract Sum; and
- **.3** The extent of the adjustment, if any, in the Contract Time.

§ 7.3 Construction Change Directives

§ 7.3.1 A Construction Change Directive is a written order prepared by the Architect and signed by the Owner and Architect, directing a change in the Work prior to agreement on adjustment, if any, in the Contract Sum or Contract Time, or both. The Owner may by Construction Change Directive, without invalidating the Contract, order changes in the Work within the general scope of the Contract consisting of additions, deletions, or other revisions, the Contract Sum and Contract Time being adjusted accordingly.

§ 7.3.2 A Construction Change Directive shall be used in the absence of total agreement on the terms of a Change Order.

§ 7.3.3 If the Construction Change Directive provides for an adjustment to the Contract Sum, the adjustment shall be based on one of the following methods:

- **.1** Mutual acceptance of a lump sum properly itemized and supported by sufficient substantiating data to permit evaluation;
- **.2** Unit prices stated in the Contract Documents or subsequently agreed upon;
- **.3** Cost to be determined in a manner agreed upon by the parties and a mutually acceptable fixed or percentage fee; or
- **.4** As provided in Section 7.3.4.

§ 7.3.4 If the Contractor does not respond promptly or disagrees with the method for adjustment in the Contract Sum, the Architect shall determine the adjustment on the basis of reasonable expenditures and savings of those performing the Work attributable to the change, including, in case of an increase in the Contract Sum, an amount for overhead and profit as set forth in the Agreement, or if no such amount is set forth in the Agreement, a reasonable amount. In such case, and also under Section 7.3.3.3, the Contractor shall keep and present, in such form as the Architect may prescribe, an itemized accounting together with appropriate supporting data. Unless otherwise provided in the Contract Documents, costs for the purposes of this Section 7.3.4 shall be limited to the following:

- **.1** Costs of labor, including applicable payroll taxes, fringe benefits required by agreement or custom, workers' compensation insurance, and other employee costs approved by the Architect;
- **.2** Costs of materials, supplies, and equipment, including cost of transportation, whether incorporated or consumed;

.3 Rental costs of machinery and equipment, exclusive of hand tools, whether rented from the Contractor or others;

.4 Costs of premiums for all bonds and insurance, permit fees, and sales, use, or similar taxes, directly related to the change; and

.5 Costs of supervision and field office personnel directly attributable to the change.

§ 7.3.5 If the Contractor disagrees with the adjustment in the Contract Time, the Contractor may make a Claim in accordance with applicable provisions of Article 15.

§ 7.3.6 Upon receipt of a Construction Change Directive, the Contractor shall promptly proceed with the change in the Work involved and advise the Architect of the Contractor's agreement or disagreement with the method, if any, provided in the Construction Change Directive for determining the proposed adjustment in the Contract Sum or Contract Time.

§ 7.3.7 A Construction Change Directive signed by the Contractor indicates the Contractor's agreement therewith, including adjustment in Contract Sum and Contract Time or the method for determining them. Such agreement shall be effective immediately and shall be recorded as a Change Order.

§ 7.3.8 The amount of credit to be allowed by the Contractor to the Owner for a deletion or change that results in a net decrease in the Contract Sum shall be actual net cost as confirmed by the Architect. When both additions and credits covering related Work or substitutions are involved in a change, the allowance for overhead and profit shall be figured on the basis of net increase, if any, with respect to that change.

§ 7.3.9 Pending final determination of the total cost of a Construction Change Directive to the Owner, the Contractor may request payment for Work completed under the Construction Change Directive in Applications for Payment. The Architect will make an interim determination for purposes of monthly certification for payment for those costs and certify for payment the amount that the Architect determines, in the Architect's professional judgment, to be reasonably justified. The Architect's interim determination of cost shall adjust the Contract Sum on the same basis as a Change Order, subject to the right of either party to disagree and assert a Claim in accordance with Article 15.

§ 7.3.10 When the Owner and Contractor agree with a determination made by the Architect concerning the adjustments in the Contract Sum and Contract Time, or otherwise reach agreement upon the adjustments, such agreement shall be effective immediately and the Architect will prepare a Change Order. Change Orders may be issued for all or any part of a Construction Change Directive.

§ 7.4 Minor Changes in the Work

The Architect may order minor changes in the Work that are consistent with the intent of the Contract Documents and do not involve an adjustment in the Contract Sum or an extension of the Contract Time. The Architect's order for minor changes shall be in writing. If the Contractor believes that the proposed minor change in the Work will affect the Contract Sum or Contract Time, the Contractor shall notify the Architect and shall not proceed to implement the change in the Work. If the Contractor performs the Work set forth in the Architect's order for a minor change without prior notice to the Architect that such change will affect the Contract Sum or Contract Time, the Contractor waives any adjustment to the Contract Sum or extension of the Contract Time.

ARTICLE 8 TIME

§ 8.1 Definitions

§ 8.1.1 Unless otherwise provided, Contract Time is the period of time, including authorized adjustments, allotted in the Contract Documents for Substantial Completion of the Work.

§ 8.1.2 The date of commencement of the Work is the date established in the Agreement.

§ 8.1.3 The date of Substantial Completion is the date certified by the Architect in accordance with Section 9.8.

§ 8.1.4 The term "day" as used in the Contract Documents shall mean calendar day unless otherwise specifically defined.

§ 8.2 Progress and Completion

§ 8.2.1 Time limits stated in the Contract Documents are of the essence of the Contract. By executing the Agreement, the Contractor confirms that the Contract Time is a reasonable period for performing the Work.

§ 8.2.2 The Contractor shall not knowingly, except by agreement or instruction of the Owner in writing, commence the Work prior to the effective date of insurance required to be furnished by the Contractor and Owner.

§ 8.2.3 The Contractor shall proceed expeditiously with adequate forces and shall achieve Substantial Completion within the Contract Time.

§ 8.3 Delays and Extensions of Time

§ 8.3.1 If the Contractor is delayed at any time in the commencement or progress of the Work by (1) an act or neglect of the Owner or Architect, of an employee of either, or of a Separate Contractor; (2) by changes ordered in the Work; (3) by labor disputes, fire, unusual delay in deliveries, unavoidable casualties, adverse weather conditions documented in accordance with Section 15.1.6.2, or other causes beyond the Contractor's control; (4) by delay authorized by the Owner pending mediation and binding dispute resolution; or (5) by other causes that the Contractor asserts, and the Architect determines, justify delay, then the Contract Time shall be extended for such reasonable time as the Architect may determine.

§ 8.3.2 Claims relating to time shall be made in accordance with applicable provisions of Article 15.

§ 8.3.3 This Section 8.3 does not preclude recovery of damages for delay by either party under other provisions of the Contract Documents.

ARTICLE 9 PAYMENTS AND COMPLETION

§ 9.1 Contract Sum

§ 9.1.1 The Contract Sum is stated in the Agreement and, including authorized adjustments, is the total amount payable by the Owner to the Contractor for performance of the Work under the Contract Documents.

§ 9.1.2 If unit prices are stated in the Contract Documents or subsequently agreed upon, and if quantities originally contemplated are materially changed so that application of such unit prices to the actual quantities causes substantial inequity to the Owner or Contractor, the applicable unit prices shall be equitably adjusted.

§ 9.2 Schedule of Values

Where the Contract is based on a stipulated sum or Guaranteed Maximum Price, the Contractor shall submit a schedule of values to the Architect before the first Application for Payment, allocating the entire Contract Sum to the various portions of the Work. The schedule of values shall be prepared in the form, and supported by the data to substantiate its accuracy, required by the Architect. This schedule, unless objected to by the Architect, shall be used as a basis for reviewing the Contractor's Applications for Payment. Any changes to the schedule of values shall be submitted to the Architect and supported by such data to substantiate its accuracy as the Architect may require, and unless objected to by the Architect, shall be used as a basis for reviewing the Contractor's subsequent Applications for Payment.

§ 9.3 Applications for Payment

§ 9.3.1 At least ten days before the date established for each progress payment, the Contractor shall submit to the Architect an itemized Application for Payment prepared in accordance with the schedule of values, if required under Section 9.2, for completed portions of the Work. The application shall be notarized, if required, and supported by all data substantiating the Contractor's right to payment that the Owner or Architect require, such as copies of requisitions, and releases and waivers of liens from Subcontractors and suppliers, and shall reflect retainage if provided for in the Contract Documents.

§ 9.3.1.1 As provided in Section 7.3.9, such applications may include requests for payment on account of changes in the Work that have been properly authorized by Construction Change Directives, or by interim determinations of the Architect, but not yet included in Change Orders.

§ 9.3.1.2 Applications for Payment shall not include requests for payment for portions of the Work for which the Contractor does not intend to pay a Subcontractor or supplier, unless such Work has been performed by others

whom the Contractor intends to pay.

§ 9.3.2 Unless otherwise provided in the Contract Documents, payments shall be made on account of materials and equipment delivered and suitably stored at the site for subsequent incorporation in the Work. If approved in advance by the Owner, payment may similarly be made for materials and equipment suitably stored off the site at a location agreed upon in writing. Payment for materials and equipment stored on or off the site shall be conditioned upon compliance by the Contractor with procedures satisfactory to the Owner to establish the Owner's title to such materials and equipment or otherwise protect the Owner's interest, and shall include the costs of applicable insurance, storage, and transportation to the site, for such materials and equipment stored off the site.

§ 9.3.3 The Contractor warrants that title to all Work covered by an Application for Payment will pass to the Owner no later than the time of payment. The Contractor further warrants that upon submittal of an Application for Payment all Work for which Certificates for Payment have been previously issued and payments received from the Owner shall, to the best of the Contractor's knowledge, information, and belief, be free and clear of liens, claims, security interests, or encumbrances, in favor of the Contractor, Subcontractors, suppliers, or other persons or entities that provided labor, materials, and equipment relating to the Work.

§ 9.4 Certificates for Payment

§ 9.4.1 The Architect will, within seven days after receipt of the Contractor's Application for Payment, either (1) issue to the Owner a Certificate for Payment in the full amount of the Application for Payment, with a copy to the Contractor; or (2) issue to the Owner a Certificate for Payment for such amount as the Architect determines is properly due, and notify the Contractor and Owner of the Architect's reasons for withholding certification in part as provided in Section 9.5.1; or (3) withhold certification of the entire Application for Payment, and notify the Contractor and Owner of the Architect's reason for withholding certification in whole as provided in Section 9.5.1.

§ 9.4.2 The issuance of a Certificate for Payment will constitute a representation by the Architect to the Owner, based on the Architect's evaluation of the Work and the data in the Application for Payment, that, to the best of the Architect's knowledge, information, and belief, the Work has progressed to the point indicated, the quality of the Work is in accordance with the Contract Documents, and that the Contractor is entitled to payment in the amount certified. The foregoing representations are subject to an evaluation of the Work for conformance with the Contract Documents upon Substantial Completion, to results of subsequent tests and inspections, to correction of minor deviations from the Contract Documents prior to completion, and to specific qualifications expressed by the Architect. However, the issuance of a Certificate for Payment will not be a representation that the Architect has (1) made exhaustive or continuous on-site inspections to check the quality or quantity of the Work; (2) reviewed construction means, methods, techniques, sequences, or procedures; (3) reviewed copies of requisitions received from Subcontractors and suppliers and other data requested by the Owner to substantiate the Contractor's right to payment; or (4) made examination to ascertain how or for what purpose the Contractor has used money previously paid on account of the Contract Sum.

§ 9.5 Decisions to Withhold Certification

§ 9.5.1 The Architect may withhold a Certificate for Payment in whole or in part, to the extent reasonably necessary to protect the Owner, if in the Architect's opinion the representations to the Owner required by Section 9.4.2 cannot be made. If the Architect is unable to certify payment in the amount of the Application, the Architect will notify the Contractor and Owner as provided in Section 9.4.1. If the Contractor and Architect cannot agree on a revised amount, the Architect will promptly issue a Certificate for Payment for the amount for which the Architect is able to make such representations to the Owner. The Architect may also withhold a Certificate for Payment or, because of subsequently discovered evidence, may nullify the whole or a part of a Certificate for Payment previously issued, to such extent as may be necessary in the Architect's opinion to protect the Owner from loss for which the Contractor is responsible, including loss resulting from acts and omissions described in Section 3.3.2, because of

- **.1** defective Work not remedied;
- **.2** third party claims filed or reasonable evidence indicating probable filing of such claims, unless security acceptable to the Owner is provided by the Contractor;
- **.3** failure of the Contractor to make payments properly to Subcontractors or suppliers for labor, materials or equipment;
- **.4** reasonable evidence that the Work cannot be completed for the unpaid balance of the Contract Sum;
- **.5** damage to the Owner or a Separate Contractor;
- **.6** reasonable evidence that the Work will not be completed within the Contract Time, and that the unpaid balance would not be adequate to cover actual or liquidated damages for the anticipated delay;

or

.7 repeated failure to carry out the Work in accordance with the Contract Documents.

§ 9.5.2 When either party disputes the Architect's decision regarding a Certificate for Payment under Section 9.5.1, in whole or in part, that party may submit a Claim in accordance with Article 15.

§ 9.5.3 When the reasons for withholding certification are removed, certification will be made for amounts previously withheld.

§ 9.5.4 If the Architect withholds certification for payment under Section 9.5.1.3, the Owner may, at its sole option, issue joint checks to the Contractor and to any Subcontractor or supplier to whom the Contractor failed to make payment for Work properly performed or material or equipment suitably delivered. If the Owner makes payments by joint check, the Owner shall notify the Architect and the Contractor shall reflect such payment on its next Application for Payment.

§ 9.6 Progress Payments

§ 9.6.1 After the Architect has issued a Certificate for Payment, the Owner shall make payment in the manner and within the time provided in the Contract Documents, and shall so notify the Architect.

§ 9.6.2 The Contractor shall pay each Subcontractor, no later than seven days after receipt of payment from the Owner, the amount to which the Subcontractor is entitled, reflecting percentages actually retained from payments to the Contractor on account of the Subcontractor's portion of the Work. The Contractor shall, by appropriate agreement with each Subcontractor, require each Subcontractor to make payments to Sub-subcontractors in a similar manner.

§ 9.6.3 The Architect will, on request, furnish to a Subcontractor, if practicable, information regarding percentages of completion or amounts applied for by the Contractor and action taken thereon by the Architect and Owner on account of portions of the Work done by such Subcontractor.

§ 9.6.4 The Owner has the right to request written evidence from the Contractor that the Contractor has properly paid Subcontractors and suppliers amounts paid by the Owner to the Contractor for subcontracted Work. If the Contractor fails to furnish such evidence within seven days, the Owner shall have the right to contact Subcontractors and suppliers to ascertain whether they have been properly paid. Neither the Owner nor Architect shall have an obligation to pay, or to see to the payment of money to, a Subcontractor or supplier, except as may otherwise be required by law.

§ 9.6.5 The Contractor's payments to suppliers shall be treated in a manner similar to that provided in Sections 9.6.2, 9.6.3 and 9.6.4.

§ 9.6.6 A Certificate for Payment, a progress payment, or partial or entire use or occupancy of the Project by the Owner shall not constitute acceptance of Work not in accordance with the Contract Documents.

§ 9.6.7 Unless the Contractor provides the Owner with a payment bond in the full penal sum of the Contract Sum, payments received by the Contractor for Work properly performed by Subcontractors or provided by suppliers shall be held by the Contractor for those Subcontractors or suppliers who performed Work or furnished materials, or both, under contract with the Contractor for which payment was made by the Owner. Nothing contained herein shall require money to be placed in a separate account and not commingled with money of the Contractor, create any fiduciary liability or tort liability on the part of the Contractor for breach of trust, or entitle any person or entity to an award of punitive damages against the Contractor for breach of the requirements of this provision.

§ 9.6.8 Provided the Owner has fulfilled its payment obligations under the Contract Documents, the Contractor shall defend and indemnify the Owner from all loss, liability, damage or expense, including reasonable attorney's fees and litigation expenses, arising out of any lien claim or other claim for payment by any Subcontractor or supplier of any tier. Upon receipt of notice of a lien claim or other claim for payment, the Owner shall notify the Contractor. If approved by the applicable court, when required, the Contractor may substitute a surety bond for the property against which the lien or other claim for payment has been asserted.

§ 9.7 Failure of Payment

If the Architect does not issue a Certificate for Payment, through no fault of the Contractor, within seven days after receipt of the Contractor's Application for Payment, or if the Owner does not pay the Contractor within seven days after the date established in the Contract Documents, the amount certified by the Architect or awarded by binding dispute resolution, then the Contractor may, upon seven additional days' notice to the Owner and Architect, stop the Work until payment of the amount owing has been received. The Contract Time shall be extended appropriately and the Contract Sum shall be increased by the amount of the Contractor's reasonable costs of shutdown, delay and start-up, plus interest as provided for in the Contract Documents.

§ 9.8 Substantial Completion

§ 9.8.1 Substantial Completion is the stage in the progress of the Work when the Work or designated portion thereof is sufficiently complete in accordance with the Contract Documents so that the Owner can occupy or utilize the Work for its intended use.

§ 9.8.2 When the Contractor considers that the Work, or a portion thereof which the Owner agrees to accept separately, is substantially complete, the Contractor shall prepare and submit to the Architect a comprehensive list of items to be completed or corrected prior to final payment. Failure to include an item on such list does not alter the responsibility of the Contractor to complete all Work in accordance with the Contract Documents.

§ 9.8.3 Upon receipt of the Contractor's list, the Architect will make an inspection to determine whether the Work or designated portion thereof is substantially complete. If the Architect's inspection discloses any item, whether or not included on the Contractor's list, which is not sufficiently complete in accordance with the Contract Documents so that the Owner can occupy or utilize the Work or designated portion thereof for its intended use, the Contractor shall, before issuance of the Certificate of Substantial Completion, complete or correct such item upon notification by the Architect. In such case, the Contractor shall then submit a request for another inspection by the Architect to determine Substantial Completion.

§ 9.8.4 When the Work or designated portion thereof is substantially complete, the Architect will prepare a Certificate of Substantial Completion that shall establish the date of Substantial Completion; establish responsibilities of the Owner and Contractor for security, maintenance, heat, utilities, damage to the Work and insurance; and fix the time within which the Contractor shall finish all items on the list accompanying the Certificate. Warranties required by the Contract Documents shall commence on the date of Substantial Completion of the Work or designated portion thereof unless otherwise provided in the Certificate of Substantial Completion.

§ 9.8.5 The Certificate of Substantial Completion shall be submitted to the Owner and Contractor for their written acceptance of responsibilities assigned to them in the Certificate. Upon such acceptance, and consent of surety if any, the Owner shall make payment of retainage applying to the Work or designated portion thereof. Such payment shall be adjusted for Work that is incomplete or not in accordance with the requirements of the Contract Documents.

§ 9.9 Partial Occupancy or Use

§ 9.9.1 The Owner may occupy or use any completed or partially completed portion of the Work at any stage when such portion is designated by separate agreement with the Contractor, provided such occupancy or use is consented to by the insurer and authorized by public authorities having jurisdiction over the Project. Such partial occupancy or use may commence whether or not the portion is substantially complete, provided the Owner and Contractor have accepted in writing the responsibilities assigned to each of them for payments, retainage, if any, security, maintenance, heat, utilities, damage to the Work and insurance, and have agreed in writing concerning the period for correction of the Work and commencement of warranties required by the Contract Documents. When the Contractor considers a portion substantially complete, the Contractor shall prepare and submit a list to the Architect as provided under Section 9.8.2. Consent of the Contractor to partial occupancy or use shall not be unreasonably withheld. The stage of the progress of the Work shall be determined by written agreement between the Owner and Contractor or, if no agreement is reached, by decision of the Architect.

§ 9.9.2 Immediately prior to such partial occupancy or use, the Owner, Contractor, and Architect shall jointly inspect the area to be occupied or portion of the Work to be used in order to determine and record the condition of the Work.

§ 9.9.3 Unless otherwise agreed upon, partial occupancy or use of a portion or portions of the Work shall not constitute acceptance of Work not complying with the requirements of the Contract Documents.

§ 9.10 Final Completion and Final Payment

§ 9.10.1 Upon receipt of the Contractor's notice that the Work is ready for final inspection and acceptance and upon receipt of a final Application for Payment, the Architect will promptly make such inspection. When the Architect finds the Work acceptable under the Contract Documents and the Contract fully performed, the Architect will promptly issue a final Certificate for Payment stating that to the best of the Architect's knowledge, information and belief, and on the basis of the Architect's on-site visits and inspections, the Work has been completed in accordance with the Contract Documents and that the entire balance found to be due the Contractor and noted in the final Certificate is due and payable. The Architect's final Certificate for Payment will constitute a further representation that conditions listed in Section 9.10.2 as precedent to the Contractor's being entitled to final payment have been fulfilled.

§ 9.10.2 Neither final payment nor any remaining retained percentage shall become due until the Contractor submits to the Architect (1) an affidavit that payrolls, bills for materials and equipment, and other indebtedness connected with the Work for which the Owner or the Owner's property might be responsible or encumbered (less amounts withheld by Owner) have been paid or otherwise satisfied, (2) a certificate evidencing that insurance required by the Contract Documents to remain in force after final payment is currently in effect, (3) a written statement that the Contractor knows of no reason that the insurance will not be renewable to cover the period required by the Contract Documents, (4) consent of surety, if any, to final payment, (5) documentation of any special warranties, such as manufacturers' warranties or specific Subcontractor warranties, and (6) if required by the Owner, other data establishing payment or satisfaction of obligations, such as receipts and releases and waivers of liens, claims, security interests, or encumbrances arising out of the Contract, to the extent and in such form as may be designated by the Owner. If a Subcontractor refuses to furnish a release or waiver required by the Owner, the Contractor may furnish a bond satisfactory to the Owner to indemnify the Owner against such lien, claim, security interest, or encumbrance. If a lien, claim, security interest, or encumbrance remains unsatisfied after payments are made, the Contractor shall refund to the Owner all money that the Owner may be compelled to pay in discharging the lien, claim, security interest, or encumbrance, including all costs and reasonable attorneys' fees.

§ 9.10.3 If, after Substantial Completion of the Work, final completion thereof is materially delayed through no fault of the Contractor or by issuance of Change Orders affecting final completion, and the Architect so confirms, the Owner shall, upon application by the Contractor and certification by the Architect, and without terminating the Contract, make payment of the balance due for that portion of the Work fully completed, corrected, and accepted. If the remaining balance for Work not fully completed or corrected is less than retainage stipulated in the Contract Documents, and if bonds have been furnished, the written consent of the surety to payment of the balance due for that portion of the Work fully completed and accepted shall be submitted by the Contractor to the Architect prior to certification of such payment. Such payment shall be made under terms and conditions governing final payment, except that it shall not constitute a waiver of Claims.

§ 9.10.4 The making of final payment shall constitute a waiver of Claims by the Owner except those arising from

- **.1** liens, Claims, security interests, or encumbrances arising out of the Contract and unsettled;
- **.2** failure of the Work to comply with the requirements of the Contract Documents;
- **.3** terms of special warranties required by the Contract Documents; or
- **.4** audits performed by the Owner, if permitted by the Contract Documents, after final payment.

§ 9.10.5 Acceptance of final payment by the Contractor, a Subcontractor, or a supplier, shall constitute a waiver of claims by that payee except those previously made in writing and identified by that payee as unsettled at the time of final Application for Payment.

ARTICLE 10 PROTECTION OF PERSONS AND PROPERTY

§ 10.1 Safety Precautions and Programs

The Contractor shall be responsible for initiating, maintaining, and supervising all safety precautions and programs in connection with the performance of the Contract.

§ 10.2 Safety of Persons and Property

§ 10.2.1 The Contractor shall take reasonable precautions for safety of, and shall provide reasonable protection to prevent damage, injury, or loss to

- **.1** employees on the Work and other persons who may be affected thereby;

.2 the Work and materials and equipment to be incorporated therein, whether in storage on or off the site, under care, custody, or control of the Contractor, a Subcontractor, or a Sub-subcontractor; and

.3 other property at the site or adjacent thereto, such as trees, shrubs, lawns, walks, pavements, roadways, structures, and utilities not designated for removal, relocation, or replacement in the course of construction.

§ 10.2.2 The Contractor shall comply with, and give notices required by applicable laws, statutes, ordinances, codes, rules and regulations, and lawful orders of public authorities, bearing on safety of persons or property or their protection from damage, injury, or loss.

§ 10.2.3 The Contractor shall implement, erect, and maintain, as required by existing conditions and performance of the Contract, reasonable safeguards for safety and protection, including posting danger signs and other warnings against hazards; promulgating safety regulations; and notifying the owners and users of adjacent sites and utilities of the safeguards.

§ 10.2.4 When use or storage of explosives or other hazardous materials or equipment, or unusual methods are necessary for execution of the Work, the Contractor shall exercise utmost care and carry on such activities under supervision of properly qualified personnel.

§ 10.2.5 The Contractor shall promptly remedy damage and loss (other than damage or loss insured under property insurance required by the Contract Documents) to property referred to in Sections 10.2.1.2 and 10.2.1.3 caused in whole or in part by the Contractor, a Subcontractor, a Sub-subcontractor, or anyone directly or indirectly employed by any of them, or by anyone for whose acts they may be liable and for which the Contractor is responsible under Sections 10.2.1.2 and 10.2.1.3. The Contractor may make a Claim for the cost to remedy the damage or loss to the extent such damage or loss is attributable to acts or omissions of the Owner or Architect or anyone directly or indirectly employed by either of them, or by anyone for whose acts either of them may be liable, and not attributable to the fault or negligence of the Contractor. The foregoing obligations of the Contractor are in addition to the Contractor's obligations under Section 3.18.

§ 10.2.6 The Contractor shall designate a responsible member of the Contractor's organization at the site whose duty shall be the prevention of accidents. This person shall be the Contractor's superintendent unless otherwise designated by the Contractor in writing to the Owner and Architect.

§ 10.2.7 The Contractor shall not permit any part of the construction or site to be loaded so as to cause damage or create an unsafe condition.

§ 10.2.8 Injury or Damage to Person or Property

If either party suffers injury or damage to person or property because of an act or omission of the other party, or of others for whose acts such party is legally responsible, notice of the injury or damage, whether or not insured, shall be given to the other party within a reasonable time not exceeding 21 days after discovery. The notice shall provide sufficient detail to enable the other party to investigate the matter.

§ 10.3 Hazardous Materials and Substances

§ 10.3.1 The Contractor is responsible for compliance with any requirements included in the Contract Documents regarding hazardous materials or substances. If the Contractor encounters a hazardous material or substance not addressed in the Contract Documents and if reasonable precautions will be inadequate to prevent foreseeable bodily injury or death to persons resulting from a material or substance, including but not limited to asbestos or polychlorinated biphenyl (PCB), encountered on the site by the Contractor, the Contractor shall, upon recognizing the condition, immediately stop Work in the affected area and notify the Owner and Architect of the condition.

§ 10.3.2 Upon receipt of the Contractor's notice, the Owner shall obtain the services of a licensed laboratory to verify the presence or absence of the material or substance reported by the Contractor and, in the event such material or substance is found to be present, to cause it to be rendered harmless. Unless otherwise required by the Contract Documents, the Owner shall furnish in writing to the Contractor and Architect the names and qualifications of persons or entities who are to perform tests verifying the presence or absence of the material or substance or who are to perform the task of removal or safe containment of the material or substance. The Contractor and the Architect will promptly reply to the Owner in writing stating whether or not either has reasonable objection to the persons or entities proposed by the Owner. If either the Contractor or Architect has an objection to a person or entity proposed

by the Owner, the Owner shall propose another to whom the Contractor and the Architect have no reasonable objection. When the material or substance has been rendered harmless, Work in the affected area shall resume upon written agreement of the Owner and Contractor. By Change Order, the Contract Time shall be extended appropriately and the Contract Sum shall be increased by the amount of the Contractor's reasonable additional costs of shutdown, delay, and start-up.

§ 10.3.3 To the fullest extent permitted by law, the Owner shall indemnify and hold harmless the Contractor, Subcontractors, Architect, Architect's consultants, and agents and employees of any of them from and against claims, damages, losses, and expenses, including but not limited to attorneys' fees, arising out of or resulting from performance of the Work in the affected area if in fact the material or substance presents the risk of bodily injury or death as described in Section 10.3.1 and has not been rendered harmless, provided that such claim, damage, loss, or expense is attributable to bodily injury, sickness, disease or death, or to injury to or destruction of tangible property (other than the Work itself), except to the extent that such damage, loss, or expense is due to the fault or negligence of the party seeking indemnity.

§ 10.3.4 The Owner shall not be responsible under this Section 10.3 for hazardous materials or substances the Contractor brings to the site unless such materials or substances are required by the Contract Documents. The Owner shall be responsible for hazardous materials or substances required by the Contract Documents, except to the extent of the Contractor's fault or negligence in the use and handling of such materials or substances.

§ 10.3.5 The Contractor shall reimburse the Owner for the cost and expense the Owner incurs (1) for remediation of hazardous materials or substances the Contractor brings to the site and negligently handles, or (2) where the Contractor fails to perform its obligations under Section 10.3.1, except to the extent that the cost and expense are due to the Owner's fault or negligence.

§ 10.3.6 If, without negligence on the part of the Contractor, the Contractor is held liable by a government agency for the cost of remediation of a hazardous material or substance solely by reason of performing Work as required by the Contract Documents, the Owner shall reimburse the Contractor for all cost and expense thereby incurred.

§ 10.4 Emergencies

In an emergency affecting safety of persons or property, the Contractor shall act, at the Contractor's discretion, to prevent threatened damage, injury, or loss. Additional compensation or extension of time claimed by the Contractor on account of an emergency shall be determined as provided in Article 15 and Article 7.

ARTICLE 11 INSURANCE AND BONDS

§ 11.1 Contractor's Insurance and Bonds

§ 11.1.1 The Contractor shall purchase and maintain insurance of the types and limits of liability, containing the endorsements, and subject to the terms and conditions, as described in the Agreement or elsewhere in the Contract Documents. The Contractor shall purchase and maintain the required insurance from an insurance company or insurance companies lawfully authorized to issue insurance in the jurisdiction where the Project is located. The Owner, Architect, and Architect's consultants shall be named as additional insureds under the Contractor's commercial general liability policy or as otherwise described in the Contract Documents.

§ 11.1.2 The Contractor shall provide surety bonds of the types, for such penal sums, and subject to such terms and conditions as required by the Contract Documents. The Contractor shall purchase and maintain the required bonds from a company or companies lawfully authorized to issue surety bonds in the jurisdiction where the Project is located.

§ 11.1.3 Upon the request of any person or entity appearing to be a potential beneficiary of bonds covering payment of obligations arising under the Contract, the Contractor shall promptly furnish a copy of the bonds or shall authorize a copy to be furnished.

§ 11.1.4 Notice of Cancellation or Expiration of Contractor's Required Insurance. Within three (3) business days of the date the Contractor becomes aware of an impending or actual cancellation or expiration of any insurance required by the Contract Documents, the Contractor shall provide notice to the Owner of such impending or actual cancellation or expiration. Upon receipt of notice from the Contractor, the Owner shall, unless the lapse in coverage arises from an act or omission of the Owner, have the right to stop the Work until the lapse in coverage has been cured by the procurement of replacement coverage by the Contractor. The furnishing of notice by the Contractor shall not relieve

the Contractor of any contractual obligation to provide any required coverage.

§ 11.2 Owner's Insurance

§ 11.2.1 The Owner shall purchase and maintain insurance of the types and limits of liability, containing the endorsements, and subject to the terms and conditions, as described in the Agreement or elsewhere in the Contract Documents. The Owner shall purchase and maintain the required insurance from an insurance company or insurance companies lawfully authorized to issue insurance in the jurisdiction where the Project is located.

§ 11.2.2 Failure to Purchase Required Property Insurance. If the Owner fails to purchase and maintain the required property insurance, with all of the coverages and in the amounts described in the Agreement or elsewhere in the Contract Documents, the Owner shall inform the Contractor in writing prior to commencement of the Work. Upon receipt of notice from the Owner, the Contractor may delay commencement of the Work and may obtain insurance that will protect the interests of the Contractor, Subcontractors, and Sub-Subcontractors in the Work. When the failure to provide coverage has been cured or resolved, the Contract Sum and Contract Time shall be equitably adjusted. In the event the Owner fails to procure coverage, the Owner waives all rights against the Contractor, Subcontractors, and Sub-subcontractors to the extent the loss to the Owner would have been covered by the insurance to have been procured by the Owner. The cost of the insurance shall be charged to the Owner by a Change Order. If the Owner does not provide written notice, and the Contractor is damaged by the failure or neglect of the Owner to purchase or maintain the required insurance, the Owner shall reimburse the Contractor for all reasonable costs and damages attributable thereto.

§ 11.2.3 Notice of Cancellation or Expiration of Owner's Required Property Insurance. Within three (3) business days of the date the Owner becomes aware of an impending or actual cancellation or expiration of any property insurance required by the Contract Documents, the Owner shall provide notice to the Contractor of such impending or actual cancellation or expiration. Unless the lapse in coverage arises from an act or omission of the Contractor: (1) the Contractor, upon receipt of notice from the Owner, shall have the right to stop the Work until the lapse in coverage has been cured by the procurement of replacement coverage by either the Owner or the Contractor; (2) the Contract Time and Contract Sum shall be equitably adjusted; and (3) the Owner waives all rights against the Contractor, Subcontractors, and Sub-subcontractors to the extent any loss to the Owner would have been covered by the insurance had it not expired or been cancelled. If the Contractor purchases replacement coverage, the cost of the insurance shall be charged to the Owner by an appropriate Change Order. The furnishing of notice by the Owner shall not relieve the Owner of any contractual obligation to provide required insurance.

§ 11.3 Waivers of Subrogation

§ 11.3.1 The Owner and Contractor waive all rights against (1) each other and any of their subcontractors, sub-subcontractors, agents, and employees, each of the other; (2) the Architect and Architect's consultants; and (3) Separate Contractors, if any, and any of their subcontractors, sub-subcontractors, agents, and employees, for damages caused by fire, or other causes of loss, to the extent those losses are covered by property insurance required by the Agreement or other property insurance applicable to the Project, except such rights as they have to proceeds of such insurance. The Owner or Contractor, as appropriate, shall require similar written waivers in favor of the individuals and entities identified above from the Architect, Architect's consultants, Separate Contractors, subcontractors, and sub-subcontractors. The policies of insurance purchased and maintained by each person or entity agreeing to waive claims pursuant to this section 11.3.1 shall not prohibit this waiver of subrogation. This waiver of subrogation shall be effective as to a person or entity (1) even though that person or entity would otherwise have a duty of indemnification, contractual or otherwise, (2) even though that person or entity did not pay the insurance premium directly or indirectly, or (3) whether or not the person or entity had an insurable interest in the damaged property.

§ 11.3.2 If during the Project construction period the Owner insures properties, real or personal or both, at or adjacent to the site by property insurance under policies separate from those insuring the Project, or if after final payment property insurance is to be provided on the completed Project through a policy or policies other than those insuring the Project during the construction period, to the extent permissible by such policies, the Owner waives all rights in accordance with the terms of Section 11.3.1 for damages caused by fire or other causes of loss covered by this separate property insurance.

§ 11.4 Loss of Use, Business Interruption, and Delay in Completion Insurance

The Owner, at the Owner's option, may purchase and maintain insurance that will protect the Owner against loss of use of the Owner's property, or the inability to conduct normal operations, due to fire or other causes of loss. The Owner waives all rights of action against the Contractor and Architect for loss of use of the Owner's property, due to

fire or other hazards however caused.

§11.5 Adjustment and Settlement of Insured Loss

§ 11.5.1 A loss insured under the property insurance required by the Agreement shall be adjusted by the Owner as fiduciary and made payable to the Owner as fiduciary for the insureds, as their interests may appear, subject to requirements of any applicable mortgagee clause and of Section 11.5.2. The Owner shall pay the Architect and Contractor their just shares of insurance proceeds received by the Owner, and by appropriate agreements the Architect and Contractor shall make payments to their consultants and Subcontractors in similar manner.

§ 11.5.2 Prior to settlement of an insured loss, the Owner shall notify the Contractor of the terms of the proposed settlement as well as the proposed allocation of the insurance proceeds. The Contractor shall have 14 days from receipt of notice to object to the proposed settlement or allocation of the proceeds. If the Contractor does not object, the Owner shall settle the loss and the Contractor shall be bound by the settlement and allocation. Upon receipt, the Owner shall deposit the insurance proceeds in a separate account and make the appropriate distributions. Thereafter, if no other agreement is made or the Owner does not terminate the Contract for convenience, the Owner and Contractor shall execute a Change Order for reconstruction of the damaged or destroyed Work in the amount allocated for that purpose. If the Contractor timely objects to either the terms of the proposed settlement or the allocation of the proceeds, the Owner may proceed to settle the insured loss, and any dispute between the Owner and Contractor arising out of the settlement or allocation of the proceeds shall be resolved pursuant to Article 15. Pending resolution of any dispute, the Owner may issue a Construction Change Directive for the reconstruction of the damaged or destroyed Work.

ARTICLE 12 UNCOVERING AND CORRECTION OF WORK

§ 12.1 Uncovering of Work

§ 12.1.1 If a portion of the Work is covered contrary to the Architect's request or to requirements specifically expressed in the Contract Documents, it must, if requested in writing by the Architect, be uncovered for the Architect's examination and be replaced at the Contractor's expense without change in the Contract Time.

§ 12.1.2 If a portion of the Work has been covered that the Architect has not specifically requested to examine prior to its being covered, the Architect may request to see such Work and it shall be uncovered by the Contractor. If such Work is in accordance with the Contract Documents, the Contractor shall be entitled to an equitable adjustment to the Contract Sum and Contract Time as may be appropriate. If such Work is not in accordance with the Contract Documents, the costs of uncovering the Work, and the cost of correction, shall be at the Contractor's expense.

§ 12.2 Correction of Work

§ 12.2.1 Before Substantial Completion

The Contractor shall promptly correct Work rejected by the Architect or failing to conform to the requirements of the Contract Documents, discovered before Substantial Completion and whether or not fabricated, installed or completed. Costs of correcting such rejected Work, including additional testing and inspections, the cost of uncovering and replacement, and compensation for the Architect's services and expenses made necessary thereby, shall be at the Contractor's expense.

§ 12.2.2 After Substantial Completion

§ 12.2.2.1 In addition to the Contractor's obligations under Section 3.5, if, within one year after the date of Substantial Completion of the Work or designated portion thereof or after the date for commencement of warranties established under Section 9.9.1, or by terms of any applicable special warranty required by the Contract Documents, any of the Work is found to be not in accordance with the requirements of the Contract Documents, the Contractor shall correct it promptly after receipt of notice from the Owner to do so, unless the Owner has previously given the Contractor a written acceptance of such condition. The Owner shall give such notice promptly after discovery of the condition. During the one-year period for correction of Work, if the Owner fails to notify the Contractor and give the Contractor an opportunity to make the correction, the Owner waives the rights to require correction by the Contractor and to make a claim for breach of warranty. If the Contractor fails to correct nonconforming Work within a reasonable time during that period after receipt of notice from the Owner or Architect, the Owner may correct it in accordance with Section 2.5.

§ 12.2.2.2 The one-year period for correction of Work shall be extended with respect to portions of Work first performed after Substantial Completion by the period of time between Substantial Completion and the actual completion of that portion of the Work.

§ 12.2.2.3 The one-year period for correction of Work shall not be extended by corrective Work performed by the Contractor pursuant to this Section 12.2.

§ 12.2.3 The Contractor shall remove from the site portions of the Work that are not in accordance with the requirements of the Contract Documents and are neither corrected by the Contractor nor accepted by the Owner.

§ 12.2.4 The Contractor shall bear the cost of correcting destroyed or damaged construction of the Owner or Separate Contractors, whether completed or partially completed, caused by the Contractor's correction or removal of Work that is not in accordance with the requirements of the Contract Documents.

§ 12.2.5 Nothing contained in this Section 12.2 shall be construed to establish a period of limitation with respect to other obligations the Contractor has under the Contract Documents. Establishment of the one-year period for correction of Work as described in Section 12.2.2 relates only to the specific obligation of the Contractor to correct the Work, and has no relationship to the time within which the obligation to comply with the Contract Documents may be sought to be enforced, nor to the time within which proceedings may be commenced to establish the Contractor's liability with respect to the Contractor's obligations other than specifically to correct the Work.

§ 12.3 Acceptance of Nonconforming Work

If the Owner prefers to accept Work that is not in accordance with the requirements of the Contract Documents, the Owner may do so instead of requiring its removal and correction, in which case the Contract Sum will be reduced as appropriate and equitable. Such adjustment shall be effected whether or not final payment has been made.

ARTICLE 13 MISCELLANEOUS PROVISIONS

§ 13.1 Governing Law

The Contract shall be governed by the law of the place where the Project is located, excluding that jurisdiction's choice of law rules. If the parties have selected arbitration as the method of binding dispute resolution, the Federal Arbitration Act shall govern Section 15.4.

§ 13.2 Successors and Assigns

§ 13.2.1 The Owner and Contractor respectively bind themselves, their partners, successors, assigns, and legal representatives to covenants, agreements, and obligations contained in the Contract Documents. Except as provided in Section 13.2.2, neither party to the Contract shall assign the Contract as a whole without written consent of the other. If either party attempts to make an assignment without such consent, that party shall nevertheless remain legally responsible for all obligations under the Contract.

§ 13.2.2 The Owner may, without consent of the Contractor, assign the Contract to a lender providing construction financing for the Project, if the lender assumes the Owner's rights and obligations under the Contract Documents. The Contractor shall execute all consents reasonably required to facilitate the assignment.

§ 13.3 Rights and Remedies

§ 13.3.1 Duties and obligations imposed by the Contract Documents and rights and remedies available thereunder shall be in addition to and not a limitation of duties, obligations, rights, and remedies otherwise imposed or available by law.

§ 13.3.2 No action or failure to act by the Owner, Architect, or Contractor shall constitute a waiver of a right or duty afforded them under the Contract, nor shall such action or failure to act constitute approval of or acquiescence in a breach thereunder, except as may be specifically agreed upon in writing.

§ 13.4 Tests and Inspections

§ 13.4.1 Tests, inspections, and approvals of portions of the Work shall be made as required by the Contract Documents and by applicable laws, statutes, ordinances, codes, rules, and regulations or lawful orders of public authorities. Unless otherwise provided, the Contractor shall make arrangements for such tests, inspections, and approvals with an independent testing laboratory or entity acceptable to the Owner, or with the appropriate public authority, and shall bear all related costs of tests, inspections, and approvals. The Contractor shall give the Architect timely notice of when and where tests and inspections are to be made so that the Architect may be present for such procedures. The Owner shall bear costs of tests, inspections, or approvals that do not become requirements until after bids are received or negotiations concluded. The Owner shall directly arrange and pay for tests, inspections, or

approvals where building codes or applicable laws or regulations so require.

§ 13.4.2 If the Architect, Owner, or public authorities having jurisdiction determine that portions of the Work require additional testing, inspection, or approval not included under Section 13.4.1, the Architect will, upon written authorization from the Owner, instruct the Contractor to make arrangements for such additional testing, inspection, or approval, by an entity acceptable to the Owner, and the Contractor shall give timely notice to the Architect of when and where tests and inspections are to be made so that the Architect may be present for such procedures. Such costs, except as provided in Section 13.4.3, shall be at the Owner's expense.

§ 13.4.3 If procedures for testing, inspection, or approval under Sections 13.4.1 and 13.4.2 reveal failure of the portions of the Work to comply with requirements established by the Contract Documents, all costs made necessary by such failure, including those of repeated procedures and compensation for the Architect's services and expenses, shall be at the Contractor's expense.

§ 13.4.4 Required certificates of testing, inspection, or approval shall, unless otherwise required by the Contract Documents, be secured by the Contractor and promptly delivered to the Architect.

§ 13.4.5 If the Architect is to observe tests, inspections, or approvals required by the Contract Documents, the Architect will do so promptly and, where practicable, at the normal place of testing.

§ 13.4.6 Tests or inspections conducted pursuant to the Contract Documents shall be made promptly to avoid unreasonable delay in the Work.

§ 13.5 Interest

Payments due and unpaid under the Contract Documents shall bear interest from the date payment is due at the rate the parties agree upon in writing or, in the absence thereof, at the legal rate prevailing from time to time at the place where the Project is located.

ARTICLE 14 TERMINATION OR SUSPENSION OF THE CONTRACT

§ 14.1 Termination by the Contractor

§ 14.1.1 The Contractor may terminate the Contract if the Work is stopped for a period of 30 consecutive days through no act or fault of the Contractor, a Subcontractor, a Sub-subcontractor, their agents or employees, or any other persons or entities performing portions of the Work, for any of the following reasons:

- **.1** Issuance of an order of a court or other public authority having jurisdiction that requires all Work to be stopped;
- **.2** An act of government, such as a declaration of national emergency, that requires all Work to be stopped;
- **.3** Because the Architect has not issued a Certificate for Payment and has not notified the Contractor of the reason for withholding certification as provided in Section 9.4.1, or because the Owner has not made payment on a Certificate for Payment within the time stated in the Contract Documents; or
- **.4** The Owner has failed to furnish to the Contractor reasonable evidence as required by Section 2.2.

§ 14.1.2 The Contractor may terminate the Contract if, through no act or fault of the Contractor, a Subcontractor, a Sub-subcontractor, their agents or employees, or any other persons or entities performing portions of the Work, repeated suspensions, delays, or interruptions of the entire Work by the Owner as described in Section 14.3, constitute in the aggregate more than 100 percent of the total number of days scheduled for completion, or 120 days in any 365-day period, whichever is less.

§ 14.1.3 If one of the reasons described in Section 14.1.1 or 14.1.2 exists, the Contractor may, upon seven days' notice to the Owner and Architect, terminate the Contract and recover from the Owner payment for Work executed, as well as reasonable overhead and profit on Work not executed, and costs incurred by reason of such termination.

§ 14.1.4 If the Work is stopped for a period of 60 consecutive days through no act or fault of the Contractor, a Subcontractor, a Sub-subcontractor, or their agents or employees or any other persons or entities performing portions of the Work because the Owner has repeatedly failed to fulfill the Owner's obligations under the Contract Documents with respect to matters important to the progress of the Work, the Contractor may, upon seven additional days' notice to the Owner and the Architect, terminate the Contract and recover from the Owner as provided in

Section 14.1.3.

§ 14.2 Termination by the Owner for Cause

§ 14.2.1 The Owner may terminate the Contract if the Contractor

.1 repeatedly refuses or fails to supply enough properly skilled workers or proper materials;

.2 fails to make payment to Subcontractors or suppliers in accordance with the respective agreements between the Contractor and the Subcontractors or suppliers;

.3 repeatedly disregards applicable laws, statutes, ordinances, codes, rules and regulations, or lawful orders of a public authority; or

.4 otherwise is guilty of substantial breach of a provision of the Contract Documents.

§ 14.2.2 When any of the reasons described in Section 14.2.1 exist, and upon certification by the Architect that sufficient cause exists to justify such action, the Owner may, without prejudice to any other rights or remedies of the Owner and after giving the Contractor and the Contractor's surety, if any, seven days' notice, terminate employment of the Contractor and may, subject to any prior rights of the surety:

.1 Exclude the Contractor from the site and take possession of all materials, equipment, tools, and construction equipment and machinery thereon owned by the Contractor;

.2 Accept assignment of subcontracts pursuant to Section 5.4; and

.3 Finish the Work by whatever reasonable method the Owner may deem expedient. Upon written request of the Contractor, the Owner shall furnish to the Contractor a detailed accounting of the costs incurred by the Owner in finishing the Work.

§ 14.2.3 When the Owner terminates the Contract for one of the reasons stated in Section 14.2.1, the Contractor shall not be entitled to receive further payment until the Work is finished.

§ 14.2.4 If the unpaid balance of the Contract Sum exceeds costs of finishing the Work, including compensation for the Architect's services and expenses made necessary thereby, and other damages incurred by the Owner and not expressly waived, such excess shall be paid to the Contractor. If such costs and damages exceed the unpaid balance, the Contractor shall pay the difference to the Owner. The amount to be paid to the Contractor or Owner, as the case may be, shall be certified by the Initial Decision Maker, upon application, and this obligation for payment shall survive termination of the Contract.

§ 14.3 Suspension by the Owner for Convenience

§ 14.3.1 The Owner may, without cause, order the Contractor in writing to suspend, delay or interrupt the Work, in whole or in part for such period of time as the Owner may determine.

§ 14.3.2 The Contract Sum and Contract Time shall be adjusted for increases in the cost and time caused by suspension, delay, or interruption under Section 14.3.1. Adjustment of the Contract Sum shall include profit. No adjustment shall be made to the extent

.1 that performance is, was, or would have been, so suspended, delayed, or interrupted, by another cause for which the Contractor is responsible; or

.2 that an equitable adjustment is made or denied under another provision of the Contract.

§ 14.4 Termination by the Owner for Convenience

§ 14.4.1 The Owner may, at any time, terminate the Contract for the Owner's convenience and without cause.

§ 14.4.2 Upon receipt of notice from the Owner of such termination for the Owner's convenience, the Contractor shall

.1 cease operations as directed by the Owner in the notice;

.2 take actions necessary, or that the Owner may direct, for the protection and preservation of the Work; and

.3 except for Work directed to be performed prior to the effective date of termination stated in the notice, terminate all existing subcontracts and purchase orders and enter into no further subcontracts and purchase orders.

§ 14.4.3 In case of such termination for the Owner's convenience, the Owner shall pay the Contractor for Work properly executed; costs incurred by reason of the termination, including costs attributable to termination of Subcontracts; and the termination fee, if any, set forth in the Agreement.

ARTICLE 15 CLAIMS AND DISPUTES

§ 15.1 Claims

§ 15.1.1 Definition

A Claim is a demand or assertion by one of the parties seeking, as a matter of right, payment of money, a change in the Contract Time, or other relief with respect to the terms of the Contract. The term "Claim" also includes other disputes and matters in question between the Owner and Contractor arising out of or relating to the Contract. The responsibility to substantiate Claims shall rest with the party making the Claim. This Section 15.1.1 does not require the Owner to file a Claim in order to impose liquidated damages in accordance with the Contract Documents.

§ 15.1.2 Time Limits on Claims

The Owner and Contractor shall commence all Claims and causes of action against the other and arising out of or related to the Contract, whether in contract, tort, breach of warranty or otherwise, in accordance with the requirements of the binding dispute resolution method selected in the Agreement and within the period specified by applicable law, but in any case not more than 10 years after the date of Substantial Completion of the Work. The Owner and Contractor waive all Claims and causes of action not commenced in accordance with this Section 15.1.2.

§ 15.1.3 Notice of Claims

§ 15.1.3.1 Claims by either the Owner or Contractor, where the condition giving rise to the Claim is first discovered prior to expiration of the period for correction of the Work set forth in Section 12.2.2, shall be initiated by notice to the other party and to the Initial Decision Maker with a copy sent to the Architect, if the Architect is not serving as the Initial Decision Maker. Claims by either party under this Section 15.1.3.1 shall be initiated within 21 days after occurrence of the event giving rise to such Claim or within 21 days after the claimant first recognizes the condition giving rise to the Claim, whichever is later.

§ 15.1.3.2 Claims by either the Owner or Contractor, where the condition giving rise to the Claim is first discovered after expiration of the period for correction of the Work set forth in Section 12.2.2, shall be initiated by notice to the other party. In such event, no decision by the Initial Decision Maker is required.

§ 15.1.4 Continuing Contract Performance

§ 15.1.4.1 Pending final resolution of a Claim, except as otherwise agreed in writing or as provided in Section 9.7 and Article 14, the Contractor shall proceed diligently with performance of the Contract and the Owner shall continue to make payments in accordance with the Contract Documents.

§ 15.1.4.2 The Contract Sum and Contract Time shall be adjusted in accordance with the Initial Decision Maker's decision, subject to the right of either party to proceed in accordance with this Article 15. The Architect will issue Certificates for Payment in accordance with the decision of the Initial Decision Maker.

§ 15.1.5 Claims for Additional Cost

If the Contractor wishes to make a Claim for an increase in the Contract Sum, notice as provided in Section 15.1.3 shall be given before proceeding to execute the portion of the Work that is the subject of the Claim. Prior notice is not required for Claims relating to an emergency endangering life or property arising under Section 10.4.

§ 15.1.6 Claims for Additional Time

§ 15.1.6.1 If the Contractor wishes to make a Claim for an increase in the Contract Time, notice as provided in Section 15.1.3 shall be given. The Contractor's Claim shall include an estimate of cost and of probable effect of delay on progress of the Work. In the case of a continuing delay, only one Claim is necessary.

§ 15.1.6.2 If adverse weather conditions are the basis for a Claim for additional time, such Claim shall be documented by data substantiating that weather conditions were abnormal for the period of time, could not have been reasonably anticipated, and had an adverse effect on the scheduled construction.

§ 15.1.7 Waiver of Claims for Consequential Damages

The Contractor and Owner waive Claims against each other for consequential damages arising out of or relating to this Contract. This mutual waiver includes

.1 damages incurred by the Owner for rental expenses, for losses of use, income, profit, financing, business and reputation, and for loss of management or employee productivity or of the services of such persons; and

.2 damages incurred by the Contractor for principal office expenses including the compensation of personnel stationed there, for losses of financing, business and reputation, and for loss of profit, except anticipated profit arising directly from the Work.

This mutual waiver is applicable, without limitation, to all consequential damages due to either party's termination in accordance with Article 14. Nothing contained in this Section 15.1.7 shall be deemed to preclude assessment of liquidated damages, when applicable, in accordance with the requirements of the Contract Documents.

§ 15.2 Initial Decision

§ 15.2.1 Claims, excluding those where the condition giving rise to the Claim is first discovered after expiration of the period for correction of the Work set forth in Section 12.2.2 or arising under Sections 10.3, 10.4, and 11.5, shall be referred to the Initial Decision Maker for initial decision. The Architect will serve as the Initial Decision Maker, unless otherwise indicated in the Agreement. Except for those Claims excluded by this Section 15.2.1, an initial decision shall be required as a condition precedent to mediation of any Claim. If an initial decision has not been rendered within 30 days after the Claim has been referred to the Initial Decision Maker, the party asserting the Claim may demand mediation and binding dispute resolution without a decision having been rendered. Unless the Initial Decision Maker and all affected parties agree, the Initial Decision Maker will not decide disputes between the Contractor and persons or entities other than the Owner.

§ 15.2.2 The Initial Decision Maker will review Claims and within ten days of the receipt of a Claim take one or more of the following actions: (1) request additional supporting data from the claimant or a response with supporting data from the other party, (2) reject the Claim in whole or in part, (3) approve the Claim, (4) suggest a compromise, or (5) advise the parties that the Initial Decision Maker is unable to resolve the Claim if the Initial Decision Maker lacks sufficient information to evaluate the merits of the Claim or if the Initial Decision Maker concludes that, in the Initial Decision Maker's sole discretion, it would be inappropriate for the Initial Decision Maker to resolve the Claim.

§ 15.2.3 In evaluating Claims, the Initial Decision Maker may, but shall not be obligated to, consult with or seek information from either party or from persons with special knowledge or expertise who may assist the Initial Decision Maker in rendering a decision. The Initial Decision Maker may request the Owner to authorize retention of such persons at the Owner's expense.

§ 15.2.4 If the Initial Decision Maker requests a party to provide a response to a Claim or to furnish additional supporting data, such party shall respond, within ten days after receipt of the request, and shall either (1) provide a response on the requested supporting data, (2) advise the Initial Decision Maker when the response or supporting data will be furnished, or (3) advise the Initial Decision Maker that no supporting data will be furnished. Upon receipt of the response or supporting data, if any, the Initial Decision Maker will either reject or approve the Claim in whole or in part.

§ 15.2.5 The Initial Decision Maker will render an initial decision approving or rejecting the Claim, or indicating that the Initial Decision Maker is unable to resolve the Claim. This initial decision shall (1) be in writing; (2) state the reasons therefor; and (3) notify the parties and the Architect, if the Architect is not serving as the Initial Decision Maker, of any change in the Contract Sum or Contract Time or both. The initial decision shall be final and binding on the parties but subject to mediation and, if the parties fail to resolve their dispute through mediation, to binding dispute resolution.

§ 15.2.6 Either party may file for mediation of an initial decision at any time, subject to the terms of Section 15.2.6.1.

§ 15.2.6.1 Either party may, within 30 days from the date of receipt of an initial decision, demand in writing that the other party file for mediation. If such a demand is made and the party receiving the demand fails to file for mediation within 30 days after receipt thereof, then both parties waive their rights to mediate or pursue binding dispute resolution proceedings with respect to the initial decision.

§ 15.2.7 In the event of a Claim against the Contractor, the Owner may, but is not obligated to, notify the surety, if any, of the nature and amount of the Claim. If the Claim relates to a possibility of a Contractor's default, the Owner

may, but is not obligated to, notify the surety and request the surety's assistance in resolving the controversy.

§ 15.2.8 If a Claim relates to or is the subject of a mechanic's lien, the party asserting such Claim may proceed in accordance with applicable law to comply with the lien notice or filing deadlines.

§ 15.3 Mediation

§ 15.3.1 Claims, disputes, or other matters in controversy arising out of or related to the Contract, except those waived as provided for in Sections 9.10.4, 9.10.5, and 15.1.7, shall be subject to mediation as a condition precedent to binding dispute resolution.

§ 15.3.2 The parties shall endeavor to resolve their Claims by mediation which, unless the parties mutually agree otherwise, shall be administered by the American Arbitration Association in accordance with its Construction Industry Mediation Procedures in effect on the date of the Agreement. A request for mediation shall be made in writing, delivered to the other party to the Contract, and filed with the person or entity administering the mediation. The request may be made concurrently with the filing of binding dispute resolution proceedings but, in such event, mediation shall proceed in advance of binding dispute resolution proceedings, which shall be stayed pending mediation for a period of 60 days from the date of filing, unless stayed for a longer period by agreement of the parties or court order. If an arbitration is stayed pursuant to this Section 15.3.2, the parties may nonetheless proceed to the selection of the arbitrator(s) and agree upon a schedule for later proceedings.

§ 15.3.3 Either party may, within 30 days from the date that mediation has been concluded without resolution of the dispute or 60 days after mediation has been demanded without resolution of the dispute, demand in writing that the other party file for binding dispute resolution. If such a demand is made and the party receiving the demand fails to file for binding dispute resolution within 60 days after receipt thereof, then both parties waive their rights to binding dispute resolution proceedings with respect to the initial decision.

§ 15.3.4 The parties shall share the mediator's fee and any filing fees equally. The mediation shall be held in the place where the Project is located, unless another location is mutually agreed upon. Agreements reached in mediation shall be enforceable as settlement agreements in any court having jurisdiction thereof.

§ 15.4 Arbitration

§ 15.4.1 If the parties have selected arbitration as the method for binding dispute resolution in the Agreement, any Claim subject to, but not resolved by, mediation shall be subject to arbitration which, unless the parties mutually agree otherwise, shall be administered by the American Arbitration Association in accordance with its Construction Industry Arbitration Rules in effect on the date of the Agreement. The Arbitration shall be conducted in the place where the Project is located, unless another location is mutually agreed upon. A demand for arbitration shall be made in writing, delivered to the other party to the Contract, and filed with the person or entity administering the arbitration. The party filing a notice of demand for arbitration must assert in the demand all Claims then known to that party on which arbitration is permitted to be demanded.

§ 15.4.1.1 A demand for arbitration shall be made no earlier than concurrently with the filing of a request for mediation, but in no event shall it be made after the date when the institution of legal or equitable proceedings based on the Claim would be barred by the applicable statute of limitations. For statute of limitations purposes, receipt of a written demand for arbitration by the person or entity administering the arbitration shall constitute the institution of legal or equitable proceedings based on the Claim.

§ 15.4.2 The award rendered by the arbitrator or arbitrators shall be final, and judgment may be entered upon it in accordance with applicable law in any court having jurisdiction thereof.

§ 15.4.3 The foregoing agreement to arbitrate and other agreements to arbitrate with an additional person or entity duly consented to by parties to the Agreement, shall be specifically enforceable under applicable law in any court having jurisdiction thereof.

§ 15.4.4 Consolidation or Joinder

§ 15.4.4.1 Subject to the rules of the American Arbitration Association or other applicable arbitration rules, either party may consolidate an arbitration conducted under this Agreement with any other arbitration to which it is a party provided that (1) the arbitration agreement governing the other arbitration permits consolidation, (2) the arbitrations to be consolidated substantially involve common questions of law or fact, and (3) the arbitrations employ materially

similar procedural rules and methods for selecting arbitrator(s).

§ 15.4.4.2 Subject to the rules of the American Arbitration Association or other applicable arbitration rules, either party may include by joinder persons or entities substantially involved in a common question of law or fact whose presence is required if complete relief is to be accorded in arbitration, provided that the party sought to be joined consents in writing to such joinder. Consent to arbitration involving an additional person or entity shall not constitute consent to arbitration of any claim, dispute or other matter in question not described in the written consent.

§ 15.4.4.3 The Owner and Contractor grant to any person or entity made a party to an arbitration conducted under this Section 15.4, whether by joinder or consolidation, the same rights of joinder and consolidation as those of the Owner and Contractor under this Agreement.

SECTION 011000
SUMMARY

PART 1 GENERAL

1.01 SUMMARY

A. This Section includes the following:
   1. Work covered by the Contract Documents.
   2. Use of premises.
   3. Specification format and conventions.

1.02 WORK COVERED BY CONTRACT DOCUMENTS

A. Project Identification: The Village at Discovery - Lot 5
   1. Project Location: Lee's Summit, Missouri

B. Owner: INTRINSIC DEVELOPMENT
   1. Owner's Representative: Brian Maenner

C. Architect: Rosemann & Associates, P.C., 1526 Grand, Kansas City, MO 64108

D. Contractor:

E. The Work consists of the following:
   1. The Project consists of the development of a steel-supported concrete podium with wood-framed construction above, slab-on-grade (primarily leave-out for future commercial tenants), and an elevator-equipped three-story building. The building will have retail on the first floor and thirty-six (36), one-bedroom units and two-bedroom units on the second and third. The building shall also consist of a small elevator lobby with resident mail and building service spaces. The Project will also include appropriate surface parking and site amenities.

1.03 USE OF PREMISES

A. General: Contractor shall have full use of premises for construction operations, including use of Project site, during construction period. Contractor’s use of premises is limited only by Owner’s right to perform work or to retain other contractors on portions of Project.

1.04 SPECIFICATION FORMATS AND CONVENTIONS

A. Specification Format: The Specifications are organized into Divisions and Sections using the 6-digit MasterFormat numbering system.
   1. Division 1: Sections in Division 1 govern the execution of the Work of all Sections in the Specifications.

B. Specification Contract: The Specifications use certain conventions for the style of language and the intended meaning of certain terms, words, and phrases when used in particular situations. These conventions are as follows:
   1. Abbreviated Language: Language used in the Specifications and other Contract Documents is abbreviated. Words and meanings shall be interpreted as appropriate. Words implied, but not stated, shall be inferred as the sense requires. Singular words shall be interpreted as plural and plural words shall be interpreted as singular where applicable as the context of the Contract Documents indicates.
   2. Imperative mood and streamlined language are generally used in the Specifications. Requirements expressed in the imperative mood are to be performed by Contractor. Occasionally, the indicative or subjunctive mood may be used in the Section Text for clarity to describe responsibilities that must be fulfilled indirectly by Contractor or by others when so noted.
      a. The words “shall”, “shall be”, or “shall comply with”, depending on the context, are implied where a colon (:) is used within a sentence or phrase.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

SECTION 012100
ALLOWANCES

GENERAL

1.01 SUMMARY

A. Section includes administrative and procedural requirements governing allowances.

B. Types of allowances include the following:
   1. Base Bid Allowances.

C. Related Sections:
   1. Division 01 Section "Unit Prices" for procedures for using unit prices.
   2. Division 01 Section "Quality Requirements" for procedures governing the use of allowances for testing and inspecting.

1.02 SELECTION AND PURCHASE

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

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

C. Purchase products and systems selected by Architect from the designated supplier.

1.03 SUBMITTALS

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

B. Submit invoices or delivery slips to show actual quantities of materials delivered to the site for use in fulfillment of each allowance.

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

D. Coordinate and process submittals for allowance items in same manner as for other portions of the Work.

1.04 COORDINATION

A. Coordinate allowance items with other portions of the Work. Furnish templates as required to coordinate installation.

1.05 LUMP SUM ALLOWANCES

A. Allowance shall include cost to Contractor of specific products and materials ordered by Owner or selected by Architect under allowance and shall include taxes, freight, and delivery to Project site.

B. Unless otherwise indicated, Contractor's costs for receiving and handling at Project site, labor, installation, overhead and profit, and similar costs related to products and materials selected by Architect under allowance shall be included as part of the Contract Sum and not part of the allowance.

C. Unused Materials: Return unused materials purchased under an allowance to manufacturer or supplier for credit to Owner, after installation has been completed and accepted.
   1. If requested by Architect, retain and prepare unused material for storage by Owner. Deliver unused material to Owner's storage space as directed.

1.06 CONTINGENCY ALLOWANCES

A. Use the contingency allowance only as directed by Architect for Owner's purposes and only by Change Orders that indicate amounts to be charged to the allowance.

B. Contractor's overhead, profit, and related costs for products and equipment ordered by Owner under the contingency allowance are included in the allowance and are not part of the Contract

Sum. These costs include delivery, installation, taxes, insurance, equipment rental, and similar costs.

C. Change Orders authorizing use of funds from the contingency allowance will include Contractor's related costs and reasonable overhead and profit margins.

D. At Project closeout, credit unused amounts remaining in the contingency allowance to Owner by Change Order.

1.07 TESTING AND INSPECTING ALLOWANCES

A. Testing and inspecting allowances include the cost of engaging testing agencies, actual tests and inspections, and reporting results.

B. The allowance does not include incidental labor required to assist the testing agency or costs for retesting if previous tests and inspections result in failure. The cost for incidental labor to assist the testing agency shall be included in the Contract Sum.

C. Costs of services not required by the Contract Documents are not included in the allowance.

D. At Project closeout, credit unused amounts remaining in the testing and inspecting allowance to Owner by Change Order.

1.08 ADJUSTMENT OF ALLOWANCES

A. Allowance Adjustment: To adjust allowance amounts, prepare a Change Order proposal based on the difference between purchase amount and the allowance, multiplied by final measurement of work-in-place where applicable. If applicable, include reasonable allowances for cutting losses, tolerances, mixing wastes, normal product imperfections, and similar margins.
   1. Include installation costs in purchase amount only where indicated as part of the allowance.
   2. If requested, prepare explanation and documentation to substantiate distribution of overhead costs and other margins claimed.
   3. Submit substantiation of a change in scope of work, if any, claimed in Change Orders related to unit-cost allowances.
   4. Owner reserves the right to establish the quantity of work-in-place by independent quantity survey, measure, or count.

B. Submit claims for increased costs because of a change in scope or nature of the allowance described in the Contract Documents, whether for the purchase order amount or Contractor's handling, labor, installation, overhead, and profit.
   1. Do not include Contractor's or subcontractor's indirect expense in the Change Order cost amount unless it is clearly shown that the nature or extent of work has changed from what could have been foreseen from information in the Contract Documents.
   2. No change to Contractor's indirect expense is permitted for selection of higher- or lower-priced materials or systems of the same scope and nature as originally indicated.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION

3.01 EXAMINATION

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

3.02 PREPARATION

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

END OF SECTION

SECTION 012300
ALTERNATES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Description of Alternates.

1.02 ACCEPTANCE OF ALTERNATES

A. Alternates quoted on Bid Forms will be reviewed and accepted or rejected at Owner's option. Accepted Alternates will be identified in the Owner-Contractor Agreement.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION

SECTION 012500
SUBSTITUTION PROCEDURES

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

2.01 GENERAL REQUIREMENTS

A. A Substitution Request for products, assemblies, materials, and equipment constitutes a representation that the submitter:
   1. Has investigated proposed product and determined that it meets or exceeds the quality level of the specified product, equipment, assembly, or system.
   2. Agrees to provide the same warranty for the substitution as for the specified product.
   3. Agrees to coordinate installation and make changes to other work that may be required for the work to be complete, with no additional cost to Owner.
   4. Waives claims for additional costs or time extension that may subsequently become apparent.

B. Document each request with complete data substantiating compliance of proposed substitution with Contract Documents. Burden of proof is on proposer.

C. Content: Include information necessary for tracking the status of each Substitution Request, and information necessary to provide an actionable response.

D. Limit each request to a single proposed substitution item.

2.02 RESOLUTION

2.03 ACCEPTANCE

END OF SECTION

SECTION 012600
CONTRACT MODIFICATION PROCEDURES

PART 1 GENERAL

1.01 MINOR CHANGES IN THE WORK

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

1.02 PROPOSAL REQUESTS

A. Owner-Initiated Proposal Requests: Architect will issue a detailed description of proposed changes in the Work that may require adjustment to the Contract Sum or the Contract Time. If necessary, the description will include supplemental or revised Drawings and Specifications.
   1. Proposal Requests issued by Architect are not instructions either to stop work in progress or to execute the proposed change.
   2. Within time specified in Proposal Request after receipt of Proposal Request, submit a quotation estimating cost adjustments to the Contract Sum and the Contract Time necessary to execute the change.
      a. Include a list of quantities of products required or eliminated and unit costs, with total amount of purchases and credits to be made. If requested, furnish survey data to substantiate quantities.
      b. Indicate applicable taxes, delivery charges, equipment rental, and amounts of trade discounts.
      c. Include costs of labor and supervision directly attributable to the change.
      d. Include an updated Contractor's construction schedule that indicates the effect of the change, including, but not limited to, changes in activity duration, start and finish times, and activity relationship. Use available total float before requesting an extension of the Contract Time.
      e. Quotation Form: Use forms acceptable to Architect.

B. Contractor-Initiated Proposals: If latent or changed conditions require modifications to the Contract, Contractor may initiate a claim by submitting a request for a change to Architect.
   1. Include a statement outlining reasons for the change and the effect of the change on the Work. Provide a complete description of the proposed change. Indicate the effect of the proposed change on the Contract Sum and the Contract Time.
   2. Include a list of quantities of products required or eliminated and unit costs, with total amount of purchases and credits to be made. If requested, furnish survey data to substantiate quantities.
   3. Indicate applicable taxes, delivery charges, equipment rental, and amounts of trade discounts.
   4. Include costs of labor and supervision directly attributable to the change.
   5. Include an updated Contractor's construction schedule that indicates the effect of the change, including, but not limited to, changes in activity duration, start and finish times, and activity relationship. Use available total float before requesting an extension of the Contract Time.
   6. Comply with requirements in Division 01 Section "Substitution Procedures" if the proposed change requires substitution of one product or system for product or system specified.
   7. Proposal Request Form: Use form acceptable to Architect.

1.03 CHANGE ORDER PROCEDURES

A. On Owner's approval of a Proposal Request, Architect will issue a Change Order for signatures of Owner and Contractor on AIA G701

1.04 CONSTRUCTION CHANGE DIRECTIVE

A. Construction Change Directive: Architect may issue a Construction Change Directive on AIA Document G714. Construction Change Directive instructs Contractor to proceed with a change

in the Work, for subsequent inclusion in a Change Order.

1. Construction Change Directive contains a complete description of change in the Work. It also designates method to be followed to determine change in the Contract Sum or the Contract Time.

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

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

SECTION 012900
PAYMENT PROCEDURES

PART 1 GENERAL

1.01 SCHEDULE OF VALUES

A. Coordination: Coordinate preparation of the schedule of values with preparation of Contractor's construction schedule.
   1. Correlate line items in the schedule of values with other required administrative forms and schedules, including the following:
      a. Application for Payment forms with continuation sheets.
      b. Submittal schedule.
      c. Items required to be indicated as separate activities in Contractor's construction schedule.
   2. Submit the schedule of values to Architect at earliest possible date but no later than seven days before the date scheduled for submittal of initial Applications for Payment.
   3. Subschedules for Phased Work: Where the Work is separated into phases requiring separately phased payments, provide subschedules showing values correlated with each phase of payment.

B. Format and Content: Use the specifications table of contents as a guide to establish line items for the schedule of values. Provide at least one line item for each Specification Section.
   1. Identification: Include the following Project identification on the schedule of values:
      a. Project name and location.
      b. Name of Architect.
      c. Architect's project number.
      d. Contractor's name and address.
      e. Date of submittal.
   2. Arrange schedule of values consistent with format of AIA Document G702
   3. Provide a breakdown of the Contract Sum in enough detail to facilitate continued evaluation of Applications for Payment and progress reports. Coordinate with the Project Manual table of contents. Provide multiple line items for principal subcontract amounts in excess of five percent of Contract Sum.
   4. Round amounts to nearest whole dollar; total shall equal the Contract Sum.
   5. Provide a separate line item in the schedule of values for each part of the Work where Applications for Payment may include materials or equipment purchased or fabricated and stored, but not yet installed.
   6. Provide separate line items in the schedule of values for initial cost of materials, for each subsequent stage of completion, and for total installed value of that part of the Work.
   7. Allowances: Provide a separate line item in the schedule of values for each allowance. Show line-item value of unit-cost allowances, as a product of the unit cost, multiplied by measured quantity. Use information indicated in the Contract Documents to determine quantities.
   8. Each item in the schedule of values and Applications for Payment shall be complete. Include total cost and proportionate share of general overhead and profit for each item.
      a. Temporary facilities and other major cost items that are not direct cost of actual work-in-place may be shown either as separate line items in the schedule of values or distributed as general overhead expense, at Contractor's option.
   9. Schedule Updating: Update and resubmit the schedule of values before the next Applications for Payment when Change Orders or Construction Change Directives result in a change in the Contract Sum.

1.02 APPLICATIONS FOR PAYMENT

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

1. Initial Application for Payment, Application for Payment at time of Substantial Completion, and final Application for Payment involve additional requirements.

B. Payment Application Times: The date for each progress payment is indicated in the Agreement between Owner and Contractor. The period of construction work covered by each Application for Payment is the period indicated in the Agreement.

C. Payment Application Times: Progress payments shall be submitted to Architect by the fifteenth (15) of the month. The period covered by each Application for Payment is one month, ending on the last day of the month.

D. Application for Payment Forms: Use AIA Document G702 as form for Applications for Payment.

E. Application for Payment Forms: Use forms provided by Owner for Applications for Payment. Sample copies are included in the Project Manual.

F. Application Preparation: Complete every entry on form. Notarize and execute by a person authorized to sign legal documents on behalf of Contractor. Architect will return incomplete applications without action.
   1. Entries shall match data on the schedule of values and Contractor's construction schedule. Use updated schedules if revisions were made.
   2. Include amounts of Change Orders and Construction Change Directives issued before last day of construction period covered by application.

G. Transmittal: Submit three signed and notarized original copies of each Application for Payment to Architect by a method ensuring receipt. One copy shall include waivers of lien and similar attachments if required.
   1. Transmit each copy with a transmittal form listing attachments and recording appropriate information about application.

H. Waivers of Mechanic's Lien: With each Application for Payment, submit waivers of mechanic's lien from entities lawfully entitled to file a mechanic's lien arising out of the Contract and related to the Work covered by the payment.
   1. Submit partial waivers on each item for amount requested in previous application, after deduction for retainage, on each item.
   2. When an application shows completion of an item, submit conditional final or full waivers.
   3. Owner reserves the right to designate which entities involved in the Work must submit waivers.
   4. Waiver Forms: Submit waivers of lien on forms, executed in a manner acceptable to Owner.

I. Initial Application for Payment: Administrative actions and submittals that must precede or coincide with submittal of first Application for Payment include the following:
   1. List of subcontractors.
   2. Schedule of values.
   3. Contractor's construction schedule (preliminary if not final).
   4. Schedule of unit prices.
   5. Submittal schedule (preliminary if not final).
   6. List of Contractor's staff assignments.
   7. List of Contractor's principal consultants.
   8. Copies of building permits.
   9. Copies of authorizations and licenses from authorities having jurisdiction for performance of the Work.
   10. Initial progress report.
   11. Report of preconstruction conference.

J. Application for Payment at Substantial Completion: After issuing the Certificate of Substantial Completion, submit an Application for Payment showing 100 percent completion for portion of the Work claimed as substantially complete.

1. Include documentation supporting claim that the Work is substantially complete and a statement showing an accounting of changes to the Contract Sum.
2. This application shall reflect Certificates of Partial Substantial Completion issued previously for Owner occupancy of designated portions of the Work.

K. Final Payment Application: Submit final Application for Payment with releases and supporting documentation not previously submitted and accepted, including, but not limited, to the following:
1. Evidence of completion of Project closeout requirements.
2. Insurance certificates for products and completed operations where required and proof that taxes, fees, and similar obligations were paid.
3. Updated final statement, accounting for final changes to the Contract Sum.
4. AIA Document G706-1994, "Contractor's Affidavit of Payment of Debts and Claims."
5. AIA Document G706A-1994, "Contractor's Affidavit of Release of Liens."
6. AIA Document G707-1994, "Consent of Surety to Final Payment."
7. Evidence that claims have been settled.
8. Final meter readings for utilities, a measured record of stored fuel, and similar data as of date of Substantial Completion or when Owner took possession of and assumed responsibility for corresponding elements of the Work.
9. Final liquidated damages settlement statement.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

SECTION 013000
ADMINISTRATIVE REQUIREMENTS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. General administrative requirements.

B. Preconstruction meeting.

C. Progress meetings.

D. Construction progress schedule.

E. Submittals for review, information, and project closeout.

F. Number of copies of submittals.

G. Requests for Interpretation (RFI) procedures.

H. Submittal procedures.

1.02 GENERAL ADMINISTRATIVE REQUIREMENTS

A. Comply with requirements of Section 017000 - Execution and Closeout Requirements for coordination of execution of administrative tasks with timing of construction activities.

B. Make the following types of submittals to Architect:
   1. Requests for Interpretation (RFI).
   2. Requests for substitution.
   3. Shop drawings, product data, and samples.
   4. Test and inspection reports.
   5. Design data.
   6. Manufacturer's instructions and field reports.
   7. Applications for payment and change order requests.
   8. Progress schedules.
   9. Coordination drawings.
   10. Correction Punch List and Final Correction Punch List for Substantial Completion.
   11. Closeout submittals.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.01 PRECONSTRUCTION MEETING

A. Attendance Required:
   1. Owner.
   2. Architect.
   3. Contractor.

B. Agenda:
   1. Execution of Owner-Contractor Agreement.
   2. Submission of executed bonds and insurance certificates.
   3. Distribution of Contract Documents.
   4. Submission of list of subcontractors, list of products, schedule of values, and progress schedule.
   5. Designation of personnel representing the parties to Contract, _____ and .
   6. Procedures and processing of field decisions, submittals, substitutions, applications for payments, proposal request, Change Orders, and Contract closeout procedures.
   7. Scheduling.

C. Record minutes and distribute copies within two days after meeting to participants, with two copies to Architect, Owner, participants, and those affected by decisions made.

3.02 PROGRESS MEETINGS

A. Attendance Required:
   1. Contractor.
   2. Owner.
   3. Architect.
   4. Contractor's superintendent.
   5. Major subcontractors.

B. Agenda:
   1. Review minutes of previous meetings.
   2. Review of work progress.
   3. Field observations, problems, and decisions.
   4. Identification of problems that impede, or will impede, planned progress.
   5. Review of submittals schedule and status of submittals.
   6. Maintenance of progress schedule.
   7. Corrective measures to regain projected schedules.
   8. Planned progress during succeeding work period.
   9. Maintenance of quality and work standards.
   10. Effect of proposed changes on progress schedule and coordination.
   11. Other business relating to work.

C. Record minutes and distribute copies within two days after meeting to participants, with two copies to Architect, Owner, participants, and those affected by decisions made.

3.03 CONSTRUCTION PROGRESS SCHEDULE - SEE SECTION 013216

A. If preliminary schedule requires revision after review, submit revised schedule within 10 days.

B. Within 20 days after review of preliminary schedule, submit draft of proposed complete schedule for review.
   1. Include written certification that major contractors have reviewed and accepted proposed schedule.

C. Within 10 days after joint review, submit complete schedule.

D. Submit updated schedule with each Application for Payment.

3.04 REQUESTS FOR INTERPRETATION (RFI)

A. Preparation: Prepare an RFI immediately upon discovery of a need for interpretation of Contract Documents. Failure to submit a RFI in a timely manner is not a legitimate cause for claiming additional costs or delays in execution of the work.
   1. Prepare a separate RFI for each specific item.

B. RFI Log: Prepare and maintain a tabular log of RFIs for the duration of the project.

3.05 SUBMITTALS FOR REVIEW

A. When the following are specified in individual sections, submit them for review:
   1. Product data.
   2. Shop drawings.
   3. Samples for selection.
   4. Samples for verification.

B. Submit to Architect for review for the limited purpose of checking for compliance with information given and the design concept expressed in Contract Documents.

C. Samples will be reviewed for aesthetic, color, or finish selection.

D. After review, provide copies and distribute in accordance with SUBMITTAL PROCEDURES article below and for record documents purposes described in Section 017800 - Closeout Submittals.

3.06 SUBMITTALS FOR INFORMATION

A. When the following are specified in individual sections, submit them for information:
   1. Design data.
   2. Certificates.
   3. Test reports.
   4. Inspection reports.
   5. Manufacturer's instructions.
   6. Manufacturer's field reports.
   7. Other types indicated.

B. Submit for Architect's knowledge as contract administrator or for Owner.

3.07 SUBMITTALS FOR PROJECT CLOSEOUT

A. Submit Correction Punch List for Substantial Completion.

B. Submit Final Correction Punch List for Substantial Completion.

C. When the following are specified in individual sections, submit them at project closeout in compliance with requirements of Section 017800 - Closeout Submittals:
   1. Project record documents.
   2. Operation and maintenance data.
   3. Warranties.
   4. Bonds.
   5. Other types as indicated.

D. Submit for Owner's benefit during and after project completion.

3.08 NUMBER OF COPIES OF SUBMITTALS

A. Electronic Documents: Submit one electronic copy in PDF format; an electronically-marked up file will be returned. Create PDFs at native size and right-side up; illegible files will be rejected.

B. Samples: Submit the number specified in individual specification sections; one of which will be retained by Architect.
   1. After review, produce duplicates.
   2. Retained samples will not be returned to Contractor unless specifically so stated.

3.09 SUBMITTAL PROCEDURES

A. General Requirements:
   1. Use a separate transmittal for each item.
   2. Submit separate packages of submittals for review and submittals for information, when included in the same specification section.
   3. Transmit using approved form.
      a. Use Contractor's form, subject to prior approval by Architect.
      b. Use form generated by Electronic Document Submittal Service software.
   4. Sequentially identify each item. For revised submittals use original number and a sequential numerical suffix.
   5. Identify: Project; Contractor; subcontractor or supplier; pertinent drawing and detail number; and specification section number and article/paragraph, as appropriate on each copy.
   6. Apply Contractor's stamp, signed or initialed certifying that review, approval, verification of products required, field dimensions, adjacent construction work, and coordination of information is in accordance with the requirements of the work and Contract Documents.
      a. Submittals from sources other than the Contractor, or without Contractor's stamp will not be acknowledged, reviewed, or returned.

B. Product Data Procedures:
   1. Submit only information required by individual specification sections.
   2. Collect required information into a single submittal.

3. Do not submit (Material) Safety Data Sheets for materials or products.

C. Shop Drawing Procedures:
   1. Prepare accurate, drawn-to-scale, original shop drawing documentation by interpreting Contract Documents and coordinating related work.
   2. Generic, non-project-specific information submitted as shop drawings do not meet the requirements for shop drawings.

3.10 SUBMITTAL REVIEW

A. Submittals for Review: Architect will review each submittal, and approve, or take other appropriate action.

B. Submittals for Information: Architect will acknowledge receipt and review. See below for actions to be taken.

C. Architect's actions will be reflected by marking each returned submittal using virtual stamp on electronic submittals.

D. Architect's and consultants' actions on items submitted for review:
   1. Authorizing purchasing, fabrication, delivery, and installation:
      a. "Approved", or language with same legal meaning.
      b. "Approved as Noted, Resubmission not required", or language with same legal meaning.
         1) At Contractor's option, submit corrected item, with review notations acknowledged and incorporated.
      c. "Approved as Noted, Resubmit for Record", or language with same legal meaning.
   2. Not Authorizing fabrication, delivery, and installation:

E. Architect's and consultants' actions on items submitted for information:
   1. Items for which no action was taken:
      a. "Received" - to notify the Contractor that the submittal has been received for record only.
   2. Items for which action was taken:
      a. "Reviewed" - no further action is required from Contractor.

END OF SECTION

SECTION 013100
PROJECT MANAGEMENT AND COORDINATION

PART 1 GENERAL

1.01 COORDINATION

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

B. Prepare memoranda for distribution to each party involved, outlining special procedures required for coordination. Include such items as required notices, reports, and list of attendees at meetings.
   1. Prepare similar memoranda for Owner and separate contractors if coordination of their Work is required.

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

1.02 REQUESTS FOR INFORMATION (RFIS)

A. General: Immediately on discovery of the need for additional information or interpretation of the Contract Documents, Contractor shall prepare and submit an RFI in the form specified.
   1. Architect will return RFIs submitted to Architect by other entities controlled by Contractor with no response.
   2. Coordinate and submit RFIs in a prompt manner so as to avoid delays in Contractor's work or work of subcontractors.

B. Content of the RFI: Include a detailed, legible description of item needing information or interpretation and the following:
   1. Project name.
   2. Project number.
   3. Date.
   4. Name of Contractor.
   5. Name of Architect.
   6. RFI number, numbered sequentially.
   7. RFI subject.
   8. Specification Section number and title and related paragraphs, as appropriate.
   9. Drawing number and detail references, as appropriate.
   10. Field dimensions and conditions, as appropriate.

11. Contractor's suggested resolution. If Contractor's solution(s) impacts the Contract Time or the Contract Sum, Contractor shall state impact in the RFI.
12. Contractor's signature.
13. Attachments: Include sketches, descriptions, measurements, photos, Product Data, Shop Drawings, coordination drawings, and other information necessary to fully describe items needing interpretation.

C. RFI Forms: Software-generated form with substantially the same content as indicated above, acceptable to Architect.

D. Architect's Action: Architect will review each RFI, determine action required, and respond. Allow seven working days for Architect's response for each RFI. RFIs received by Architect after 1:00 p.m. will be considered as received the following working day.
1. The following RFIs will be returned without action:
   a. Requests for approval of submittals.
   b. Requests for approval of substitutions.
   c. Requests for coordination information already indicated in the Contract Documents.
   d. Requests for adjustments in the Contract Time or the Contract Sum.
   e. Requests for interpretation of Architect's actions on submittals.
   f. Incomplete RFIs or inaccurately prepared RFIs.
2. Architect's action may include a request for additional information, in which case Architect's time for response will date from time of receipt of additional information.
3. Architect's action on RFIs that may result in a change to the Contract Time or the Contract Sum may be eligible for Contractor to submit Change Proposal according to Division 01 Section "Contract Modification Procedures."
   a. If Contractor believes the RFI response warrants change in the Contract Time or the Contract Sum, notify Architect in writing within 10 days of receipt of the RFI response.

E. On receipt of Architect's action, update the RFI log and immediately distribute the RFI response to affected parties. Review response and notify Architect within seven days if Contractor disagrees with response.

F. RFI Log: Prepare, maintain, and submit a tabular log of RFIs organized by the RFI number. Submit log weekly. Include the following:
1. Project name.
2. Name and address of Contractor.
3. Name and address of Architect.
4. RFI number including RFIs that were dropped and not submitted.
5. RFI description.
6. Date the RFI was submitted.
7. Date Architect's response was received.
8. Identification of related Minor Change in the Work, Construction Change Directive, and Proposal Request, as appropriate.

1.03 PROJECT MEETINGS

A. Preconstruction Conference: Schedule and conduct a preconstruction conference before starting construction, at a time convenient to Owner and Architect, but no later than 15 days after execution of the Agreement.
1. Attendees: Authorized representatives of Owner, Architect, and their consultants; Contractor and its superintendent; major subcontractors; suppliers; and other concerned parties shall attend the conference. Participants at the conference shall be familiar with Project and authorized to conclude matters relating to the Work.
2. Agenda: Discuss items of significance that could affect progress, including the following:
   a. Tentative construction schedule.
   b. Phasing.
   c. Critical work sequencing and long-lead items.
   d. Designation of key personnel and their duties.

e. Procedures for processing field decisions and Change Orders.
f. Procedures for RFIs.
g. Procedures for testing and inspecting.
h. Procedures for processing Applications for Payment.
i. Distribution of the Contract Documents.
j. Submittal procedures.
k. Sustainable design requirements.
l. Preparation of record documents.
m. Use of the premises.
n. Work restrictions.
o. Working hours.
p. Owner's occupancy requirements.
q. Responsibility for temporary facilities and controls.
r. Procedures for moisture and mold control.
s. Procedures for disruptions and shutdowns.
t. Construction waste management and recycling.
u. Parking availability.
v. Office, work, and storage areas.
w. Equipment deliveries and priorities.
x. First aid.
y. Security.
z. Progress cleaning.

3. Minutes: Entity responsible for conducting meeting will record and distribute meeting minutes.

B. Progress Meetings: Conduct progress meetings at biweekly intervals.
1. Attendees: In addition to representatives of Owner and Architect, each contractor, subcontractor, supplier, and other entity concerned with current progress or involved in planning, coordination, or performance of future activities shall be represented at these meetings. All participants at the meeting shall be familiar with Project and authorized to conclude matters relating to the Work.
2. Agenda: Review and correct or approve minutes of previous progress meeting. Review other items of significance that could affect progress. Include topics for discussion as appropriate to status of Project.
a. Contractor's Construction Schedule: Review progress since the last meeting. Determine whether each activity is on time, ahead of schedule, or behind schedule, in relation to Contractor's construction schedule. Determine how construction behind schedule will be expedited; secure commitments from parties involved to do so. Discuss whether schedule revisions are required to ensure that current and subsequent activities will be completed within the Contract Time.
1) Review schedule for next period.
b. Review present and future needs of each entity present, including the following:
1) Interface requirements.
2) Sequence of operations.
3) Status of submittals.
4) Deliveries.
5) Off-site fabrication.
6) Access.
7) Site utilization.
8) Temporary facilities and controls.
9) Progress cleaning.
10) Quality and work standards.
11) Status of correction of deficient items.
12) Field observations.

13) Status of RFIs.
14) Status of proposal requests.
15) Pending changes.
16) Status of Change Orders.
17) Pending claims and disputes.
18) Documentation of information for payment requests.

3. Minutes: Entity responsible for conducting the meeting will record and distribute the meeting minutes to each party present and to parties requiring information.
   a. Schedule Updating: Revise Contractor's construction schedule after each progress meeting where revisions to the schedule have been made or recognized. Issue revised schedule concurrently with the report of each meeting.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

SECTION 013300
SUBMITTAL PROCEDURES

PART 1 GENERAL

1.01 DEFINITIONS

A. Action Submittals: Written and graphic information and physical samples that require Architect's responsive action.

B. Informational Submittals: Written and graphic information and physical samples that do not require Architect's responsive action. Submittals may be rejected for not complying with requirements.

1.02 ACTION SUBMITTALS

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

1.03 SUBMITTAL ADMINISTRATIVE REQUIREMENTS

A. Architect's Digital Data Files: Electronic copies of CAD Drawings of the Contract Drawings will be provided by Architect for Contractor's use in preparing submittals.
   1. Architect will furnish Contractor one set of digital data drawing files of the of requested Contract Drawings for use in preparing Shop Drawings.
      a. Architect makes no representations as to the accuracy or completeness of digital data drawing files as they relate to the Contract Drawings.
      b. Contractor shall execute a data licensing agreement in the form prepared by the Architect

B. Coordination: Coordinate preparation and processing of submittals with performance of construction activities.
   1. Coordinate each submittal with fabrication, purchasing, testing, delivery, other submittals, and related activities that require sequential activity.
   2. Coordinate transmittal of different types of submittals for related parts of the Work so processing will not be delayed because of need to review submittals concurrently for coordination.
      a. Architect reserves the right to withhold action on a submittal requiring coordination with other submittals until related submittals are received.

C. Processing Time: Allow time for submittal review, including time for resubmittals, as follows. Time for review shall commence on Architect's receipt of submittal. No extension of the Contract Time will be authorized because of failure to transmit submittals enough in advance of the Work to permit processing, including resubmittals.
   1. Initial Review: Allow 15 calendar days for initial review of each submittal. Allow additional time if coordination with subsequent submittals is required. Architect will advise Contractor when a submittal being processed must be delayed for coordination.
   2. Intermediate Review: If intermediate submittal is necessary, process it in same manner as initial submittal.
   3. Resubmittal Review: Allow 15 calendar days for review of each resubmittal.

D. Identification and Information: Place a permanent label or title block on each paper copy submittal item for identification.
   1. Indicate name of firm or entity that prepared each submittal on label or title block.
   2. Provide a space approximately 6 by 8 inches (150 by 200 mm) on label or beside title block to record Contractor's review and approval markings and action taken by Architect.
   3. Include the following information for processing and recording action taken:
      a. Project name.

b. Date.
c. Name of Architect.
d. Name of Construction Manager.
e. Name of Contractor.
f. Name of subcontractor.
g. Name of supplier.
h. Name of manufacturer.
i. Submittal number or other unique identifier, including revision identifier.
j. Number and title of appropriate Specification Section.
k. Drawing number and detail references, as appropriate.
l. Location(s) where product is to be installed, as appropriate.
m. Other necessary identification.

E. Options: Identify options requiring selection by the Architect.

F. Deviations: Identify deviations from the Contract Documents on submittals.

G. Transmittal: Assemble each submittal individually and appropriately for transmittal and handling. Transmit each submittal using a transmittal form. Architect will return submittals, without review, received from sources other than Contractor.

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

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

J. Use for Construction: Use only final submittals that are marked with approval notation from Architect's action stamp.

PART 2 PRODUCTS

2.01 SUBMITTAL PROCEDURES

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

5. Submit Product Data before or concurrent with Samples.
6. Submit Product Data in the following format:
    a. Three paper copies of Product Data, unless otherwise indicated. Architect will return two copies.

B. Shop Drawings: Prepare Project-specific information, drawn accurately to scale. Do not base Shop Drawings on reproductions of the Contract Documents or standard printed data, unless submittal based upon Architect's digital data drawing files is otherwise permitted.
1. Preparation: Fully illustrate requirements in the Contract Documents. Include the following information, as applicable:
    a. Identification of products.
    b. Schedules.
    c. Compliance with specified standards.
    d. Notation of coordination requirements.
    e. Notation of dimensions established by field measurement.
    f. Relationship and attachment to adjoining construction clearly indicated.
    g. Seal and signature of professional engineer if specified.
2. Sheet Size: Except for templates, patterns, and similar full-size drawings, submit Shop Drawings on sheets at least 8-1/2 by 11 inches (215 by 280 mm) but no larger than 30 by 42 inches (750 by 1067 mm).
3. Submit Shop Drawings in the following format:
    a. Three opaque copies of each submittal. Architect will retain two copies; remainder will be returned.

C. Samples: Submit Samples for review of kind, color, pattern, and texture for a check of these characteristics with other elements and for a comparison of these characteristics between submittal and actual component as delivered and installed.
1. Transmit Samples that contain multiple, related components such as accessories together in one submittal package.
2. Identification: Attach label on unexposed side of Samples that includes the following:
    a. Generic description of Sample.
    b. Product name and name of manufacturer.
    c. Sample source.
    d. Number and title of applicable Specification Section.
3. Disposition: Maintain sets of approved Samples at Project site, available for quality-control comparisons throughout the course of construction activity. Sample sets may be used to determine final acceptance of construction associated with each set.
    a. Samples that may be incorporated into the Work are indicated in individual Specification Sections. Such Samples must be in an undamaged condition at time of use.
    b. Samples not incorporated into the Work, or otherwise designated as Owner's property, are the property of Contractor.
4. Samples for Initial Selection: Submit manufacturer's color charts consisting of units or sections of units showing the full range of colors, textures, and patterns available.
    a. Number of Samples: Submit two full set(s) of available choices where color, pattern, texture, or similar characteristics are required to be selected from manufacturer's product line. Architect will return one submittal with options selected.
5. Samples for Verification: Submit full-size units or Samples of size indicated, prepared from same material to be used for the Work, cured and finished in manner specified, and physically identical with material or product proposed for use, and that show full range of color and texture variations expected. Samples include, but are not limited to, the following: partial sections of manufactured or fabricated components; small cuts or containers of materials; complete units of repetitively used materials; swatches showing color, texture, and pattern; color range sets; and components used for independent testing and inspection.

a. Number of Samples: Submit three sets of Samples. Architect will retain one Sample sets; remainder will be returned.
b. If variation in color, pattern, texture, or other characteristic is inherent in material or product represented by a Sample, submit at least three sets of paired units that show approximate limits of variations.

D. Product Schedule: As required in individual Specification Sections, prepare a written summary indicating types of products required for the Work and their intended location. Include the following information in tabular form:
1. Submit product schedule in the following format:
a. Three paper copies of product schedule or list, unless otherwise indicated. Architect will return two copies.

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

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

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

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

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

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

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

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

M. Research Reports: Submit written evidence, from a model code organization acceptable to authorities having jurisdiction, that product complies with building code in effect for Project.

2.02 DELEGATED-DESIGN SERVICES

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

B. Delegated-Design Services Certification: In addition to Shop Drawings, Product Data, and other required submittals, submit three paper copies of certificate, signed and sealed by the responsible design professional, for each product and system specifically assigned to Contractor to be designed or certified by a design professional.
1. Indicate that products and systems comply with performance and design criteria in the Contract Documents. Include list of codes, loads, and other factors used in performing these services.

PART 3 EXECUTION

3.01 CONTRACTOR'S REVIEW

A. Action and Informational Submittals: Review each submittal and check for coordination with other Work of the Contract and for compliance with the Contract Documents. Note corrections and field dimensions. Mark with approval stamp before submitting to Architect.

B. Project Closeout and Maintenance/Material Submittals: Refer to requirements in Division 01 Section "Closeout Procedures."

C. Approval Stamp: Stamp each submittal with a uniform, approval stamp. Include Project name and location, submittal number, Specification Section title and number, name of reviewer, date of Contractor's approval, and statement certifying that submittal has been reviewed, checked, and approved for compliance with the Contract Documents.

3.02 ARCHITECT'S ACTION

A. General: Architect will not review submittals that do not bear Contractor's approval stamp and will return them without action.

B. Action Submittals: Architect will review each submittal, make marks to indicate corrections or modifications required, and return it. Architect will stamp each submittal with an action stamp and will mark stamp appropriately to indicate action.

C. Informational Submittals: Architect will review each submittal and will not return it, or will return it if it does not comply with requirements. Architect will forward each submittal to appropriate party.

D. Incomplete submittals are not acceptable, will be considered nonresponsive, and will be returned without review.

E. Submittals not required by the Contract Documents may not be reviewed and may be discarded.

END OF SECTION

SECTION 014000
QUALITY REQUIREMENTS

PART 1 GENERAL

1.01 CONFLICTING REQUIREMENTS

A. Referenced Standards: If compliance with two or more standards is specified and the standards establish different or conflicting requirements for minimum quantities or quality levels, comply with the most stringent requirement. Refer conflicting requirements that are different, but apparently equal, to Architect for a decision before proceeding.

1.02 INFORMATIONAL SUBMITTALS

A. Contractor's Statement of Responsibility: When required by authorities having jurisdiction, submit copy of written statement of responsibility sent to authorities having jurisdiction before starting work on the following systems.
   1. Main wind-force resisting system or a wind-resisting component listed in the wind-force-resisting system quality assurance plan prepared by the Architect.

B. Testing Agency Qualifications: For testing agencies specified in "Quality Assurance" Article to demonstrate their capabilities and experience. Include proof of qualifications in the form of a recent report on the inspection of the testing agency by a recognized authority.

1.03 REPORTS AND DOCUMENTS

A. Test and Inspection Reports: Prepare and submit certified written reports specified in other Sections. Include the following:
   1. Date of issue.
   2. Project title and number.
   3. Name, address, and telephone number of testing agency.
   4. Dates and locations of samples and tests or inspections.
   5. Names of individuals making tests and inspections.
   6. Description of the Work and test and inspection method.
   7. Identification of product and Specification Section.
   8. Complete test or inspection data.
   9. Test and inspection results and an interpretation of test results.
   10. Record of temperature and weather conditions at time of sample taking and testing and inspecting.
   11. Comments or professional opinion on whether tested or inspected Work complies with the Contract Document requirements.
   12. Name and signature of laboratory inspector.
   13. Recommendations on retesting and reinspecting.

B. Permits, Licenses, and Certificates: For Owner's records, submit copies of permits, licenses, certifications, inspection reports, releases, jurisdictional settlements, notices, receipts for fee payments, judgments, correspondence, records, and similar documents, established for compliance with standards and regulations bearing on performance of the Work.

1.04 QUALITY ASSURANCE

A. General: Qualifications paragraphs in this article establish the minimum qualification levels required; individual Specification Sections specify additional requirements.

B. Manufacturer Qualifications: A firm experienced in manufacturing products or systems similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.

C. Fabricator Qualifications: A firm experienced in producing products similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.

D. Installer Qualifications: A firm or individual experienced in installing, erecting, or assembling work similar in material, design, and extent to that indicated for this Project, whose work has resulted in construction with a record of successful in-service performance.

E. Professional Engineer Qualifications: A professional engineer who is legally qualified to practice in jurisdiction where Project is located and who is experienced in providing engineering services of the kind indicated. Engineering services are defined as those performed for installations of the system, assembly, or product that are similar to those indicated for this Project in material, design, and extent.

F. Testing Agency Qualifications: An NRTL, an NVLAP, or an independent agency with the experience and capability to conduct testing and inspecting indicated, as documented according to ASTM E 329; and with additional qualifications specified in individual Sections; and where required by authorities having jurisdiction, that is acceptable to authorities.
   1. NRTL: A nationally recognized testing laboratory according to 29 CFR 1910.7.
   2. NVLAP: A testing agency accredited according to NIST's National Voluntary Laboratory Accreditation Program.

G. Mockups: Before installing portions of the Work requiring mockups, build mockups for each form of construction and finish required to comply with the following requirements, using materials indicated for the completed Work:
   1. Build mockups in location and of size indicated or, if not indicated, as directed by Architect.
   2. Notify Architect seven days in advance of dates and times when mockups will be constructed.
   3. Demonstrate the proposed range of aesthetic effects and workmanship.
   4. Obtain Architect's approval of mockups before starting work, fabrication, or construction.
      a. Allow five days for initial review and each re-review of each mockup.
   5. Maintain mockups during construction in an undisturbed condition as a standard for judging the completed Work.
   6. Demolish and remove mockups when directed, unless otherwise indicated.

1.05 QUALITY CONTROL

A. Owner Responsibilities: Where quality-control services are indicated as Owner's responsibility, Owner will engage a qualified testing agency to perform these services.
   1. Owner will furnish Contractor with names, addresses, and telephone numbers of testing agencies engaged and a description of types of testing and inspecting they are engaged to perform.
   2. Costs for retesting and reinspecting construction that replaces or is necessitated by work that failed to comply with the Contract Documents will be charged to Contractor.

B. Contractor Responsibilities: Tests and inspections not explicitly assigned to Owner are Contractor's responsibility. Perform additional quality-control activities required to verify that the Work complies with requirements, whether specified or not.
   1. Where services are indicated as Contractor's responsibility, engage a qualified testing agency to perform these quality-control services.
      a. Contractor shall not employ same entity engaged by Owner, unless agreed to in writing by Owner.
   2. Notify testing agencies at least 24 hours in advance of time when Work that requires testing or inspecting will be performed.
   3. Where quality-control services are indicated as Contractor's responsibility, submit a certified written report, in duplicate, of each quality-control service.
   4. Testing and inspecting requested by Contractor and not required by the Contract Documents are Contractor's responsibility.
   5. Submit additional copies of each written report directly to authorities having jurisdiction, when they so direct.

C. Manufacturer's Field Services: Where indicated, engage a manufacturer's representative to observe and inspect the Work. Manufacturer's representative's services include examination of substrates and conditions, verification of materials, inspection of completed portions of the Work, and submittal of written reports.

D. Retesting/Reinspecting: Regardless of whether original tests or inspections were Contractor's responsibility, provide quality-control services, including retesting and reinspecting, for construction that replaced Work that failed to comply with the Contract Documents.

E. Testing Agency Responsibilities: Cooperate with Architect and Contractor in performance of duties. Provide qualified personnel to perform required tests and inspections.
   1. Notify Architect and Contractor promptly of irregularities or deficiencies observed in the Work during performance of its services.
   2. Determine the location from which test samples will be taken and in which in-situ tests are conducted.
   3. Conduct and interpret tests and inspections and state in each report whether tested and inspected work complies with or deviates from requirements.
   4. Submit a certified written report, in duplicate, of each test, inspection, and similar quality-control service through Contractor.
   5. Do not release, revoke, alter, or increase the Contract Document requirements or approve or accept any portion of the Work.
   6. Do not perform any duties of Contractor.

F. Associated Services: Cooperate with agencies performing required tests, inspections, and similar quality-control services, and provide reasonable auxiliary services as requested. Notify agency sufficiently in advance of operations to permit assignment of personnel. Provide the following:
   1. Access to the Work.
   2. Incidental labor and facilities necessary to facilitate tests and inspections.
   3. Adequate quantities of representative samples of materials that require testing and inspecting. Assist agency in obtaining samples.
   4. Preliminary design mix proposed for use for material mixes that require control by testing agency.

G. Coordination: Coordinate sequence of activities to accommodate required quality-assurance and -control services with a minimum of delay and to avoid necessity of removing and replacing construction to accommodate testing and inspecting.
   1. Schedule times for tests, inspections, obtaining samples, and similar activities.

1.06 SPECIAL TESTS AND INSPECTIONS

A. Special Tests and Inspections: Owner shall engage and Contractor Shall coordinate a qualified special inspector to conduct special tests and inspections required by authorities having jurisdiction as the responsibility of Owner, and as follows:

B. Special Tests and Inspections: Conducted by a qualified special inspector as required by authorities having jurisdiction, as indicated in individual Specification Sections, and as follows:
   1. Verifying that manufacturer maintains detailed fabrication and quality-control procedures and reviewing the completeness and adequacy of those procedures to perform the Work.
   2. Notifying Architect and Contractor promptly of irregularities and deficiencies observed in the Work during performance of its services.
   3. Submitting a certified written report of each test, inspection, and similar quality-control service to Architect with copy to Contractor and to authorities having jurisdiction.
   4. Submitting a final report of special tests and inspections at Substantial Completion, which includes a list of unresolved deficiencies.
   5. Interpreting tests and inspections and stating in each report whether tested and inspected work complies with or deviates from the Contract Documents.
   6. Retesting and reinspecting corrected work.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION

3.01 REPAIR AND PROTECTION

A. General: On completion of testing, inspecting, sample taking, and similar services, repair damaged construction and restore substrates and finishes.
   1. Provide materials and comply with installation requirements specified in other Specification Sections or matching existing substrates and finishes. Restore patched areas and extend restoration into adjoining areas with durable seams that are as invisible as possible. Comply with the Contract Document requirements for cutting and patching in Division 01 Section "Execution."

B. Protect construction exposed by or for quality-control service activities.

C. Repair and protection are Contractor's responsibility, regardless of the assignment of responsibility for quality-control services.

END OF SECTION

SECTION 014533
CODE-REQUIRED SPECIAL INSPECTIONS

PART 1 – GENERAL

1.1 SECTION INCLUDES

A. Code-required special inspections.

B. Testing services incidental to special inspections.

C. Submittals.

D. Manufacturers' field services.

E. Fabricators' field services.

1.2 DEFINITIONS

A. Code or Building Code: ICC (IBC), 2018 Edition of the International Building Code and specifically, Chapter 17 - Special Inspections and Tests.

B. Authority Having Jurisdiction (AHJ): Agency or individual officially empowered to enforce the building, fire and life safety code requirements of the permitting jurisdiction in which the Project is located.

C. National Institute of Standards and Technology (NIST).

D. Special Inspection:

1. Special inspections are inspections and testing of materials, installation, fabrication, erection or placement of components and connections mandated by the AHJ that also require special expertise to ensure compliance with the approved contract documents and the referenced standards.

2. Special inspections are separate from and independent of tests and inspections conducted by Owner or Contractor for the purposes of quality assurance and contract administration.

1.3 REFERENCE STANDARDS

A. ACI 318 - Building Code Requirements for Structural Concrete and Commentary; 2014 (Errata 2017)..

B. TMS 402/602 - Building Code Requirements and Specification for Masonry Structures; 2016.

C. AISC 341 - Seismic Provisions for Structural Steel Buildings; 2016.

D. AISC 360 - Specification for Structural Steel Buildings; 2016.

E. ASCE 7 - Minimum Design Loads and Associated Criteria for Buildings and Other Structures; 2018.

F. ASTM A615/A615M - Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement; 2016.

G. ASTM C31/C31M - Standard Practice for Making and Curing Concrete Test Specimens in the Field; 2018b.

H. ASTM C172/C172M - Standard Practice for Sampling Freshly Mixed Concrete; 2014a.

I. ASTM D3740 - Standard Practice for Minimum Requirements for Agencies Engaged in the Testing and/or Inspection of Soil and Rock as Used in Engineering Design and Construction; 2012a.

J. ASTM E329 - Standard Specification for Agencies Engaged in Construction Inspection, Testing, or Special Inspection; 2018.

K. ASTM E543 - Standard Specification for Agencies Performing Nondestructive Testing; 2015.

L. AWS D1.1/D1.1M - Structural Welding Code - Steel; 2015, with Errata (2016).

M. AWS D1.3/D1.3M - Structural Welding Code - Sheet Steel; 2018.

N. AWS D1.4/D1.4M - Structural Welding Code - Reinforcing Steel; 2018.

O. ICC (IBC) - International Building Code; 2021.

1.4 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Special Inspection Agency Qualifications: Prior to the start of work, the Special Inspection Agency shall:

1. Submit agency name, address, and telephone number, names of full time registered Engineer and responsible officer.
2. Submit copy of report of laboratory facilities inspection made by NIST Construction Materials Reference Laboratory during most recent inspection, with memorandum of remedies of any deficiencies reported by the inspection.
3. Submit certification that Special Inspection Agency is acceptable to AHJ.

C. Testing Agency Qualifications: Prior to the start of work, the Testing Agency shall:

1. Submit agency name, address, and telephone number, and names of full time registered Engineer and responsible officer.
2. Submit copy of report of laboratory facilities inspection made by NIST Construction Materials Reference Laboratory during most recent inspection, with memorandum of remedies of any deficiencies reported by the inspection.
3. Submit certification that Testing Agency is acceptable to AHJ.

D. Special Inspection Reports: After each special inspection, Special Inspector shall promptly submit two copies of report; one to Architect and one to the AHJ.

1. Include:
   a. Date issued.
   b. Project title and number.
   c. Name of Special Inspector.
   d. Date and time of special inspection.
   e. Identification of product and specifications section.
   f. Location in the Project.
   g. Type of special inspection.
   h. Date of special inspection.
   i. Results of special inspection.
   j. Compliance with Contract Documents.
2. Final Special Inspection Report: Document special inspections and correction of discrepancies prior to the start of the work.

E. Test Reports: After each test or inspection, promptly submit two copies of report; one to Architect and one to AHJ.

F. Certificates: When specified in individual special inspection requirements, Special Inspector shall submit certification by the manufacturer, fabricator, and installation subcontractor to Architect and AHJ, in quantities specified for Product Data.

1. Indicate material or product complies with or exceeds specified requirements. Submit supporting reference data, affidavits, and certifications as appropriate.
2. Certificates may be recent or previous test results on material or product, but must be acceptable to Architect and AHJ.

1.5 SPECIAL INSPECTION AGENCY

A. The Special Inspection Agency may employ and pay for services of an independent testing agency to perform testing and sampling associated with special inspections and required by the building code.

1.6 TESTING AND INSPECTION AGENCIES

A. Owner or Architect may employ services of an independent testing agency to perform additional testing and sampling associated with special inspections but not required by the building code.

1.7 QUALITY ASSURANCE

A. Special Inspection Agency Qualifications:
   1. Independent firm specializing in performing testing and inspections of the type specified in this section.
B. Testing Agency Qualifications:
   1. Independent firm specializing in performing testing and inspections of the type specified in this section.
C. Copies of Documents at Project Site: Maintain at the project site a copy of each referenced document.

PART 2 – PRODUCTS

2.1 NOT USED

PART 3 – EXECUTION

3.1 SCHEDULE OF SPECIAL INSPECTIONS, GENERAL

A. Frequency of Special Inspections: Special Inspections are indicated as continuous or periodic.
   1. Continuous Special Inspection: Special Inspection Agency shall be present in the area where the work is being performed and observe the work at all times the work is in progress.
   2. Periodic Special Inspection: Special Inspection Agency shall be present in the area where work is being performed and observe the work part-time or intermittently and at the completion of the work.

3.2 SPECIAL INSPECTIONS FOR STEEL CONSTRUCTION

A. High-Strength Bolt, Nut and Washer Material:
   1. Verify identification markings comply with ASTM standards specified in the approved contract and to AISC 360, Section A3.3; periodic.
   2. Submit manufacturer's certificates of compliance; periodic.

B. High-Strength Bolting Installation: Verify items listed below comply with AISC 360, Section M2.5.

1. Snug tight joints; periodic.
2. Pretensioned and slip-critical joints with matchmarking, twist-off bolt or direct tension indicator method of installation; periodic.
3. Pretensioned and slip-critical joints without matchmarking or calibrated wrench method of installation; continuous.

C. Structural Steel and Cold Formed Steel Deck Material:

1. Structural Steel: Verify identification markings comply with AISC 360, Section M3.5; periodic.
2. Other Steel: Verify identification markings comply with ASTM standards specified in the approved contract documents; periodic.
3. Submit manufacturer's certificates of compliance and test reports; periodic.

D. Weld Filler Material:

1. Verify identification markings comply with AWS standards specified in the approved contract documents and to AISC 360, Section A3.5; periodic.
2. Submit manufacturer's certificates of compliance; periodic.

E. Welding:

1. Structural Steel and Cold Formed Steel Deck:
   a. Complete and Partial Joint Penetration Groove Welds: Verify compliance with AWS D1.1/D1.1M; continuous.
   b. Multipass Fillet Welds: Verify compliance with AWS D1.1/D1.1M; continuous.
   c. Single Pass Fillet Welds Less than 5/16 inch Wide: Verify compliance with AWS D1.1/D1.1M; periodic.
   d. Plug and Slot Welds: Verify compliance with AWS D1.1/D1.1M; continuous.
   e. Single Pass Fillet Welds 5/16 inch or Greater: Verify compliance with AWS D1.1/D1.1M; continuous.
   f. Floor and Roof Deck Welds: Verify compliance with AWS D1.3/D1.3M; continuous.
2. Reinforcing Steel: Verify items listed below comply with AWS D1.4/D1.4M and ACI 318, Section 3.5.2.
   a. Verification of weldability; periodic.
   b. Reinforcing steel resisting flexural and axial forces in intermediate and special moment frames as well as boundary elements of special structural walls of concrete and shear reinforcement; continuous.
   c. Shear reinforcement; continuous.
   d. Other reinforcing steel; periodic.

F. Steel Frame Joint Details: Verify compliance with approved contract documents.

1. Details, bracing and stiffening; periodic.
2. Member locations; periodic.
3. Application of joint details at each connection; periodic.

G. Cold formed steel trusses spanning 60 feet or more; periodic.

3.3 SPECIAL INSPECTIONS FOR CONCRETE CONSTRUCTION

A. Reinforcing Steel, Including Prestressing of Tendons and Placement: Verify compliance with approved contract documents and ACI 318, Sections 3.5 and 7.1 through 7.7; periodic.

B. Reinforcing Steel Welding: Verify compliance with AWS D1.4/D1.4M and ACI 318, Section 3.5.2; periodic.

C. Bolts Installed in Concrete: Where allowable loads have been increased or where strength design is used, verify compliance with approved contract documents and ACI 318, Sections 8.1.3 and 21.2.8 prior to and during placement of concrete; continuous.

D. Anchors Installed in Hardened Concrete: Verify compliance with ACI 318, Sections 3.8.6, 8.1.3, and 21.2.8; periodic.

E. Design Mix: Verify plastic concrete complies with the design mix in approved contract documents and with ACI 318, Chapter 4 and 5.2; periodic.

F. Concrete Sampling Concurrent with Strength Test Sampling: Each time fresh concrete is sampled for strength tests, verify compliance with ASTM C172/C172M, ASTM C31/C31M and ACI 318, Sections 5.6 and 5.8 and record the following, continuous:

1. Slump.
2. Air content.
3. Temperature of concrete.

G. Concrete and Shotcrete Placement: Verify application techniques comply with approved contract documents and ACI 318, Sections 5.9 and 5.10; continuous.

H. Specified Curing Temperature and Techniques: Verify compliance with approved contract documents and ACI 318, Sections 5.11 through 5.13; periodic.

I. Concrete Strength in Situ: Verify concrete strength complies with approved contract documents and ACI 318, Section 6.2, for the following.

J. Formwork Shape, Location and Dimensions: Verify compliance with approved contract documents and ACI 318, Section 6.1.1; periodic.

3.4 SPECIAL INSPECTIONS FOR MASONRY CONSTRUCTION

A. Masonry Structures Subject to Special Inspection:

1. Empirically designed masonry, glass unit masonry and masonry veneer in structures designated as "essential facilities".
2. Engineered masonry in structures classified as "low hazard..." and "substantial hazard to human life in the event of failure".

B. Verify each item below complies with approved contract documents and the applicable articles of TMS 402/602.

1. Inspections and Approvals:
   a. Verify compliance with the required inspection provisions of the approved contract documents; periodic.
   b. Verify approval of submittals required by contract documents; periodic.
2. Compressive Strength of Masonry: Verify compressive strength of masonry units prior to start of construction unless specifically exempted by code; periodic.
3. Slump Flow and Visual Stability Index (VSI): Verify compliance as self consolidating grout arrives on site; continuous.
4. Joints and Accessories: When masonry construction begins, verify:
   a. Proportions of site prepared mortar; periodic.
   b. Construction of mortar joints; periodic.

c. Location of reinforcement, connectors, prestressing tendons, anchorages, etc; periodic.

5. Structural Elements, Joints, Anchors, Protection: During masonry construction, verify:

a. Size and location of structural elements; periodic.

b. Type, size and location of anchors, including anchorage of masonry to structural members, frames or other construction; periodic.

c. Size, grade and type of reinforcement, anchor bolts and prestressing tendons and anchorages; periodic.

d. Welding of reinforcing bars; continuous.

e. Preparation, construction and protection of masonry against hot weather above 90 degrees F and cold weather below 40 degrees F; periodic.

6. Grouting Preparation: Prior to grouting, verify:

a. Grout space is clean; periodic.

b. Correct placement of reinforcing, connectors, prestressing tendons and anchorages; periodic.

c. Correctly proportioned site prepared grouts and prestressing grout for bonded tendons; periodic.

d. Correctly constructed mortar joints; periodic.

7. Preparation of Grout Specimens, Mortar Specimens and Prisms: Observe preparation of specimens; periodic.

C. Engineered Masonry in Buildings Designated as "Essential Facilities": Verify compliance of each item below with approved contract documents and the applicable articles of TMS 402/602.

1. Inspections and Approvals:

a. Verify compliance with the required inspection provisions of the approved contract documents; periodic.

b. Verify approval of submittals required by contract documents; periodic.

2. Compressive Strength of Masonry: Verify compressive strength of masonry units prior to start of construction and upon completion of each 5,000 square feet increment of masonry erected during construction; periodic.

3. Preblended Mortar and Grout: Verify proportions of materials upon delivery to site; periodic.

4. Slump Flow and Visual Stability Index (VSI): Verify compliance as self consolidating grout arrives on site; continuous.

5. Engineered Elements, Joints, Anchors, Grouting, Protection: Verify compliance of each item below with approved contract documents and referenced standards.

a. Proportions of site prepared mortar; periodic.

b. Placement of masonry units and construction of mortar joints; periodic.

c. Placement of reinforcement, connectors, prestressing tendons, anchorages, etc.; periodic.

d. Grout space prior to grouting; continuous.

e. Placement of grout; continuous.

f. Placement of prestressing grout; continuous.

g. Size and location of structural elements; periodic.

h. Type, size and location of anchors, including anchorage of masonry to structural members, frames or other construction; continuous.

i. Size, grade and type of reinforcement, anchor bolts and prestressing tendons and anchorages; periodic.

j. Welding of reinforcing bars; continuous.

k. Preparation, construction and protection of masonry against hot weather above 90 degrees F and cold weather below 40 degrees F; periodic.

l. Application and measurement of prestressing force; continuous.

6. Preparation of Grout Specimens, Mortar Specimens and Prisms: Observe preparation of specimens; continuous.

3.5 SPECIAL INSPECTIONS FOR CAST-IN-PLACE DEEP FOUNDATIONS

A. Materials, Equipment and Final Placement: Verify each item below complies with approved construction documents and approved geotechnical report.

1. Element length; continuous.
2. Element diameters and bell diameters; continuous.
3. Embedment into bedrock; continuous.
4. End bearing strata capacity; continuous.
5. Placement locations and plumbness; continuous.
6. Type and size of hammer; continuous.

B. Drilling Operations: Observe and maintain complete and accurate records for each element; continuous.

C. Material Volume: Record concrete and grout volumes.

D. Concrete Elements Associated with Cast-in-Place Deep Foundations: Perform additional inspections as required by the Special Inspections for Concrete Construction article of this section.

3.6 SPECIAL INSPECTIONS FOR SEISMIC RESISTANCE

A. Structural Observations for Seismic Resistance: Visually observe structural system for general compliance with the approved contract documents; periodic.

3.7 SPECIAL INSPECTIONS FOR WIND RESISTANCE

A. Wind Resisting Components:

1. Roof cladding; periodic.
2. Wall cladding; periodic.

B. Structural Observations for Wind Resistance: Visually observe structural system for general compliance with the approved contract documents; periodic.

3.8 OTHER SPECIAL INSPECTIONS

A. Provide for special inspection of work that, in the opinion of the AHJ, is unusual in nature.

B. For the purposes of this section, work unusual in nature includes, but is not limited to:

1. Materials and systems required to be installed in accordance with the manufacturer's instructions when said instructions prescribe requirements not included in the building code or in standards referenced by the building code.

C. Load Tests:

1. Proposed Construction and Construction in Progress: Where required by code, conduct tests listed below.
   a. Load test procedures specified in code; periodic.
   b. Load test procedures not specified in code; periodic.
   c. Loadbearing Wall and Partition Assemblies: Load test with and without window framing; periodic.
   d. Exterior Window and Door Assemblies: Wind load design pressure test; periodic.
2. Completed Construction: Where required by code, conduct tests listed below.
   a. Load test procedures specified in code; periodic.
   b. Load test procedures not specified in code; periodic.

3.9 SPECIAL INSPECTION AGENCY DUTIES AND RESPONSIBILITIES

A. Special Inspection Agency shall:

1. Verify samples submitted by Contractor comply with the referenced standards and the approved contract documents.
2. Provide qualified personnel at site. Cooperate with Architect and Contractor in performance of services.
3. Perform specified sampling and testing of products in accordance with specified reference standards.
4. Ascertain compliance of materials and products with requirements of Contract Documents.
5. Promptly notify Architect and Contractor of observed irregularities or non-compliance of work or products.
6. Perform additional tests and inspections required by Architect.
7. Submit reports of all tests or inspections specified.

B. Limits on Special Inspection Agency Authority:

1. Agency may not release, revoke, alter, or enlarge on requirements of Contract Documents.
2. Agency may not approve or accept any portion of the work.
3. Agency may not assume any duties of Contractor.
4. Agency has no authority to stop the work.

C. Re-testing required because of non-compliance with specified requirements shall be performed by the same agency on instructions by Architect.

D. Re-testing required because of non-compliance with specified requirements shall be paid for by Contractor.

3.10 TESTING AGENCY DUTIES AND RESPONSIBILITIES

A. Testing Agency Duties:

1. Provide qualified personnel at site. Cooperate with Architect and Contractor in performance of services.

2. Perform specified sampling and testing of products in accordance with specified standards.
3. Ascertain compliance of materials and mixes with requirements of Contract Documents.
4. Promptly notify Architect and Contractor of observed irregularities or non-compliance of work or products.
5. Perform additional tests and inspections required by Architect.
6. Submit reports of all tests or inspections specified.

B. Limits on Testing or Inspection Agency Authority:
1. Agency may not release, revoke, alter, or enlarge on requirements of Contract Documents.
2. Agency may not approve or accept any portion of the work.
3. Agency may not assume any duties of Contractor.
4. Agency has no authority to stop the work.

C. On instructions by Architect, perform re-testing required because of non-compliance with specified requirements, using the same agency.

D. Contractor will pay for re-testing required because of non-compliance with specified requirements.

3.11 CONTRACTOR DUTIES AND RESPONSIBILITIES

A. Contractor Responsibilities, General:
1. Deliver to agency at designated location, adequate samples of materials for special inspections that require material verification.
2. Cooperate with agency and laboratory personnel; provide access to the work, to manufacturers' facilities, and to fabricators' facilities.
3. Provide incidental labor and facilities:
a. To provide access to work to be tested or inspected.
b. To obtain and handle samples at the site or at source of Products to be tested or inspected.
c. To facilitate tests or inspections.
d. To provide storage and curing of test samples.
4. Notify Architect and laboratory 24 hours prior to expected time for operations requiring testing or inspection services.
5. Arrange with Owner's agency and pay for additional samples, tests, and inspections required beyond specified requirements.

B. Contractor Responsibilities, Seismic Force-Resisting Systems: Submit written statement of responsibility for each item listed to AHJ and Owner prior to starting work. Statement of responsibility shall acknowledge awareness of special construction requirements and other requirements listed.

C. Contractor Responsibilities, Wind Force-Resisting Systems: Submit written statement of responsibility for each item listed to AHJ and Owner prior to starting work. Statement of responsibility shall acknowledge awareness of special construction requirements and other requirements listed.

3.12 MANUFACTURERS' AND FABRICATORS' FIELD SERVICES

A. When specified in individual specification sections, require material suppliers, assembly fabricators, or product manufacturers to provide qualified staff personnel to observe site conditions, conditions of surfaces and installation, quality of workmanship, start-up of equipment, to test, adjust, and balance equipment as applicable, and to initiate instructions when necessary.

B. Report observations and site decisions or instructions given to applicators or installers that are supplemental or contrary to manufacturers' written instructions.

END OF SECTION 014533

SECTION 015000
TEMPORARY FACILITIES AND CONTROLS

PART 1 GENERAL

1.01 USE CHARGES

A. General: Installation and removal of and use charges for temporary facilities shall be included in the Contract Sum unless otherwise indicated. Allow other entities to use temporary services and facilities without cost, including, but not limited to, Owner's construction forces, Architect, testing agencies, and authorities having jurisdiction.

1.02 INFORMATIONAL SUBMITTALS

A. Site Plan: Show temporary facilities, utility hookups, staging areas, and parking areas for construction personnel.

B. Erosion- and Sedimentation-Control Plan: Show compliance with requirements of EPA Construction General Permit or authorities having jurisdiction, whichever is more stringent.

1.03 QUALITY ASSURANCE

A. Electric Service: Comply with NECA, NEMA, and UL standards and regulations for temporary electric service. Install service to comply with NFPA 70.

B. Tests and Inspections: Arrange for authorities having jurisdiction to test and inspect each temporary utility before use. Obtain required certifications and permits.

1.04 PROJECT CONDITIONS

A. Temporary Use of Permanent Facilities: Engage installer of each permanent service to assume responsibility for operation, maintenance, and protection of each permanent service during its use as a construction facility before Owner's acceptance, regardless of previously assigned responsibilities.

PART 2 PRODUCTS

2.01 MATERIALS

A. Chain-Link Fencing: Minimum 2-inch (50-mm), 0.148-inch- (3.8-mm-) thick, galvanized steel, chain-link fabric fencing; minimum 6 feet (1.8 m) high with galvanized steel pipe posts; minimum 2-3/8-inch- (60-mm-) OD line posts and 2-7/8-inch- (73-mm-) OD corner and pull posts, with 1-5/8-inch- (42-mm-) OD top rails.

B. Portable Chain-Link Fencing: Minimum 2-inch (50-mm), 0.148-inch- (3.8-mm-) thick, galvanized steel, chain-link fabric fencing; minimum 6 feet (1.8 m) high with galvanized steel pipe posts; minimum 2-3/8-inch- (60-mm-) OD line posts and 2-7/8-inch- (73-mm-) OD corner and pull posts, with 1-5/8-inch- (42-mm-) OD top and bottom rails. Provide galvanized steel bases for supporting posts.

2.02 TEMPORARY FACILITIES

A. Field Offices, General: Prefabricated or mobile units with serviceable finishes, temperature controls, and foundations adequate for normal loading.

B. Storage and Fabrication Sheds: Provide sheds sized, furnished, and equipped to accommodate materials and equipment for construction operations.

2.03 EQUIPMENT

A. Fire Extinguishers: Portable, UL rated; with class and extinguishing agent as required by locations and classes of fire exposures.

B. HVAC Equipment: Unless Owner authorizes use of permanent HVAC system, provide vented, self-contained, liquid-propane-gas or fuel-oil heaters with individual space thermostatic control.

1. Use of gasoline-burning space heaters, open-flame heaters, or salamander-type heating units is prohibited.

2. Heating Units: Listed and labeled for type of fuel being consumed, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
3. Permanent HVAC System: If Owner authorizes use of permanent HVAC system for temporary use during construction, provide filter with MERV of 8 at each return air grille in system and remove at end of construction and clean HVAC system as required in Division 01 Section "Closeout Procedures."

PART 3 EXECUTION

3.01 INSTALLATION, GENERAL

A. Locate facilities where they will serve Project adequately and result in minimum interference with performance of the Work. Relocate and modify facilities as required by progress of the Work.
   1. Locate facilities to limit site disturbance as specified in Division 01 Section "Summary."

B. Provide each facility ready for use when needed to avoid delay. Do not remove until facilities are no longer needed or are replaced by authorized use of completed permanent facilities.

3.02 TEMPORARY UTILITY INSTALLATION

A. General: Install temporary service or connect to existing service.
   1. Arrange with utility company, Owner, and existing users for time when service can be interrupted, if necessary, to make connections for temporary services.

B. Water Service: Install water service and distribution piping in sizes and pressures adequate for construction.

C. Sanitary Facilities: Provide temporary toilets, wash facilities, and drinking water for use of construction personnel. Comply with requirements of authorities having jurisdiction for type, number, location, operation, and maintenance of fixtures and facilities.

D. Heating and Cooling: Provide temporary heating and cooling required by construction activities for curing or drying of completed installations or for protecting installed construction from adverse effects of low temperatures or high humidity. Select equipment that will not have a harmful effect on completed installations or elements being installed.

E. Ventilation and Humidity Control: Provide temporary ventilation required by construction activities for curing or drying of completed installations or for protecting installed construction from adverse effects of high humidity. Select equipment that will not have a harmful effect on completed installations or elements being installed. Coordinate ventilation requirements to produce ambient condition required and minimize energy consumption.

F. Electric Power Service: Provide electric power service and distribution system of sufficient size, capacity, and power characteristics required for construction operations.
   1. Install electric power service underground, unless otherwise indicated.

G. Lighting: Provide temporary lighting with local switching that provides adequate illumination for construction operations, observations, inspections, and traffic conditions.
   1. Install and operate temporary lighting that fulfills security and protection requirements without operating entire system.

H. Telephone Service: Provide temporary telephone service in common-use facilities for use by all construction personnel. Install one telephone line(s) for each field office.
   1. At each telephone, post a list of important telephone numbers.
      a. Police and fire departments.
      b. Ambulance service.
      c. Contractor's home office.
      d. Architect's office.
      e. Engineers' offices.
      f. Owner's office.
      g. Principal subcontractors' field and home offices.

2. Provide superintendent with cellular telephone or portable two-way radio for use when away from field office.

3.03 SUPPORT FACILITIES INSTALLATION

A. General: Comply with the following:
   1. Provide construction for temporary offices, shops, and sheds located within construction area or within 30 feet (9 m) of building lines that is noncombustible according to ASTM E 136. Comply with NFPA 241.
   2. Maintain support facilities until Architect schedules Substantial Completion inspection. Remove before Substantial Completion. Personnel remaining after Substantial Completion will be permitted to use permanent facilities, under conditions acceptable to Owner.

B. Temporary Roads and Paved Areas: Construct and maintain temporary roads and paved areas adequate for construction operations. Locate temporary roads and paved areas within construction limits indicated on Drawings.
   1. Provide dust-control treatment that is nonpolluting and nontracking. Reapply treatment as required to minimize dust.

C. Temporary Use of Permanent Roads and Paved Areas: Locate temporary roads and paved areas in same location as permanent roads and paved areas. Construct and maintain temporary roads and paved areas adequate for construction operations. Extend temporary roads and paved areas, within construction limits indicated, as necessary for construction operations.
   1. Coordinate elevations of temporary roads and paved areas with permanent roads and paved areas.
   2. Prepare subgrade and install subbase and base for temporary roads and paved areas according to Division 31 Section "Earth Moving."
   3. Recondition base after temporary use, including removing contaminated material, regrading, proofrolling, compacting, and testing.
   4. Delay installation of final course of permanent hot-mix asphalt pavement until immediately before Substantial Completion. Repair hot-mix asphalt base-course pavement before installation of final course according to Division 32 Section "Asphalt Paving."

D. Traffic Controls: Comply with requirements of authorities having jurisdiction.
   1. Protect existing site improvements to remain including curbs, pavement, and utilities.
   2. Maintain access for fire-fighting equipment and access to fire hydrants.

E. Parking: Provide temporary parking areas for construction personnel.

F. Dewatering Facilities and Drains: Comply with requirements of authorities having jurisdiction. Maintain Project site, excavations, and construction free of water.
   1. Dispose of rainwater in a lawful manner that will not result in flooding Project or adjoining properties nor endanger permanent Work or temporary facilities.
   2. Remove snow and ice as required to minimize accumulations.

G. Project Signs: Provide Project signs as indicated. Unauthorized signs are not permitted.
   1. Identification Signs: Provide Project identification signs as indicated on Drawings.
   2. Temporary Signs: Provide other signs as indicated and as required to inform public and individuals seeking entrance to Project.
      a. Provide temporary, directional signs for construction personnel and visitors.

H. Waste Disposal Facilities: Comply with requirements specified in Division 01 Section "Construction Waste Management and Disposal."

I. Waste Disposal Facilities: Provide waste-collection containers in sizes adequate to handle waste from construction operations. Comply with requirements of authorities having jurisdiction. Comply with Division 01 Section "Execution" for progress cleaning requirements.

J. Lifts and Hoists: Provide facilities necessary for hoisting materials and personnel.

1. Truck cranes and similar devices used for hoisting materials are considered "tools and equipment" and not temporary facilities.

K. Temporary Elevator Use: Refer to Division 14 Sections for temporary use of new elevators.

L. Temporary Stairs: Until permanent stairs are available, provide temporary stairs where ladders are not adequate.

M. Temporary Use of Permanent Stairs: Use of new stairs for construction traffic will be permitted, provided stairs are protected and finishes restored to new condition at time of Substantial Completion.

3.04 SECURITY AND PROTECTION FACILITIES INSTALLATION

A. Environmental Protection: Provide protection, operate temporary facilities, and conduct construction as required to comply with environmental regulations and that minimize possible air, waterway, and subsoil contamination or pollution or other undesirable effects.

B. Temporary Erosion and Sedimentation Control: Comply with requirements of 2003 EPA Construction General Permit or authorities having jurisdiction, whichever is more stringent and requirements specified in Division 31 Section "Site Clearing."

C. Temporary Erosion and Sedimentation Control: Provide measures to prevent soil erosion and discharge of soil-bearing water runoff and airborne dust to undisturbed areas and to adjacent properties and walkways, according to erosion- and sedimentation-control Drawings.

D. Stormwater Control: Comply with requirements of authorities having jurisdiction. Provide barriers in and around excavations and subgrade construction to prevent flooding by runoff of stormwater from heavy rains.

E. Tree and Plant Protection: Comply with requirements specified in Division 01 Section "Temporary Tree and Plant Protection."

F. Tree and Plant Protection: Install temporary fencing located as indicated or outside the drip line of trees to protect vegetation from damage from construction operations. Protect tree root systems from damage, flooding, and erosion.

G. Site Enclosure Fence: Prior to commencing earthwork, furnish and install site enclosure fence in a manner that will prevent people and animals from easily entering site except by entrance gates.
   1. Extent of Fence: As required to enclose entire Project site or portion determined sufficient to accommodate construction operations.
   2. Maintain security by limiting number of keys and restricting distribution to authorized personnel. Furnish one set of keys to Owner.

H. Security Enclosure and Lockup: Install temporary enclosure around partially completed areas of construction. Provide lockable entrances to prevent unauthorized entrance, vandalism, theft, and similar violations of security. Lock entrances at end of each work day.

I. Barricades, Warning Signs, and Lights: Comply with requirements of authorities having jurisdiction for erecting structurally adequate barricades, including warning signs and lighting.

J. Temporary Egress: Maintain temporary egress from existing occupied facilities as indicated and as required by authorities having jurisdiction.

K. Temporary Enclosures: Provide temporary enclosures for protection of construction, in progress and completed, from exposure, foul weather, other construction operations, and similar activities. Provide temporary weathertight enclosure for building exterior.
   1. Where heating or cooling is needed and permanent enclosure is not complete, insulate temporary enclosures.
   2. Protect air-handling equipment.
   3. Provide walk-off mats at each entrance through temporary partition.

L. Temporary Fire Protection: Install and maintain temporary fire-protection facilities of types needed to protect against reasonably predictable and controllable fire losses. Comply with

NFPA 241.

1. Prohibit smoking in construction areas.
2. Supervise welding operations, combustion-type temporary heating units, and similar sources of fire ignition according to requirements of authorities having jurisdiction.
3. Develop and supervise an overall fire-prevention and -protection program for personnel at Project site. Review needs with local fire department and establish procedures to be followed. Instruct personnel in methods and procedures. Post warnings and information.

3.05 MOISTURE AND MOLD CONTROL

A. Contractor's Moisture Protection Plan: Avoid trapping water in finished work. Document visible signs of mold that may appear during construction.

B. Exposed Construction Phase: Before installation of weather barriers, when materials are subject to wetting and exposure and to airborne mold spores, protect materials from water damage and keep porous and organic materials from coming into prolonged contact with concrete.

C. Partially Enclosed Construction Phase: After installation of weather barriers but before full enclosure and conditioning of building, when installed materials are still subject to infiltration of moisture and ambient mold spores, protect as follows:
   1. Do not load or install drywall or other porous materials or components, or items with high organic content, into partially enclosed building.
   2. Keep interior spaces reasonably clean and protected from water damage.
   3. Discard or replace water-damaged and wet material.
   4. Discard, replace or clean stored or installed material that begins to grow mold.
   5. Perform work in a sequence that allows any wet materials adequate time to dry before enclosing the material in drywall or other interior finishes.

D. Controlled Construction Phase of Construction: After completing and sealing of the building enclosure but prior to the full operation of permanent HVAC systems, maintain as follows:
   1. Control moisture and humidity inside building by maintaining effective dry-in conditions.
   2. Remove materials that can not be completely restored to their manufactured moisture level within 48 hours.

3.06 OPERATION, TERMINATION, AND REMOVAL

A. Supervision: Enforce strict discipline in use of temporary facilities. To minimize waste and abuse, limit availability of temporary facilities to essential and intended uses.

B. Maintenance: Maintain facilities in good operating condition until removal.
   1. Maintain operation of temporary enclosures, heating, cooling, humidity control, ventilation, and similar facilities on a 24-hour basis where required to achieve indicated results and to avoid possibility of damage.

C. Temporary Facility Changeover: Do not change over from using temporary security and protection facilities to permanent facilities until Substantial Completion.

D. Termination and Removal: Remove each temporary facility when need for its service has ended, when it has been replaced by authorized use of a permanent facility, or no later than Substantial Completion. Complete or, if necessary, restore permanent construction that may have been delayed because of interference with temporary facility. Repair damaged Work, clean exposed surfaces, and replace construction that cannot be satisfactorily repaired.
   1. Materials and facilities that constitute temporary facilities are property of Contractor. Owner reserves right to take possession of Project identification signs.
   2. At Substantial Completion, repair, renovate, and clean permanent facilities used during construction period. Comply with final cleaning requirements specified in Division 01 Section "Closeout Procedures."

END OF SECTION

SECTION 015850
PROJECT SIGNS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Project identification sign.

1.02 QUALITY ASSURANCE

A. Design sign and structure to withstand 50 miles/hr wind velocity.

B. Sign Painter: Experienced as a professional sign painter for minimum three years.

C. Finishes, Painting: Adequate to withstand weathering, fading, and chipping for duration of construction.

1.03 SUBMITTALS

1.04 SEE SECTION 013000 - ADMINISTRATIVE REQUIREMENTS FOR SUBMITTAL PROCEDURES.

PART 2 PRODUCTS

2.01 SIGN MATERIALS

A. Structure and Framing: New, wood, structurally adequate.

B. Sign Surfaces: Exterior grade plywood with medium density overlay, minimum ¾ inch thick, standard large sizes to minimize joints.

C. Rough Hardware: Galvanized.

D. Paint and Primers: Exterior quality, two coats; sign background of color as selected.

E. Lettering: Exterior quality paint, colors as needed.

2.02 PROJECT IDENTIFICATION SIGN

A. One painted sign, 32 sq. ft area, and bottom 6 feet above ground.

B. Content: Project sign content to be verified by the Architect. Sign to include but not limited to the following.

1. Project number, title, logo and name of project.
2. Names and titles of authorities.
3. Names and titles of Rosemann & Associates, P.C. and Consultants.
4. Graphic Design, Colors, Style of Lettering: Designated by Rosemann & Associates, P.C.

PART 3 EXECUTION

3.01 INSTALLATION

A. Install project identification sign within 30 days after date fixed by Notice to Proceed.

B. Erect at designated location.

C. Erect supports and framing on secure foundation, rigidly braced and framed to resist wind loadings.

D. Install sign surface pump and level, with butt joints. Anchor securely.

E. Paint exposed surfaces of sign, supports, and framing.

3.02 MAINTENANCE

A. Maintain signs and supports clean, repair deterioration and damage.

3.03 REMOVAL

A. Remove signs, framing, supports, and foundations at completion of Project and restore the area.

END OF SECTION

SECTION 016000
PRODUCT REQUIREMENTS

PART 1 GENERAL

1.01 ACTION SUBMITTALS

A. Comparable Product Requests: Submit request for consideration of each comparable product. Identify product or fabrication or installation method to be replaced. Include Specification Section number and title and Drawing numbers and titles.
   1. Include data to indicate compliance with the requirements specified in "Comparable Products" Article.
   2. Architect's Action: If necessary, Architect will request additional information or documentation for evaluation within one week of receipt of a comparable product request. Architect will notify Contractor of approval or rejection of proposed comparable product request within [10] days of receipt of request, or [7] days of receipt of additional information or documentation, whichever is later.
      a. Form of Approval: As specified in Section 013300 "Submittal Procedures."
      b. Use product specified if Architect does not issue a decision on use of a comparable product request within time allocated.

B. Basis-of-Design Product Specification Submittal: Comply with requirements in Section 013300 "Submittal Procedures." Show compliance with requirements.

1.02 PRODUCT DELIVERY, STORAGE, AND HANDLING

A. Deliver, store, and handle products using means and methods that will prevent damage, deterioration, and loss, including theft and vandalism. Comply with manufacturer's written instructions.

B. Delivery and Handling:
   1. Schedule delivery to minimize long-term storage at Project site and to prevent overcrowding of construction spaces.
   2. Coordinate delivery with installation time to ensure minimum holding time for items that are flammable, hazardous, easily damaged, or sensitive to deterioration, theft, and other losses.
   3. Deliver products to Project site in an undamaged condition in manufacturer's original sealed container or other packaging system, complete with labels and instructions for handling, storing, unpacking, protecting, and installing.
   4. Inspect products on delivery to determine compliance with the Contract Documents and to determine that products are undamaged and properly protected.

C. Storage:
   1. Store products to allow for inspection and measurement of quantity or counting of units.
   2. Store materials in a manner that will not endanger Project structure.
   3. Store products that are subject to damage by the elements, under cover in a weathertight enclosure above ground, with ventilation adequate to prevent condensation.
   4. Protect foam plastic from exposure to sunlight, except to extent necessary for period of installation and concealment.
   5. Comply with product manufacturer's written instructions for temperature, humidity, ventilation, and weather-protection requirements for storage.
   6. Protect stored products from damage and liquids from freezing.
   7. Provide a secure location and enclosure at Project site for storage of materials and equipment by Owner's construction forces. Coordinate location with Owner.

1.03 PRODUCT WARRANTIES

A. Warranties specified in other Sections shall be in addition to, and run concurrent with, other warranties required by the Contract Documents. Manufacturer's disclaimers and limitations on product warranties do not relieve Contractor of obligations under requirements of the Contract Documents.

1. Manufacturer's Warranty: Written warranty furnished by individual manufacturer for a particular product and specifically endorsed by manufacturer to Owner.

B. Submittal Time: Comply with requirements in Section 017700 "Closeout Procedures."

PART 2 PRODUCTS

2.01 PRODUCT SELECTION PROCEDURES

A. General Product Requirements: Provide products that comply with the Contract Documents, are undamaged and, unless otherwise indicated, are new at time of installation.
   1. Provide products complete with accessories, trim, finish, fasteners, and other items needed for a complete installation and indicated use and effect.
   2. Standard Products: If available, and unless custom products or nonstandard options are specified, provide standard products of types that have been produced and used successfully in similar situations on other projects.
   3. Owner reserves the right to limit selection to products with warranties not in conflict with requirements of the Contract Documents.
   4. Where products are accompanied by the term "as selected," Architect will make selection.
   5. Descriptive, performance, and reference standard requirements in the Specifications establish salient characteristics of products.

B. Product Selection Procedures:
   1. Product: Where Specifications name a single manufacturer and product, provide the named product that complies with requirements. Comparable products or substitutions for Contractor's convenience will not be considered.
   2. Manufacturer/Source: Where Specifications name a single manufacturer or source, provide a product by the named manufacturer or source that complies with requirements.
   3. Products:
      a. Restricted List: Where Specifications include a list of names of both manufacturers and products, provide one of the products listed that complies with requirements.
      b. Nonrestricted List: Where Specifications include a list of names of both available manufacturers and products, provide one of the products listed, or an unnamed product, that complies with requirements. Comply with requirements in "Comparable Products" Article for consideration of an unnamed product.
   4. Basis-of-Design Product: Where Specifications name a product, or refer to a product indicated on Drawings, and include a list of manufacturers, provide the specified or indicated product or a comparable product by one of the other named manufacturers. Drawings and Specifications indicate sizes, profiles, dimensions, and other characteristics that are based on the product named.

C. Visual Matching Specification: Where Specifications require "match Architect's sample", provide a product that complies with requirements and matches Architect's sample. Architect's decision will be final on whether a proposed product matches.

PART 3 EXECUTION (NOT USED)

END OF SECTION

SECTION 017300
EXECUTION

PART 1 GENERAL

1.01 INFORMATIONAL SUBMITTALS

A. Qualification Data: For land surveyor.

B. Certificates: Submit certificate signed by land surveyor certifying that location and elevation of improvements comply with requirements.

C. Landfill Receipts: Submit copy of receipts issued by a landfill facility, licensed to accept hazardous materials, for hazardous waste disposal.

D. Certified Surveys: Submit three copies signed by land surveyor.

E. Final Property Survey: Submit 10 copies showing the Work performed and record survey data.

1.02 QUALITY ASSURANCE

A. Land Surveyor Qualifications: A professional land surveyor who is legally qualified to practice in jurisdiction where Project is located and who is experienced in providing land-surveying services of the kind indicated.

B. Cutting and Patching: Comply with requirements for and limitations on cutting and patching of construction elements.

1. Operational Elements: Do not cut and patch operating elements and related components in a manner that results in reducing their capacity to perform as intended or that results in increased maintenance or decreased operational life or safety. Operational elements include the following:
    a. Primary operational systems and equipment.
    b. Fire separation assemblies.
    c. Air or smoke barriers.
    d. Fire-suppression systems.
    e. Mechanical systems piping and ducts.
    f. Control systems.
    g. Communication systems.
    h. Fire-detection and -alarm systems.
    i. Conveying systems.
    j. Electrical wiring systems.
    k. Operating systems of special construction.
2. Other Construction Elements: Do not cut and patch other construction elements or components in a manner that could change their load-carrying capacity, that results in reducing their capacity to perform as intended, or that results in increased maintenance or decreased operational life or safety. Other construction elements include but are not limited to the following:
    a. Water, moisture, or vapor barriers.
    b. Membranes and flashings.
    c. Exterior curtain-wall construction.
    d. Sprayed fire-resistive material.
    e. Equipment supports.
    f. Piping, ductwork, vessels, and equipment.
    g. Noise- and vibration-control elements and systems.
3. Visual Elements: Do not cut and patch construction in a manner that results in visual evidence of cutting and patching. Do not cut and patch exposed construction in a manner that would, in Architect's opinion, reduce the building's aesthetic qualities. Remove and replace construction that has been cut and patched in a visually unsatisfactory manner.

C. Manufacturer's Installation Instructions: Obtain and maintain on-site manufacturer's written recommendations and instructions for installation of products and equipment.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION

3.01 EXAMINATION

A. Existing Conditions: The existence and location of underground and other utilities and construction indicated as existing are not guaranteed. Before beginning sitework, investigate and verify the existence and location of underground utilities, mechanical and electrical systems, and other construction affecting the Work.
   1. Before construction, verify the location and invert elevation at points of connection of sanitary sewer, storm sewer, and water-service piping; underground electrical services, and other utilities.
   2. Furnish location data for work related to Project that must be performed by public utilities serving Project site.

B. Examination and Acceptance of Conditions: Before proceeding with each component of the Work, examine substrates, areas, and conditions, with Installer or Applicator present where indicated, for compliance with requirements for installation tolerances and other conditions affecting performance. Record observations.
   1. Examine roughing-in for mechanical and electrical systems to verify actual locations of connections before equipment and fixture installation.
   2. Examine walls, floors, and roofs for suitable conditions where products and systems are to be installed.
   3. Verify compatibility with and suitability of substrates, including compatibility with existing finishes or primers.

C. Written Report: Where a written report listing conditions detrimental to performance of the Work is required by other Sections, include the following:
   1. Description of the Work.
   2. List of detrimental conditions, including substrates.
   3. List of unacceptable installation tolerances.
   4. Recommended corrections.

D. Proceed with installation only after unsatisfactory conditions have been corrected. Proceeding with the Work indicates acceptance of surfaces and conditions.

3.02 PREPARATION

A. Existing Utility Information: Furnish information to local utility that is necessary to adjust, move, or relocate existing utility structures, utility poles, lines, services, or other utility appurtenances located in or affected by construction. Coordinate with authorities having jurisdiction.

B. Field Measurements: Take field measurements as required to fit the Work properly. Recheck measurements before installing each product. Where portions of the Work are indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication. Coordinate fabrication schedule with construction progress to avoid delaying the Work.

C. Space Requirements: Verify space requirements and dimensions of items shown diagrammatically on Drawings.

D. Review of Contract Documents and Field Conditions: Immediately on discovery of the need for clarification of the Contract Documents caused by differing field conditions outside the control of Contractor, submit a request for information to Architect.

3.03 CONSTRUCTION LAYOUT

A. Verification: Before proceeding to lay out the Work, verify layout information shown on Drawings, in relation to the property survey and existing benchmarks. If discrepancies are discovered, notify Architect promptly.

B. General: Engage a land surveyor to lay out the Work using accepted surveying practices.

1. Establish benchmarks and control points to set lines and levels at each story of construction and elsewhere as needed to locate each element of Project.
2. Establish limits on use of Project site.
3. Establish dimensions within tolerances indicated. Do not scale Drawings to obtain required dimensions.
4. Inform installers of lines and levels to which they must comply.
5. Check the location, level and plumb, of every major element as the Work progresses.
6. Notify Architect when deviations from required lines and levels exceed allowable tolerances.
7. Close site surveys with an error of closure equal to or less than the standard established by authorities having jurisdiction.

C. Site Improvements: Locate and lay out site improvements, including pavements, grading, fill and topsoil placement, utility slopes, and rim and invert elevations.

D. Building Lines and Levels: Locate and lay out control lines and levels for structures, building foundations, column grids, and floor levels, including those required for mechanical and electrical work. Transfer survey markings and elevations for use with control lines and levels. Level foundations and piers from two or more locations.

E. Record Log: Maintain a log of layout control work. Record deviations from required lines and levels. Include beginning and ending dates and times of surveys, weather conditions, name and duty of each survey party member, and types of instruments and tapes used. Make the log available for reference by Architect.

3.04 FIELD ENGINEERING

A. Reference Points: Locate existing permanent benchmarks, control points, and similar reference points before beginning the Work. Preserve and protect permanent benchmarks and control points during construction operations.
1. Replace lost or destroyed permanent benchmarks and control points promptly. Base replacements on the original survey control points.

B. Benchmarks: Establish and maintain a minimum of two permanent benchmarks on Project site, referenced to data established by survey control points. Comply with authorities having jurisdiction for type and size of benchmark.
1. Record benchmark locations, with horizontal and vertical data, on Project Record Documents.
2. Where the actual location or elevation of layout points cannot be marked, provide temporary reference points sufficient to locate the Work.
3. Remove temporary reference points when no longer needed. Restore marked construction to its original condition.

C. Certified Survey: On completion of foundation walls, major site improvements, and other work requiring field-engineering services, prepare a certified survey showing dimensions, locations, angles, and elevations of construction and sitework.

D. Final Property Survey: Engage a land surveyor to prepare a final property survey showing significant features (real property) for Project. Include on the survey a certification, signed by land surveyor, that principal metes, bounds, lines, and levels of Project are accurately positioned as shown on the survey.
1. Show boundary lines, monuments, streets, site improvements and utilities, existing improvements and significant vegetation, adjoining properties, acreage, grade contours, and the distance and bearing from a site corner to a legal point.
2. Recording: At Substantial Completion, have the final property survey recorded by or with authorities having jurisdiction as the official "property survey."

3.05 INSTALLATION

A. General: Locate the Work and components of the Work accurately, in correct alignment and elevation, as indicated.

1. Make vertical work plumb and make horizontal work level.
2. Where space is limited, install components to maximize space available for maintenance and ease of removal for replacement.
3. Conceal pipes, ducts, and wiring in finished areas unless otherwise indicated.
4. Maintain minimum headroom clearance of 96 inches (2440 mm) in occupied spaces and 90 inches (2300 mm) in unoccupied spaces.

B. Comply with manufacturer's written instructions and recommendations for installing products in applications indicated.

C. Install products at the time and under conditions that will ensure the best possible results. Maintain conditions required for product performance until Substantial Completion.

D. Conduct construction operations so no part of the Work is subjected to damaging operations or loading in excess of that expected during normal conditions of occupancy.

E. Sequence the Work and allow adequate clearances to accommodate movement of construction items on site and placement in permanent locations.

F. Tools and Equipment: Do not use tools or equipment that produce harmful noise levels.

G. Templates: Obtain and distribute to the parties involved templates for work specified to be factory prepared and field installed. Check Shop Drawings of other work to confirm that adequate provisions are made for locating and installing products to comply with indicated requirements.

H. Attachment: Provide blocking and attachment plates and anchors and fasteners of adequate size and number to securely anchor each component in place, accurately located and aligned with other portions of the Work. Where size and type of attachments are not indicated, verify size and type required for load conditions.
1. Mounting Heights: Where mounting heights are not indicated, mount components at heights directed by Architect.
2. Allow for building movement, including thermal expansion and contraction.
3. Coordinate installation of anchorages. Furnish setting drawings, templates, and directions for 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.

I. Joints: Make joints of uniform width. Where joint locations in exposed work are not indicated, arrange joints for the best visual effect. Fit exposed connections together to form hairline joints.

J. Hazardous Materials: Use products, cleaners, and installation materials that are not considered hazardous.

3.06 OWNER-INSTALLED PRODUCTS

A. Site Access: Provide access to Project site for Owner's construction personnel.

B. Coordination: Coordinate construction and operations of the Work with work performed by Owner's construction personnel.
1. Construction Schedule: Inform Owner of Contractor's preferred construction schedule for Owner's portion of the Work. Adjust construction schedule based on a mutually agreeable timetable. Notify Owner if changes to schedule are required due to differences in actual construction progress.
2. Preinstallation Conferences: Include Owner's construction personnel at preinstallation conferences covering portions of the Work that are to receive Owner's work. Attend preinstallation conferences conducted by Owner's construction personnel if portions of the Work depend on Owner's construction.

3.07 PROGRESS CLEANING

A. General: Clean Project site and work areas daily, including common areas. Enforce requirements strictly. Dispose of materials lawfully.

1. Comply with requirements in NFPA 241 for removal of combustible waste materials and debris.
2. Do not hold waste materials more than seven days during normal weather or three days if the temperature is expected to rise above 80 deg F (27 deg C).
3. Containerize hazardous and unsanitary waste materials separately from other waste. Mark containers appropriately and dispose of legally, according to regulations.
   a. Use containers intended for holding waste materials of type to be stored.
4. Coordinate progress cleaning for joint-use areas where Contractor and other contractors are working concurrently.

B. Site: Maintain Project site free of waste materials and debris.

C. Work Areas: Clean areas where work is in progress to the level of cleanliness necessary for proper execution of the Work.
   1. Remove liquid spills promptly.
   2. Where dust would impair proper execution of the Work, broom-clean or vacuum the entire work area, as appropriate.

D. Installed Work: Keep installed work clean. Clean installed surfaces according to written instructions of manufacturer or fabricator of product installed, using only cleaning materials specifically recommended. If specific cleaning materials are not recommended, use cleaning materials that are not hazardous to health or property and that will not damage exposed surfaces.

E. Concealed Spaces: Remove debris from concealed spaces before enclosing the space.

F. Exposed Surfaces in Finished Areas: Clean exposed surfaces and protect as necessary to ensure freedom from damage and deterioration at time of Substantial Completion.

G. Waste Disposal: Do not bury or burn waste materials on-site. Do not wash waste materials down sewers or into waterways. Comply with waste disposal requirements in Section 015000 "Temporary Facilities and Controls."

H. During handling and installation, clean and protect construction in progress and adjoining materials already in place. Apply protective covering where required to ensure protection from damage or deterioration at Substantial Completion.

I. Clean and provide maintenance on completed construction as frequently as necessary through the remainder of the construction period. Adjust and lubricate operable components to ensure operability without damaging effects.

J. Limiting Exposures: Supervise construction operations to assure that no part of the construction, completed or in progress, is subject to harmful, dangerous, damaging, or otherwise deleterious exposure during the construction period.

3.08 STARTING AND ADJUSTING

A. Coordinate startup and adjusting of equipment and operating components with requirements in Section 019113 "General Commissioning Requirements."

B. Start equipment and operating components to confirm proper operation. Remove malfunctioning units, replace with new units, and retest.

C. Adjust equipment for proper operation. Adjust operating components for proper operation without binding.

D. Test each piece of equipment to verify proper operation. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

3.09 PROTECTION OF INSTALLED CONSTRUCTION

A. Provide final protection and maintain conditions that ensure installed Work is without damage or deterioration at time of Substantial Completion.

B. Comply with manufacturer's written instructions for temperature and relative humidity.

END OF SECTION

SECTION 017700
CLOSEOUT PROCEDURES

PART 1 GENERAL

1.01 ACTION SUBMITTALS

A. Product Data: For cleaning agents.

B. Contractor's List of Incomplete Items: Initial submittal at Substantial Completion.

C. Certified List of Incomplete Items: Final submittal at Final Completion.

1.02 CLOSEOUT SUBMITTALS

A. Certificates of Release: From authorities having jurisdiction.

B. Certificate of Insurance: For continuing coverage.

C. Field Report: For pest control inspection.

1.03 MAINTENANCE MATERIAL SUBMITTALS

A. Schedule of Maintenance Material Items: For maintenance material submittal items specified in other Sections.

1.04 SUBSTANTIAL COMPLETION PROCEDURES

A. Contractor's List of Incomplete Items: Prepare and submit a list of items to be completed and corrected (Contractor's punch list), indicating the value of each item on the list and reasons why the Work is incomplete.

B. Submittals Prior to Substantial Completion: Complete the following a minimum of 10 days prior to requesting inspection for determining date of Substantial Completion. List items below that are incomplete at time of request.

1. Certificates of Release: Obtain and submit releases from authorities having jurisdiction permitting Owner unrestricted use of the Work and access to services and utilities. Include occupancy permits, operating certificates, and similar releases.
2. Submit closeout submittals specified in other Division 01 Sections, including project record documents, operation and maintenance manuals, final completion construction photographic documentation, damage or settlement surveys, property surveys, and similar final record information.
3. Submit closeout submittals specified in individual Sections, including specific warranties, workmanship bonds, maintenance service agreements, final certifications, and similar documents.
4. Submit maintenance material submittals specified in individual Sections, including tools, spare parts, extra materials, and similar items, and deliver to location designated by the Owner. Label with manufacturer's name and model number where applicable.
    a. Schedule of Maintenance Material Items: Prepare and submit schedule of maintenance material submittal items, including name and quantity of each item and name and number of related Specification Section.
5. Submit test/adjust/balance records.
6. Submit changeover information related to Owner's occupancy, use, operation, and maintenance.

C. Procedures Prior to Substantial Completion: Complete the following a minimum of 10 days prior to requesting inspection for determining date of Substantial Completion. List items below that are incomplete at time of request.

1. Advise Owner of pending insurance changeover requirements.
2. Make final changeover of permanent locks and deliver keys to Owner. Advise Owner's personnel of changeover in security provisions.
3. Complete startup and testing of systems and equipment.
4. Perform preventive maintenance on equipment used prior to Substantial Completion.

5. Instruct Owner's personnel in operation, adjustment, and maintenance of products, equipment, and systems. Submit demonstration and training video recordings specified in Section 017900 "Demonstration and Training."
6. Advise Owner of changeover in heat and other utilities.
7. Terminate and remove temporary facilities from Project site, along with mockups, construction tools, and similar elements.
8. Complete final cleaning requirements, including touchup painting.
9. Touch up and otherwise repair and restore marred exposed finishes to eliminate visual defects.

D. Inspection: Submit a written request for final inspection to determine acceptance a minimum of 10 days prior to date the work will be completed and ready for final inspection and tests. On receipt of request, Architect will either proceed with inspection or notify Contractor of unfulfilled requirements.
   1. Reinspection: Request reinspection when the Work identified in previous inspections as incomplete is completed or corrected.

1.05 LIST OF INCOMPLETE ITEMS (PUNCH LIST)

A. Organization of List: Include name and identification of each space and area affected by construction operations for incomplete items and items needing correction including, if necessary, areas disturbed by Contractor that are outside the limits of construction.
   1. Organize list of spaces in sequential order.
   2. Organize items applying to each space by major element, including categories for ceiling, individual walls, floors, equipment, and building systems.
   3. Include the following information at the top of each page:
      a. Project name.
      b. Date.
      c. Name of Architect.
      d. Name of Contractor.
      e. Page number.

1.06 SUBMITTAL OF PROJECT WARRANTIES

A. Time of Submittal: Submit written warranties on request of Architect for designated portions of the Work where commencement of warranties other than date of Substantial Completion is indicated, or when delay in submittal of warranties might limit Owner's rights under warranty.

B. Partial Occupancy: Submit properly executed warranties within 15 days of completion of designated portions of the Work that are completed and occupied or used by Owner during construction period by separate agreement with Contractor.

C. Organize warranty documents into an orderly sequence based on the table of contents of Project Manual.
   1. Bind warranties and bonds in heavy-duty, three-ring, vinyl-covered, loose-leaf binders, thickness as necessary to accommodate contents, and sized to receive 8-1/2-by-11-inch (215-by-280-mm) paper.
   2. Provide heavy paper dividers with plastic-covered tabs for each separate warranty. Mark tab to identify the product or installation. Provide a typed description of the product or installation, including the name of the product and the name, address, and telephone number of Installer.
   3. Identify each binder on the front and spine with the typed or printed title "WARRANTIES," Project name, and name of Contractor.

D. Provide additional copies of each warranty to include in operation and maintenance manuals.

PART 2 PRODUCTS

2.01 MATERIALS

A. Cleaning Agents: Use cleaning materials and agents recommended by manufacturer or fabricator of the surface to be cleaned. Do not use cleaning agents that are potentially

hazardous to health or property or that might damage finished surfaces.

PART 3 EXECUTION

3.01 FINAL CLEANING

A. General: Perform final cleaning. Conduct cleaning and waste-removal operations to comply with local laws and ordinances and Federal and local environmental and antipollution regulations.

B. Cleaning: Employ experienced workers or professional cleaners for final cleaning. Clean each surface or unit to condition expected in an average commercial building cleaning and maintenance program. Comply with manufacturer's written instructions.

1. Complete the following cleaning operations before requesting inspection for certification of Substantial Completion for entire Project or for a designated portion of Project:
    a. Clean Project site, yard, and grounds, in areas disturbed by construction activities, including landscape development areas, of rubbish, waste material, litter, and other foreign substances.
    b. Sweep paved areas broom clean. Remove petrochemical spills, stains, and other foreign deposits.
    c. Rake grounds that are neither planted nor paved to a smooth, even-textured surface.
    d. Remove tools, construction equipment, machinery, and surplus material from Project site.
    e. Remove snow and ice to provide safe access to building.
    f. Clean exposed exterior and interior hard-surfaced finishes to a dirt-free condition, free of stains, films, and similar foreign substances. Avoid disturbing natural weathering of exterior surfaces. Restore reflective surfaces to their original condition.
    g. Remove debris and surface dust from limited access spaces, including roofs, plenums, shafts, trenches, equipment vaults, manholes, attics, and similar spaces.
    h. Sweep concrete floors broom clean in unoccupied spaces.
    i. Vacuum carpet and similar soft surfaces, removing debris and excess nap; clean according to manufacturer's recommendations if visible soil or stains remain.
    j. Clean transparent materials, including mirrors and glass in doors and windows. Remove glazing compounds and other noticeable, vision-obscuring materials. Polish mirrors and glass, taking care not to scratch surfaces.
    k. Remove labels that are not permanent.
    l. Wipe surfaces of mechanical and electrical equipment[, elevator equipment,] and similar equipment. Remove excess lubrication, paint and mortar droppings, and other foreign substances.
    m. Clean plumbing fixtures to a sanitary condition, free of stains, including stains resulting from water exposure.
    n. Replace disposable air filters and clean permanent air filters. Clean exposed surfaces of diffusers, registers, and grills.
    o. Clean ducts, blowers, and coils if units were operated without filters during construction or that display contamination with particulate matter on inspection.
    p. Clean HVAC system in compliance with NADCA Standard 1992-01. Provide written report on completion of cleaning.
    q. Clean light fixtures, lamps, globes, and reflectors to function with full efficiency.
    r. Leave Project clean and ready for occupancy.

C. Construction Waste Disposal: Comply with waste disposal requirements in Section 015000 "Temporary Facilities and Controls."

3.02 REPAIR OF THE WORK

A. Complete repair and restoration operations before requesting inspection for determination of Substantial Completion.

B. Repair or remove and replace defective construction. Repairing includes replacing defective parts, refinishing damaged surfaces, touching up with matching materials, and properly

adjusting operating equipment. Where damaged or worn items cannot be repaired or restored, provide replacements. Remove and replace operating components that cannot be repaired. Restore damaged construction and permanent facilities used during construction to specified condition.

1. Remove and replace chipped, scratched, and broken glass, reflective surfaces, and other damaged transparent materials.
2. Touch up and otherwise repair and restore marred or exposed finishes and surfaces. Replace finishes and surfaces that that already show evidence of repair or restoration.
   a. Do not paint over "UL" and other required labels and identification, including mechanical and electrical nameplates. Remove paint applied to required labels and identification.
3. Replace parts subject to operating conditions during construction that may impede operation or reduce longevity.
4. Replace burned-out bulbs, bulbs noticeably dimmed by hours of use, and defective and noisy starters in fluorescent and mercury vapor fixtures to comply with requirements for new fixtures.

END OF SECTION

SECTION 017823
OPERATION AND MAINTENANCE DATA

PART 1 GENERAL

1.01 CLOSEOUT SUBMITTALS

A. Manual Submittal: Submit each manual in final form prior to requesting inspection for Substantial Completion and at least 15 days before commencing demonstration and training. Architect and Commissioning Agent will return copy with comments.
   1. Correct or modify each manual to comply with Architect's and Commissioning Agent's comments. Submit copies of each corrected manual within 15 days of receipt of Architect's and Commissioning Agent's comments and prior to commencing demonstration and training.

PART 2 PRODUCTS

2.01 REQUIREMENTS FOR EMERGENCY, OPERATION, AND MAINTENANCE MANUALS

A. Organization: Unless otherwise indicated, organize each manual into a separate section for each system and subsystem, and a separate section for each piece of equipment not part of a system. Each manual shall contain the following materials, in the order listed:
   1. Title page.
   2. Table of contents.
   3. Manual contents.

B. Title Page: Include the following information:
   1. Subject matter included in manual.
   2. Name and address of Project.
   3. Name and address of Owner.
   4. Date of submittal.
   5. Name and contact information for Contractor.
   6. Name and contact information for Construction Manager.
   7. Name and contact information for Architect.
   8. Name and contact information for Commissioning Agent.
   9. Names and contact information for major consultants to the Architect that designed the systems contained in the manuals.
   10. Cross-reference to related systems in other operation and maintenance manuals.

C. Table of Contents: List each product included in manual, identified by product name, indexed to the content of the volume, and cross-referenced to Specification Section number in Project Manual.

D. Manual Contents: Organize into sets of manageable size. Arrange contents alphabetically by system, subsystem, and equipment. If possible, assemble instructions for subsystems, equipment, and components of one system into a single binder.

E. Manuals, Paper Copy: Submit manuals in the form of hard copy, bound and labeled volumes.
   1. Binders: Heavy-duty, three-ring, vinyl-covered, loose-leaf binders, in thickness necessary to accommodate contents, sized to hold 8-1/2-by-11-inch (215-by-280-mm) paper; with clear plastic sleeve on spine to hold label describing contents and with pockets inside covers to hold folded oversize sheets.
      a. Identify each binder on front and spine, with printed title "OPERATION AND MAINTENANCE MANUAL," Project title or name,and subject matter of contents, and indicate Specification Section number on bottom of spine. Indicate volume number for multiple-volume sets.
   2. Dividers: Heavy-paper dividers with plastic-covered tabs for each section of the manual. Mark each tab to indicate contents. Include typed list of products and major components of equipment included in the section on each divider, cross-referenced to Specification Section number and title of Project Manual.

3. Protective Plastic Sleeves: Transparent plastic sleeves designed to enclose diagnostic software storage media for computerized electronic equipment.
4. Drawings: Attach reinforced, punched binder tabs on drawings and bind with text.
    a. If oversize drawings are necessary, fold drawings to same size as text pages and use as foldouts.
    b. If drawings are too large to be used as foldouts, fold and place drawings in labeled envelopes and bind envelopes in rear of manual. At appropriate locations in manual, insert typewritten pages indicating drawing titles, descriptions of contents, and drawing locations.

F. Emergency Instructions: Describe and explain warnings, trouble indications, error messages, and similar codes and signals. Include responsibilities of Owner's operating personnel for notification of Installer, supplier, and manufacturer to maintain warranties.

G. Emergency Procedures: Include the following, as applicable:
1. Instructions on stopping.
2. Shutdown instructions for each type of emergency.
3. Operating instructions for conditions outside normal operating limits.
4. Required sequences for electric or electronic systems.
5. Special operating instructions and procedures.

2.02 OPERATION MANUALS

A. Content: In addition to requirements in this Section, include operation data required in individual Specification Sections and the following information:
1. System, subsystem, and equipment descriptions. Use designations for systems and equipment indicated on Contract Documents.
2. Operating standards.
3. Operating procedures.
4. Wiring diagrams.
5. Control diagrams.
6. Piped system diagrams.
7. Precautions against improper use.
8. License requirements including inspection and renewal dates.

B. Descriptions: Include the following:
1. Product name and model number. Use designations for products indicated on Contract Documents.
2. Manufacturer's name.
3. Equipment identification with serial number of each component.
4. Equipment function.
5. Operating characteristics.
6. Limiting conditions.
7. Performance curves.
8. Engineering data and tests.
9. Complete nomenclature and number of replacement parts.

C. Operating Procedures: Include the following, as applicable:
1. Startup procedures.
2. Equipment or system break-in procedures.
3. Routine and normal operating instructions.
4. Regulation and control procedures.
5. Instructions on stopping.
6. Normal shutdown instructions.
7. Seasonal and weekend operating instructions.
8. Required sequences for electric or electronic systems.
9. Special operating instructions and procedures.

D. Systems and Equipment Controls: Describe the sequence of operation, and diagram controls as installed.

E. Piped Systems: Diagram piping as installed, and identify color-coding where required for identification.

2.03 PRODUCT MAINTENANCE MANUALS

A. Content: Organize manual into a separate section for each product, material, and finish. Include source information, product information, maintenance procedures, repair materials and sources, and warranties and bonds, as described below.

B. Source Information: List each product included in manual, identified by product name and arranged to match manual's table of contents. For each product, list name, address, and telephone number of Installer or supplier and maintenance service agent, and cross-reference Specification Section number and title in Project Manual.

C. Product Information: Include the following, as applicable:
   1. Product name and model number.
   2. Manufacturer's name.
   3. Color, pattern, and texture.
   4. Material and chemical composition.
   5. Reordering information for specially manufactured products.

D. Maintenance Procedures: Include manufacturer's written recommendations and the following:
   1. Inspection procedures.
   2. Types of cleaning agents to be used and methods of cleaning.
   3. List of cleaning agents and methods of cleaning detrimental to product.
   4. Schedule for routine cleaning and maintenance.
   5. Repair instructions.

E. Repair Materials and Sources: Include lists of materials and local sources of materials and related services.

F. Warranties and Bonds: Include copies of warranties and bonds and lists of circumstances and conditions that would affect validity of warranties or bonds.

2.04 SYSTEMS AND EQUIPMENT MAINTENANCE MANUALS

A. Content: For each system, subsystem, and piece of equipment not part of a system, include source information, manufacturers' maintenance documentation, maintenance procedures, maintenance and service schedules, spare parts list and source information, maintenance service contracts, and warranty and bond information, as described below.

B. Source Information: List each system, subsystem, and piece of equipment included in manual, identified by product name and arranged to match manual's table of contents. For each product, list name, address, and telephone number of Installer or supplier and maintenance service agent, and cross-reference Specification Section number and title in Project Manual.

C. Manufacturers' Maintenance Documentation: Manufacturers' maintenance documentation including the following information for each component part or piece of equipment:
   1. Standard maintenance instructions and bulletins.
   2. Drawings, diagrams, and instructions required for maintenance, including disassembly and component removal, replacement, and assembly.
   3. Identification and nomenclature of parts and components.
   4. List of items recommended to be stocked as spare parts.

D. Maintenance Procedures: Include the following information and items that detail essential maintenance procedures:
   1. Test and inspection instructions.
   2. Troubleshooting guide.
   3. Precautions against improper maintenance.

4. Disassembly; component removal, repair, and replacement; and reassembly instructions.
5. Aligning, adjusting, and checking instructions.
6. Demonstration and training video recording, if available.

E. Maintenance and Service Schedules: Include service and lubrication requirements, list of required lubricants for equipment, and separate schedules for preventive and routine maintenance and service with standard time allotment.

F. Spare Parts List and Source Information: Include lists of replacement and repair parts, with parts identified and cross-referenced to manufacturers' maintenance documentation and local sources of maintenance materials and related services.

G. Maintenance Service Contracts: Include copies of maintenance agreements with name and telephone number of service agent.

H. Warranties and Bonds: Include copies of warranties and bonds and lists of circumstances and conditions that would affect validity of warranties or bonds.

PART 3 EXECUTION

3.01 MANUAL PREPARATION

A. Operation and Maintenance Manuals: Assemble a complete set of operation and maintenance data indicating operation and maintenance of each system, subsystem, and piece of equipment not part of a system.

B. Manufacturers' Data: Where manuals contain manufacturers' standard printed data, include only sheets pertinent to product or component installed. Mark each sheet to identify each product or component incorporated into the Work. If data include more than one item in a tabular format, identify each item using appropriate references from the Contract Documents. Identify data applicable to the Work and delete references to information not applicable.

C. Comply with Division 01 Section "Closeout Procedures" for schedule for submitting operation and maintenance documentation.

END OF SECTION

SECTION 017839
PROJECT RECORD DOCUMENTS

PART 1 GENERAL

1.01 CLOSEOUT SUBMITTALS

A. Record Drawings: Comply with the following:
   1. Number of Copies: Submit copies of record Drawings as follows:
      a. Final Submittal:
         1) Submit PDF electronic files of scanned record prints and two set(s) of prints.
         2) Print each drawing, whether or not changes and additional information were recorded.

B. Record Specifications: Submit two of Project's Specifications, including addenda and contract modifications.

C. Record Product Data: Submit one paper copy of each submittal.
   1. Where record Product Data are required as part of operation and maintenance manuals, submit duplicate marked-up Product Data as a component of manual.

D. Miscellaneous Record Submittals: See other Specification Sections for miscellaneous record-keeping requirements and submittals in connection with various construction activities. Submit one paper copy of each submittal.

PART 2 PRODUCTS

2.01 RECORD DRAWINGS

A. Record Prints: Maintain one set of marked-up paper copies of the Contract Drawings and Shop Drawings, incorporating new and revised drawings as modifications are issued.
   1. Preparation: Mark record prints to show the actual installation where installation varies from that shown originally. Require individual or entity who obtained record data, whether individual or entity is Installer, subcontractor, or similar entity, to provide information for preparation of corresponding marked-up record prints.
      a. Give particular attention to information on concealed elements that would be difficult to identify or measure and record later.
      b. Accurately record information in an acceptable drawing technique.
      c. Record data as soon as possible after obtaining it.
      d. Record and check the markup before enclosing concealed installations.
   2. Content: Types of items requiring marking include, but are not limited to, the following:
      a. Dimensional changes to Drawings.
      b. Revisions to details shown on Drawings.
      c. Depths of foundations below first floor.
      d. Locations and depths of underground utilities.
      e. Revisions to routing of piping and conduits.
      f. Revisions to electrical circuitry.
      g. Actual equipment locations.
      h. Duct size and routing.
      i. Locations of concealed internal utilities.
      j. Changes made by Change Order or Construction Change Directive.
      k. Changes made following Architect's written orders.
      l. Details not on the original Contract Drawings.
      m. Field records for variable and concealed conditions.
      n. Record information on the Work that is shown only schematically.
   3. Mark the Contract Drawings and Shop Drawings completely and accurately. Use personnel proficient at recording graphic information in production of marked-up record prints.

4. Mark record sets with erasable, red-colored pencil. Use other colors to distinguish between changes for different categories of the Work at same location.
5. Mark important additional information that was either shown schematically or omitted from original Drawings.
6. Note Construction Change Directive numbers, alternate numbers, Change Order numbers, and similar identification, where applicable.

B. Format: Identify and date each record Drawing; include the designation "PROJECT RECORD DRAWING" in a prominent location.
1. Record Prints: Organize prepared record Drawings into manageable sets. Bind each set with durable paper cover sheets. Include identification on cover sheets, including AS Built Survey and other HUD required documents.
2. Format: Annotated PDF electronic file.

2.02 MISCELLANEOUS RECORD SUBMITTALS

A. Assemble miscellaneous records required by other Specification Sections for miscellaneous record keeping and submittal in connection with actual performance of the Work. Bind or file miscellaneous records and identify each, ready for continued use and reference.

B. Format: Submit miscellaneous record submittals as PDF electronic file.
1. Include miscellaneous record submittals directory organized by Specification Section number and title.

PART 3 EXECUTION

3.01 RECORDING AND MAINTENANCE

A. Recording: Maintain one copy of each submittal during the construction period for project record document purposes. Post changes and revisions to project record documents as they occur; do not wait until end of Project.

B. Maintenance of Record Documents and Samples: Store record documents and Samples in the field office apart from the Contract Documents used for construction. Do not use project record documents for construction purposes. Maintain record documents in good order and in a clean, dry, legible condition, protected from deterioration and loss. Provide access to project record documents for Architect's reference during normal working hours.

END OF SECTION

SECTION 017900
DEMONSTRATION AND TRAINING

PART 1 GENERAL

1.01 SUMMARY

A. Section includes administrative and procedural requirements for instructing Owner's personnel, including the following:
   1. Demonstration of operation of systems, subsystems, and equipment.
   2. Training in operation and maintenance of systems, subsystems, and equipment.

1.02 CLOSEOUT SUBMITTALS

A. At completion of training, submit complete training manual(s) for Owner's use.

1.03 COORDINATION

A. Coordinate instruction schedule with Owner's operations. Adjust schedule as required to minimize disrupting Owner's operations.

B. Coordinate content of training modules with content of approved emergency, operation, and maintenance manuals.

PART 2 PRODUCTS

2.01 INSTRUCTION PROGRAM

A. Program Structure: Develop an instruction program that includes individual training modules for each system and for equipment not part of a system, as required by individual Specification Sections.

B. Training Modules: For each module, include instruction for the following as applicable to the system, equipment, or component:
   1. Basis of System Design, Operational Requirements, and Criteria: Include the following:
      a. System, subsystem, and equipment descriptions.
      b. Performance and design criteria if Contractor is delegated design responsibility.
      c. Operating standards.
      d. Regulatory requirements.
      e. Equipment function.
      f. Operating characteristics.
      g. Limiting conditions.
      h. Performance curves.
   2. Documentation: Review the following items in detail:
      a. Emergency manuals.
      b. Operations manuals.
      c. Maintenance manuals.
      d. Project record documents.
      e. Identification systems.
      f. Warranties and bonds.
      g. Maintenance service agreements and similar continuing commitments.
   3. Emergencies: Include the following, as applicable:
      a. Instructions on meaning of warnings, trouble indications, and error messages.
      b. Instructions on stopping.
      c. Shutdown instructions for each type of emergency.
      d. Operating instructions for conditions outside of normal operating limits.
      e. Sequences for electric or electronic systems.
      f. Special operating instructions and procedures.
   4. Operations: Include the following, as applicable:
      a. Startup procedures.
      b. Equipment or system break-in procedures.

c. Routine and normal operating instructions.
d. Regulation and control procedures.
e. Control sequences.
f. Safety procedures.
g. Instructions on stopping.
h. Normal shutdown instructions.
i. Operating procedures for emergencies.
j. Operating procedures for system, subsystem, or equipment failure.
k. Seasonal and weekend operating instructions.
l. Required sequences for electric or electronic systems.
m. Special operating instructions and procedures.

5. Adjustments: Include the following:
   a. Alignments.
   b. Checking adjustments.
   c. Noise and vibration adjustments.
   d. Economy and efficiency adjustments.
6. Troubleshooting: Include the following:
   a. Diagnostic instructions.
   b. Test and inspection procedures.
7. Maintenance: Include the following:
   a. Inspection procedures.
   b. Types of cleaning agents to be used and methods of cleaning.
   c. List of cleaning agents and methods of cleaning detrimental to product.
   d. Procedures for routine cleaning
   e. Procedures for preventive maintenance.
   f. Procedures for routine maintenance.
   g. Instruction on use of special tools.
8. Repairs: Include the following:
   a. Diagnosis instructions.
   b. Repair instructions.
   c. Disassembly; component removal, repair, and replacement; and reassembly instructions.
   d. Instructions for identifying parts and components.
   e. Review of spare parts needed for operation and maintenance.

PART 3 EXECUTION

3.01 PREPARATION

A. Assemble educational materials necessary for instruction, including documentation and training module. Assemble training modules into a training manual organized in coordination with requirements in Division 01 Section "Operations and Maintenance Data."

3.02 INSTRUCTION

A. Engage qualified instructors to instruct Owner's personnel to adjust, operate, and maintain systems, subsystems, and equipment not part of a system.
   1. Owner will furnish Contractor with names and positions of participants.

B. Scheduling: Provide instruction at mutually agreed on times.
   1. Schedule training with Owner with at least seven days' advance notice.

END OF SECTION

SECTION 030130

MAINTENANCE OF CAST-IN-PLACE CONCRETE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Removal of deteriorated concrete and subsequent replacement and patching.
2. Floor joint repair.
3. Epoxy crack injection.
4. Corrosion-inhibiting treatment.
5. Polymer overlays.
6. Polymer sealers.
7. Composite structural reinforcement.

1.3 ALLOWANCES

A. Allowances for maintenance of cast-in-place concrete are specified in Section 012100 "Allowances."

B. Field quality-control testing is part of testing and inspecting allowance.

1.4 PREINSTALLATION MEETINGS

1.5 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include construction details, material descriptions, chemical composition, physical properties, test data, and mixing, preparation, and application instructions.

B. Samples: Cured Samples for each exposed product and for each color and texture specified, in manufacturer's standard size appropriate for each type of work.

1.6 INFORMATIONAL SUBMITTALS

A. Qualification Data: For manufacturers.

B. Material Certificates: For each type of Portland cement aggregate supplied for mixing or adding to products at Project site.

C. Product Test Reports: For each manufactured bonding agent cementitious patching mortar joint-filler crack-injection adhesive polymer overlay polymer sealer and composite structural reinforcement, for tests performed by manufacturer and witnessed by a qualified testing agency.

D. Field quality-control reports.

1.7 QUALITY ASSURANCE

A. Manufacturer Qualifications: Each manufactured bonding-agent packaged patching-mortar joint-filler crack-injection-adhesive corrosion-inhibiting-treatment polymer-overlay polymer-sealer and composite-structural-reinforcement manufacturer shall employ factory-authorized service representatives who are available for consultation and Project-site inspection and on-site assistance.

B. Concrete-Maintenance Specialist Qualifications: Engage an experienced concrete-maintenance firm that employs installers and supervisors who are trained and approved by manufacturer to apply packaged patching-mortar crack-injection adhesive corrosion-inhibiting treatments polymer overlays polymer sealers and composite structural reinforcement to perform work of this Section. Firm shall have completed work similar in material, design, and extent to that indicated for this Project with a record of successful in-service performance. Experience in only installing or patching new concrete is insufficient experience for concrete-maintenance work.

1. Field Supervision: Concrete-maintenance specialist firm shall maintain experienced full-time supervisors on Project site during times that concrete-maintenance work is in progress.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Comply with manufacturer's written instructions for minimum and maximum temperature requirements and other conditions for storage.

B. Store cementitious materials off the ground, under cover, and in a dry location.

C. Store aggregates covered and in a dry location; maintain grading and other required characteristics and prevent contamination.

1.9 FIELD CONDITIONS

A. Environmental Limitations for Epoxies: Do not apply when air and substrate temperatures are outside limits permitted by manufacturer. During hot weather, cool epoxy components before mixing, store mixed products in shade, and cool unused mixed products to retard setting. Do not apply to wet substrates unless approved by manufacturer.

1. Use only Class A epoxies when substrate temperatures are below or are expected to go below 40 deg F within eight hours.

2. Use only Class A or B epoxies when substrate temperatures are below or are expected to go below 60 deg F within eight hours.

3. Use only Class C epoxies when substrate temperatures are above and are expected to stay above 60 deg F for eight hours.

B. Cold-Weather Requirements for Cementitious Materials: Do not apply unless concrete-surface and air temperatures are above 40 deg F and will remain so for at least 48 hours after completion of Work.

PART 2 – PRODUCTS

2.1 MANUFACTURERS

A. Source Limitations: For repair products, obtain each color, grade, finish, type, and variety of product from single source and from single manufacturer with resources to provide products of consistent quality in appearance and physical properties.

2.2 BONDING AGENTS

A. Epoxy-Modified, Cementitious Bonding and Anticorrosion Agent: Manufactured product that consists of water-insensitive epoxy adhesive, portland cement, and water-based solution of corrosion-inhibiting chemicals that forms a protective film on steel reinforcement.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   a. Dayton Superior Corporation.
   b. Master Builders Solutions; brand of MBCC Group.
   c. Sika Corporation.
   d. Sto Corp.

B. Epoxy Bonding Agent: ASTM C881/C881M, bonding system Type II Type V and free of VOCs.
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   a. ChemCo Systems, Inc.
   b. Dayton Superior Corporation.
   c. Master Builders Solutions; brand of MBCC Group.
   d. Sika Corporation.
   e. Sto Corp.
   f. US SPEC, Division of US MIX Company.

C. Latex Bonding Agent, Redispersible: ASTM C1059/C1059M, Type I for use at nonstructural and interior locations unless otherwise indicated.
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   a. Dayton Superior Corporation.
   b. US SPEC, Division of US MIX Company.
   c. W. R. Meadows, Inc.

D. Latex Bonding Agent, Non-Redispersible: ASTM C1059/C1059M, Type II for use at structural and exterior locations and where indicated.
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   a. ChemMasters, Inc.
   b. Dayton Superior Corporation.
   c. US SPEC, Division of US MIX Company.
   d. W. R. Meadows, Inc.

E. Mortar Scrub Coat: Mix consisting of 1 part portland cement and 1 part fine aggregate complying with ASTM C144 except 100 percent passing a No. 16 sieve.

2.2 PATCHING MORTAR

A. Patching Mortar Requirements:
1. Only use patching mortars that are recommended by manufacturer for each applicable horizontal, vertical, or overhead use orientation.
2. Color and Aggregate Texture: Provide patching mortar and aggregates of colors and sizes necessary to produce patching mortar that matches existing, adjacent, exposed concrete. Blend several aggregates if necessary to achieve suitable matches.
3. Coarse Aggregate for Patching Mortar: ASTM C33/C33M, washed aggregate, Size No. 8, Class 5S. Add to patching-mortar mix only as permitted by patching-mortar manufacturer.

B. Job-Mixed Patching Mortar : 1 part portland cement and 2-1/2 parts fine aggregate complying with ASTM C144, except 100 percent passing a No. 16 sieve.

C. Cementitious Patching Mortar : Packaged, dry mix for repair of concrete.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   a. CGM, Incorporated.
   b. ChemMasters, Inc.
   c. Dayton Superior Corporation.
   d. KOSTER American Corporation.
   e. Master Builders Solutions; brand of MBCC Group.
   f. Sika Corporation.
   g. Simpson Strong-Tie Co., Inc.
   h. Sto Corp.
   i. Tnemec Company, Inc.
   j. United Gilsonite Laboratories (UGL).
   k. US SPEC, Division of US MIX Company.
   l. W. R. Meadows, Inc.
2. Compressive Strength: Not less than 5000 psi at 28 days when tested according to ASTM C109/C109M.

D. Rapid-Strengthening, Cementitious Patching Mortar : Packaged, dry mix , ASTM C928/C928M for repair of concrete.
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   a. CGM, Incorporated.
   b. ChemMasters, Inc.
   c. Dayton Superior Corporation.
   d. Master Builders Solutions; brand of MBCC Group.
   e. Sika Corporation.
   f. Simpson Strong-Tie Co., Inc.
   g. Sto Corp.
   h. US SPEC, Division of US MIX Company.
   i. W. R. Meadows, Inc.
2. Compressive Strength: Not less than 2000 psi within three hours when tested according to ASTM C109/C109M.

2.3 PREPLACED CONCRETE MATERIALS

A. Preplaced Aggregate: Washed aggregate, ASTM C33/C33M, Class 5S, with 95 to 100 percent passing a 1-1/2-inch sieve, 40 to 80 percent passing a 1-inch sieve, 20 to 45 percent passing a 3/4-inch sieve, zero to 10 percent passing a 1/2-inch sieve, and zero to 2 percent passing a 3/8-inch sieve .

B. Fine Aggregate for Grout: Fine aggregate according to ASTM C33/C33M, but with 100 percent passing a No. 8 sieve, 95 to 100 percent passing a No. 16 sieve, 55 to 80 percent passing a No. 30 sieve, 30 to 55 percent passing a No. 50 sieve, 10 to 30 percent passing a No. 100 sieve, zero to 10 percent passing a No. 200 sieve, and having a fineness modulus of 1.30 to 2.10.

C. Grout Fluidifier for Grout: ASTM C937.

2.4 JOINT FILLER

A. Epoxy Joint Filler: Two-component, semirigid, 100 percent solids, epoxy resin with a Type A Shore durometer hardness of at least 80 according to ASTM D2240.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   a. ChemCo Systems, Inc.
   b. Dayton Superior Corporation.
   c. Master Builders Solutions; brand of MBCC Group.
   d. Sika Corporation.

B. Polyurea Joint Filler: Two-component, semirigid, 100 percent solids, polyurea resin with a Type A Shore durometer hardness of at least 80 according to ASTM D2240.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   a. ASTC Global, Inc.
   b. ChemCo Systems, Inc.
   c. Master Builders Solutions; brand of MBCC Group.
   d. US SPEC, Division of US MIX Company.

C. Color: As selected by Architect from full range of industry colors.

2.5 EPOXY CRACK-INJECTION MATERIALS

A. Epoxy Crack-Injection Adhesive: ASTM C881/C881M, bonding system Type IV at structural locations and where indicated, Type I at other locations; free of VOCs.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   a. ChemCo Systems, Inc.
   b. Dayton Superior Corporation.
   c. Fyfe Co. LLC.
   d. Master Builders Solutions; brand of MBCC Group.
   e. Sika Corporation.
   f. Sto Corp.
   g. US SPEC, Division of US MIX Company.
   h. W. R. Meadows, Inc.
2. Capping Adhesive: Product manufactured for use with crack-injection adhesive by same manufacturer.
3. Color: Provide epoxy crack-injection adhesive and capping adhesive As selected by Architect from full range of industry colors.

2.6 CORROSION-INHIBITING MATERIALS

A. Corrosion-Inhibiting Treatment: Waterborne solution of alkaline corrosion-inhibiting chemicals for concrete-surface application that penetrates concrete by diffusion and forms a protective film on steel reinforcement.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   a. ARDEX Americas.

b. Cortec Corporation.
c. Euclid Chemical Company (The); a subsidiary of RPM International, Inc.
d. Master Builders Solutions; brand of MBCC Group.
e. Sika Corporation.

2.7 POLYMER-OVERLAY MATERIALS

A. Polymer Overlay: Epoxy adhesive complying with ASTM C881/C881M, bonding system Type III, with surface-applied aggregate for skid resistance; free of VOCs.
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
a. ChemCo Systems, Inc.
b. Dayton Superior Corporation.
c. Master Builders Solutions; brand of MBCC Group.
d. Sika Corporation.
e. Sto Corp.
f. US SPEC, Division of US MIX Company.
2. Aggregate: ACI 503.3, oven-dried, washed silica sand.
3. Color and Texture: As selected by Architect from full range of industry colors.

2.8 POLYMER-SEALER MATERIALS

A. Epoxy Polymer Sealer: Low-viscosity epoxy, penetrating sealer and crack filler recommended by manufacturer for penetrating and sealing cracks in exterior concrete traffic surfaces; VOC content 100 g/L or less .
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
a. ChemCo Systems, Inc.
b. Dayton Superior Corporation.
c. Master Builders Solutions; brand of MBCC Group.
d. Sika Corporation.
2. Color: As selected by Architect from full range of industry colors.

2.9 COMPOSITE REINFORCEMENT MATERIALS

A. Composite Structural Reinforcement: Manufacturer's system consisting of carbon-fiber or glass-fiber reinforcement in the form of tow sheet with field-applied saturant or preimpregnated sheet and epoxy primers, fillers, adhesives, saturants, and topcoats, designed for use as externally bonded structural reinforcement for concrete.
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
a. Fyfe Co. LLC.
b. Master Builders Solutions; brand of MBCC Group.
c. Sika Corporation.

2.10 MISCELLANEOUS MATERIALS

A. Portland Cement: ASTM C150/C150M, Type I, II, or III unless otherwise indicated.

B. Water: Potable.

2.11 MIXES

A. General: Mix products, in clean containers, according to manufacturer's written instructions.

1. Do not add water, thinners, or additives unless recommended by manufacturer.
2. When practical, use manufacturer's premeasured packages to ensure that materials are mixed in proper proportions. When premeasured packages are not used, measure ingredients using graduated measuring containers; do not estimate quantities or use shovel or trowel as unit of measure.
3. Do not mix more materials than can be used within time limits recommended by manufacturer. Discard materials that have begun to set.

B. Dry-Pack Mortar: Mix required type(s) of patching-mortar dry ingredients with just enough liquid to form damp cohesive mixture that can be squeezed by hand into a ball but is not plastic.

C. Concrete: Comply with Section 033000 "Cast-in-Place Concrete."

D. Grout for Use with Preplaced Aggregate: Proportion according to ASTM C938. Add grout fluidifier to mixing water followed by portland cement, pozzolan, and fine aggregate.

PART 3 – EXECUTION

3.1 CONCRETE-MAINTENANCE SPECIALIST

A. Concrete-Maintenance Specialist Firms: Subject to compliance with requirements, firms that may perform concrete maintenance include, but are not limited to, the following:

3.2 CONCRETE MAINTENANCE

A. Have concrete-maintenance work performed only by qualified concrete-maintenance specialist.

B. Comply with manufacturers' written instructions for surface preparation and product application.

3.3 EXAMINATION

A. Notify Architect seven days in advance of dates when areas of deteriorated or delaminated concrete and deteriorated reinforcing bars will be located.

B. Locate areas of deteriorated or delaminated concrete using hammer or chain-drag sounding and mark boundaries. Mark areas for removal by simplifying and squaring off boundaries. At columns and walls make boundaries level and plumb unless otherwise indicated.

C. Pachometer Testing: Locate at least three reinforcing bars using a pachometer, and drill test holes to determine depth of cover. Calibrate pachometer using depth of cover measurements, and verify depth of cover in removal areas using pachometer.

D. Perform surveys as the Work progresses to detect hazards resulting from concrete-maintenance work.

3.4 PREPARATION

A. Ensure that supervisory personnel are on-site and on duty when concrete maintenance work begins and during its progress.

B. Protect persons, motor vehicles, surrounding surfaces of building being repaired, building site, plants, and surrounding buildings from harm resulting from concrete maintenance work.

1. Comply with each product manufacturer's written instructions for protections and precautions. Protect against adverse effects of products and procedures on people and adjacent materials, components, and vegetation.

2. Use only proven protection methods appropriate to each area and surface being protected.
3. Provide temporary barricades, barriers, and directional signage to exclude public from areas where concrete maintenance work is being performed.
4. Erect temporary protective covers over walkways and at points of pedestrian and vehicular entrance and exit that must remain in service during course of concrete maintenance work.
5. Contain dust and debris generated by concrete maintenance work and prevent it from reaching the public or adjacent surfaces.
6. Use water-mist sprinkling and other wet methods to control dust only with adequate, approved procedures and equipment that ensure that such water will not create a hazard or adversely affect other building areas or materials.
7. Protect floors and other surfaces along haul routes from damage, wear, and staining.
8. Provide supplemental sound-control treatment to isolate removal and dismantling work from other areas of the building.
9. Protect adjacent surfaces and equipment by covering them with heavy polyethylene film and waterproof masking tape or a liquid strippable masking agent. If practical, remove items, store, and reinstall after potentially damaging operations are complete.
10. Neutralize and collect alkaline and acid wastes for disposal off Owner's property.
11. Dispose of debris and runoff from operations by legal means and in a manner that prevents soil erosion, undermining of paving and foundations, damage to landscaping, and water penetration into building interiors.

C. Existing Drains: Prior to the start of work in an area, test drainage system to ensure that it is functioning properly. Notify Architect immediately of inadequate drainage or blockage. Do not begin work in an area until the drainage system is in working order.
1. Prevent solids such as aggregate or mortar residue from entering the drainage system. Clean out drains and drain lines that become sluggish or blocked by sand or other materials resulting from concrete maintenance work.
2. Protect drains from pollutants. Block drains or filter out sediments, allowing only clean water to pass.

D. Preparation for Concrete Removal: Examine construction to be repaired to determine best methods to safely and effectively perform concrete maintenance work. Examine adjacent work to determine what protective measures will be necessary. Make explorations, probes, and inquiries as necessary to determine condition of construction to be removed in the course of repair.
1. Verify that affected utilities have been disconnected and capped.
2. Inventory and record the condition of items to be removed for reinstallation or salvage.
3. Provide and maintain shoring, bracing, and temporary structural supports as required to preserve stability and prevent unexpected or uncontrolled movement, settlement, or collapse of construction being demolished and construction and finishes to remain. Strengthen or add new supports when required during progress of removal work.

E. Reinforcing-Bar Preparation: Remove loose and flaking rust from exposed reinforcing bars by abrasive blast cleaning needle scaling or wire brushing until only tightly adhered light rust remains.
1. Where section loss of reinforcing bar is more than 25 percent, or 20 percent in two or more adjacent bars, cut bars and remove and replace as indicated on Drawings.
2. Remove additional concrete as necessary to provide at least 3/4-inch clearance at existing and replacement bars.
3. Splice replacement bars to existing bars according to ACI 318 by lapping, welding, or using mechanical couplings.

F. Preparation of Floor Joints for Repair: Saw-cut joints full width to edges and depth of spalls, but not less than 3/4 inch deep. Clean out debris and loose concrete; vacuum or blow clear with compressed air.

G. Surface Preparation for Corrosion-Inhibiting Treatment: Clean concrete to remove dirt, oils, films, and other materials detrimental to treatment application.
   1. Use low-pressure water cleaning detergent scrubbing or sand blasting .
   2. Allow surface to dry before applying corrosion-inhibiting treatment.

H. Surface Preparation for Overlays:
   1. Remove delaminated material and deteriorated concrete surface material.
   2. Roughen surface of concrete to produce a surface profile matching CSP 3 according to ICRI 310.2.
   3. Use sand blasting shot blasting scarifying needle scaling scabbling or milling .
   4. Sweep and vacuum roughened surface to remove debris followed by low-pressure water cleaning.

I. Acidic Surface Preparation for Sealers: Acid etch surface of concrete to produce a surface profile matching CSP 1 according to ICRI 310.2.
   1. Remove excess acid solution, reaction products, and debris by squeegeeing or vacuuming.
   2. Scrub surface with an alkaline detergent, rinse, and squeegee or vacuum.
   3. Check acidity of surface with pH test paper and continue rinsing until pH is acceptable according to sealer manufacturer's written instructions.
   4. When pH is acceptable according to sealer manufacturer's written instructions and surface is clean, vacuum dry.

J. Nonacidic Surface Preparation for Sealers: Clean concrete to remove dirt, oils, films, and other materials detrimental to sealer application.
   1. Use shot blasting low-pressure water cleaning or detergent scrubbing .

K. Surface Preparation for Composite Structural Reinforcement: Clean concrete where reinforcement and epoxy patching mortar is to be placed by low-pressure water cleaning or detergent scrubbing to remove dirt, oils, films, and other materials detrimental to epoxy patching mortar.
   1. Roughen surface of concrete by sand blasting.
   2. Remove delaminated material and deteriorated concrete surface material.
   3. Sweep and vacuum roughened surface to remove debris followed by low-pressure water cleaning.

3.5 REMOVAL OF CONCRETE

A. Do not overload structural elements with debris.

B. Saw-cut perimeter of areas indicated for removal to a depth of at least 1/2 inch . Make cuts perpendicular to concrete surfaces and no deeper than cover on reinforcement.

C. Remove deteriorated and delaminated concrete by breaking up and dislodging from reinforcement.

D. Remove additional concrete if necessary to provide a depth of removal of at least 1/2 inch over entire removal area.

E. Where half or more of the perimeter of reinforcing bar is exposed, bond between reinforcing bar and surrounding concrete is broken, or reinforcing bar is corroded, remove concrete from entire perimeter of bar and to provide at least 3/4-inch clearance around bar.

F. Test areas where concrete has been removed by tapping with hammer, and remove additional concrete until unsound and disbonded concrete is completely removed.

G. Provide surfaces with a fractured profile of at least 1/8 inch that are approximately perpendicular or parallel to original concrete surfaces. At columns and walls, make top and bottom surfaces level unless otherwise directed.

H. Thoroughly clean removal areas of loose concrete, dust, and debris.

3.6 APPLICATION OF BONDING AGENT

A. Epoxy-Modified, Cementitious Bonding and Anticorrosion Agent: Apply to reinforcing bars and concrete by stiff brush or hopper spray according to manufacturer's written instructions. Apply to reinforcing bars in two coats, allowing first coat to dry two to three hours before applying second coat. Allow to dry before placing patching mortar or concrete.

B. Epoxy Bonding Agent: Apply to reinforcing bars and concrete by brush, roller, or spray according to manufacturer's written instructions, leaving no pinholes or other uncoated areas. Place patching mortar or concrete while epoxy is still tacky. If epoxy dries, recoat before placing patching mortar or concrete.

C. Latex Bonding Agent, Type I: Apply to concrete by brush roller or spray. Allow to dry before placing patching mortar or concrete.

D. Latex Bonding Agent, Type II: Mix with portland cement and scrub into concrete surface according to manufacturer's written instructions. Place patching mortar or concrete while bonding agent is still wet. If bonding agent dries, recoat before placing patching mortar or concrete.

E. Mortar Scrub Coat for Job-Mixed Patching Mortar and Concrete: Dampen repair area and surrounding concrete 6 inches beyond repair area. Remove standing water and apply scrub coat with a brush, scrubbing it into surface and thoroughly coating repair area. If scrub coat dries, recoat before placing patching mortar or concrete.

F. Slurry Coat for Cementitious Patching Mortar: Wet substrate thoroughly and then remove standing water. Scrub a slurry of neat patching mortar into substrate, filling pores and voids.

3.7 INSTALLATION OF PATCHING MORTAR

A. Place patching mortar as specified in this article unless otherwise recommended in writing by manufacturer.

1. Provide forms where necessary to confine patch to required shape.

2. Wet substrate and forms thoroughly and then remove standing water.

B. Pretreatment: Apply specified bonding agent .

C. General Placement: Place patching mortar by troweling toward edges of patch to force intimate contact with edge surfaces. For large patches, fill edges first and then work toward center, always troweling toward edges of patch. At fully exposed reinforcing bars, force patching mortar to fill space behind bars by compacting with trowel from sides of bars.

D. Vertical Patching: Place material in lifts of not more than 1-1/2 inches or less than 1/4 inch. Do not feather edge.

E. Overhead Patching: Place material in lifts of not more than 1-1/2 inches or less than 1/4 inch. Do not feather edge.

F. Consolidation: After each lift is placed, consolidate material and screed surface.

G. Multiple Lifts: Where multiple lifts are used, score surface of lifts to provide a rough surface for placing subsequent lifts. Allow each lift to reach final set before placing subsequent lifts.

H. Finishing: Allow surfaces of lifts that are to remain exposed to become firm and then finish to a surface matching adjacent concrete .

I. Curing: Wet-cure cementitious patching materials, including polymer-modified cementitious patching materials, for not less than seven days by water-fog spray or water-saturated absorptive cover.

3.8 INSTALLATION OF DRY-PACK-MORTAR

A. Use dry-pack mortar for deep cavities. Place as specified in this article unless otherwise recommended in writing by manufacturer.

1. Provide forms where necessary to confine patch to required shape.

2. Wet substrate and forms thoroughly and then remove standing water.

B. Pretreatment: Apply specified bonding agent .

C. Place dry-pack mortar into cavity by hand, and compact tightly into place. Do not place more material at a time than can be properly compacted. Continue placing and compacting until patch is approximately level with surrounding surface.

D. After cavity is filled and patch is compacted, trowel surface to match profile and finish of surrounding concrete. A thin coat of patching mortar may be troweled into the surface of patch to help obtain required finish.

E. Wet-cure patch for not less than seven days by water-fog spray or water-saturated absorptive cover.

3.9 CONCRETE PLACEMENT

A. Place concrete according to Section 033000 "Cast-in-Place Concrete" and as specified in this article.

B. Pretreatment: Apply epoxy-modified, cementitious bonding and anticorrosion agent to reinforcement and concrete substrate.

C. Pretreatment: Apply Type I latex bonding agent to concrete substrate.

D. Standard Placement: Place concrete by form-and-pump method unless otherwise indicated.

1. Use vibrators to consolidate concrete as it is placed.

2. At unformed surfaces, screed concrete to produce a surface that when finished with patching mortar will match required profile and surrounding concrete.

E. Form-and-Pump Placement: Place concrete by form-and-pump method where indicated.

1. Design and construct forms to resist pumping pressure in addition to weight of wet concrete. Seal joints and seams in forms and where forms abut existing concrete.

2. Pump concrete into place from bottom to top, releasing air from forms as concrete is introduced. When formed space is full, close air vents and pressurize to 14 psi.

F. Wet-cure concrete for not less than seven days by leaving forms in place or keeping surfaces continuously wet by water-fog spray or water-saturated absorptive cover.

G. Fill placement cavities with dry-pack mortar and repair voids with patching mortar. Finish to match surrounding concrete.

3.10 GROUTING PREPLACED AGGREGATE CONCRETE

A. Use grouted preplaced aggregate concrete for column and wall repairs . Place as specified in this article.

B. Design and construct forms to resist pumping pressure in addition to weight of wet grout. Seal joints and seams in forms and where forms abut existing concrete.

C. Apply epoxy bonding agent to reinforcement and concrete substrate.

D. Place aggregate in forms, consolidating aggregate in lifts as it is placed. Pack aggregate into upper areas of forms to achieve intimate contact with concrete surfaces.

E. Fill forms with water to thoroughly dampen aggregate and substrates. Drain water from forms before placing grout.

F. Pump grout into place at bottom of preplaced aggregate, forcing grout upward. Release air from forms at top as grout is introduced. When formed space is full and grout flows from air vents, close vents and pressurize to 14 psi.

G. Wet-cure concrete for not less than seven days by leaving forms in place or keeping surfaces continuously wet by water-fog spray or water-saturated absorptive cover.

H. Repair voids with patching mortar and finish to match surrounding concrete.

3.11 FLOOR-JOINT REPAIR

A. Cut out deteriorated concrete and reconstruct sides of joint with patching mortar as indicated on Drawings. Install joint filler in nonmoving floor joints where indicated and as specified in this article.

B. Depth: Install joint filler to a depth of at least 3/4 inch . Use fine silica sand no more than 1/4 inch deep to close base of joint. Do not use sealant backer rods or compressible fillers below joint filler.

C. Top Surface: Install joint filler so that when cured, it is flush at top surface of adjacent concrete. If necessary, overfill joint and remove excess when filler has cured.

3.12 EPOXY CRACK INJECTION

A. Clean cracks with oil-free compressed air or low-pressure water to remove loose particles.

B. Clean areas to receive capping adhesive of oil, dirt, and other substances that would interfere with bond.

C. Place injection ports as recommended by epoxy manufacturer, spacing no farther apart than thickness of member being injected. Seal injection ports in place with capping adhesive.

D. Seal cracks at exposed surfaces with a ribbon of capping adhesive at least 1/4 inch thick by 1 inch wider than crack.

E. Inject cracks wider than 0.003 inch to a depth of 8 inches.

F. Inject epoxy adhesive, beginning at widest part of crack and working toward narrower parts. Inject adhesive into ports to refusal, capping adjacent ports when they extrude epoxy. Cap injected ports and inject through adjacent ports until crack is filled.

G. After epoxy adhesive has set, remove injection ports and grind surfaces smooth.

3.13 APPLICATION OF CORROSION-INHIBITING-TREATMENT

A. Apply corrosion-inhibiting treatment to surfaces indicated on Drawings, from wall-to-wall or curb-to-curb and from joint-to-joint in the perpendicular direction .

B. Apply by brush, roller, or airless spray in two coats at manufacturer's recommended application rate. Remove film of excess treatment by high-pressure washing before patching treated concrete or applying a sealer or overlay.

3.14 APPLICATION OF POLYMER OVERLAY

A. Apply polymer overlay according to ACI 503.3.

B. Apply to traffic-bearing surfaces, including parking areas and walks.

3.15 APPLICATION OF POLYMER SEALER

A. Apply polymer sealer by brush, roller, or airless spray at manufacturer's recommended application rate.

B. Apply to traffic-bearing surfaces, including parking areas and walks.

3.16 INSTALLATION OF COMPOSITE STRUCTURAL REINFORCEMENT

A. Fiber Tow Sheet and Saturant: Unless otherwise recommended by manufacturer, install as follows:

1. Apply epoxy primer using brush or short nap roller to prepared concrete surfaces in areas where composite structural reinforcement will be applied.
2. After primer has set, patch surface defects with epoxy filler and allow to set before beginning reinforcement application.
3. Apply epoxy saturant to fiber tow sheet or primed and patched surface using roller. Apply fiber tow sheet to primed and patched surface while saturant is still wet, using pressure roller to

remove air pockets. Remove paper backing from fiber tow sheet and apply additional epoxy to fully saturate tow sheet.

4. Apply additional layers using same procedure, fully saturating each layer with epoxy.
5. After saturant has cured, apply protective topcoat by brush roller or spray.

B. Preimpregnated Fiber Sheet: Unless otherwise recommended by manufacturer, install as follows:

1. Patch surface defects with epoxy mortar and allow to set before beginning reinforcement application.
2. Apply epoxy adhesive to a thickness of 1/16 inch to prepared concrete surfaces.
3. Clean fiber sheet with acetone or other suitable solvent, and apply epoxy adhesive to a thickness of 1/16 inch.
4. Apply adhesive-coated fiber sheet to adhesive-coated concrete and roll with a hard rubber roller until fiber sheet is fully embedded in adhesive, air pockets are removed, and adhesive is forced out from beneath fiber sheet at edges.
5. Apply additional layers using same procedure.

3.17 FIELD QUALITY CONTROL

A. Testing Agency: Owner will engage a qualified testing agency to perform tests and inspections.

B. Product will be considered defective if it does not pass tests and inspections.

C. Prepare test and inspection reports.

D. Manufacturers Field Service: Engage manufacturers' factory-authorized service representatives for consultation and Project-site inspection and to provide on-site assistance when requested by Architect.

1. Have manufacturers' factory-authorized service representatives perform the following number of Project-site inspections to observe progress and quality of the Work, distributed over the period of product installation, regardless of on-site assistance requested by Architect:
    a. Bonding-Agent and Packaged Patching-Mortar Installation: Three inspections.
    b. Joint-Filler Installation: Two inspections.
    c. Crack-Injection-Adhesive Preparation and Installation: Four inspections.
    d. Corrosion-Inhibiting Treatment: Two inspections.
    e. Polymer Overlay: Two inspections.
    f. Polymer Sealer: Two inspections.
    g. Composite-Structural-Reinforcement: Three inspections.

3.18 CONCRETE MAINTENANCE SCHEDULE

A. Garage Level 1 Entrance Ramp: Perform the following as indicated on Drawings:

1. Removal of deteriorated concrete and subsequent replacement and patching.
2. Floor joint repair.
3. Epoxy crack injection.
4. Corrosion-inhibiting treatment.
5. Polymer overlays.
6. Polymer sealers.
7. Composite structural reinforcement on underside of slab.

B. Elevated Warehouse Floors: Perform the following as indicated on Drawings:

1. Removal of deteriorated concrete and subsequent replacement and patching.
2. Floor joint repair.

3. Epoxy crack injection.
4. Corrosion-inhibiting treatment.
5. Polymer overlays.
6. Polymer sealers.
7. Composite structural reinforcement on underside of slab.

C. Concrete Walls and Floor in Salt Dome: Perform the following as indicated on Drawings:
1. Removal of deteriorated concrete and subsequent replacement and patching.
2. Floor joint repair.
3. Epoxy crack injection.
4. Corrosion-inhibiting treatment.
5. Polymer overlays.
6. Polymer sealers.
7. Composite structural reinforcement of columns.

END OF SECTION 030130

SECTION 031100

CONCRETE FORMWORK

PART 1 – GENERAL

1.1 WORK INCLUDES:

A. Provide all labor, materials and equipment necessary and required to complete architectural concrete and structural concrete as specified to form concrete to profiles shown.

1. Provide concrete with smooth rubbed finish.
2. Structural concrete is defined as all concrete that is not architectural concrete.
3. Layout of formwork.
4. Formwork construction.
5. Embedded items and openings in concrete.
6. Form release materials.
7. Removal of forms.
8. Field quality control.
9. Detection of movement.
10. Re-use of forms.

1.2 RELATED WORK SPECIFIED ELSEWHERE:

A. 03 20 00 - Concrete Reinforcement.

B. 03 30 00 - Cast-In-Place Concrete.

1.3 REFERENCES:

A. Codes and standards referred to in this Section are:

American Concrete Institute (ACI):

1. ACI 117: Standard Specifications for Tolerances for Concrete Construction and Materials.
2. ACI 301: Standard Specification for Structural Concrete.
3. ACI 318: Building Code Requirements for Structural Concrete.
4. ACI 347: Formwork for Concrete.

B. American Plywood Association (APA):

1. U.S. Product Standard PS 1 for Construction and Industrial Plywood.

C. West Coast Lumber Inspection Bureau (WCLB):

1. WCLB No. 17: Standard Grading Rules.

1.4 SUBMITTALS:

A. Provide all submittals, including the following, as specified in Division 1.

1. Contractor's Shop Drawings: Proposed form layout drawings and the pattern layout drawings for Concrete. Review of these drawings does not relieve the Contractor of responsibility for adequately designing and constructing forms. Shop drawings shall

indicate and include the following details and requirements:

a. Forming system and method or erection with associated details.

b. Shoring accompanied by design calculations. Include reshoring procedures. Both drawings and calculations shall be signed and sealed by a Structural Engineer who is currently registered in the State of Iowa.

c. Locations of construction joints in plan and elevation views. Means of leakage prevention for concrete exposed to view in finished construction.

d. Location and sizes of conduits, openings, recesses, pipes, ducts and other attached or embedded products.

e. Beam intersections and other conditions where concrete casting by vertical drop may be restricted.

f. Chamfer strips for corner treatment.

g. Method and schedule for removing forms and shoring.

2. Samples: Pieces of each type of sheathing, chamfer strips, form ties, form liners and rustication strips.

3. Product Data: Submit manufacturer's product data for manufactured products, including products proposed for leakage control.

1.5 QUALITY ASSURANCE:

A. Formwork Compliance: Unless otherwise indicated, design, construct, erect, maintain and remove forms and related structures for concrete work in accordance with applicable requirements of ACI 301, ACI 318 and ACI 347.

1. Architectural Concrete: Forms for architectural concrete shall be designed and constructed in accordance with ACI 301.

2. Deflection: Where dead and live loads will be more then 20 percent greater than the weight of the concrete, provide framing lumber of required strength and comply with ACI 301 and ACI 347 for design of framing members. Deflection shall be kept within the herein specified tolerances.

3. Design of formwork shall be coordinated with concrete mix design, as specified in Section 03 30 00, so that form materials, form surfaces and formwork strength will produce the desired concrete tolerances and finishes.

B. Formwork Surface Materials: Provide material and work quality which will produce clean and uniform finished surfaces within the allowable tolerances specified and which will conform with the following requirements:

1. Concrete Exposed to View: Provide material and work quality that will produce clean, smooth and uniform concrete surfaces. Refer to ACI 301 for requirements.

2. Concrete Concealed from View: Provide material and work quality that will produce aligned concrete surfaces free of fins, honeycomb and stains.

C. Special Formwork Sections: Provide openings, offsets, sinkages, keyway, recesses, moldings, rustication strips, chamfers, blocking, screeds, bulkheads, anchorages, embedded items and other features. Select material and provide workmanship that will ensure indicated finishes.

D. Chamfered Corners: All external corners shall be chamfered, unless otherwise indicated.

E. Removal Features: Design formwork to be readily removable without impact, shock and damage to concrete surfaces and adjacent materials.

F. Tolerances for Formed Surfaces: For buildings and similar structures, comply with the requirements of ACI 301, as applicable. For those items of work or parts of the structure not covered by ACI 301, comply with the requirements of ACI 117, as applicable. Coordinate with the requirements specified in Section 03 30 00 - Cast-In-Place Concrete.

1. The class of surface for offset between adjacent pieces of formwork facing material shall be Class A for surfaces permanently exposed to public view and Class C for surfaces that will be permanently concealed, unless otherwise specified.

G. Abrupt and Gradual Irregularities Tolerances for Formed Surfaces: In addition to the tolerance requirements of ACI 301, surfaces of buildings and similar structures permanently exposed to view shall conform to the abrupt and gradual irregularities tolerances specified herein. Abrupt irregularities shall be understood to mean offsets and fins resulting from displaced, mismatched, or misplaced forms, sheathing, or liners or from defects in forming materials are considered abrupt irregularities. Gradual irregularities shall be understood to mean those resulting from warping and similar uniform variations from planeness or true curvature. Gradual irregularities shall be checked with a straightedge for plane surfaces or a shaped template for curved or warped surfaces.

1. In measuring irregularities, the straightedge or template shall be placed in various places on the surface in various directions. Permitted abrupt or gradual irregularities in formed surfaces as measured within a 5 fool length with a straightedge shall be as follows:

Class of Surface	Maximum Abrupt of Gradual Irregularities
A	1/8 inch
B	1/4 inch
C	1/2 inch
D	1 inch

1.6 DELIVERY, STRORAGE and HANDLING:

A. Storage: Store form panels to prevent warpage. Protect panels from damage and contamination which could adversely affect concrete and concrete finish surfaces.

B. Lift form panels by methods that will protect panels from damage and distortion.

1.7 JOB CONDITIONS:

A. Allow sufficient time between erection of forms and placing of concrete for various trades to properly install concrete reinforcement, embedded items, sleeves and block-outs.

B. Do not apply superimposed loads to the structure until concrete has developed it specified 28-day compressive strength.

PART 2 – PRODUCTS

2.1 MANUFACTURER:

A. Acceptable manufacturers are listed below.

1. RELEASE AGENT: MAGIC KOTE VOC BY SYMONS CORP.
2. FORM COATING: A.C. HORN CORP, BROOKLYN NY
3. FORM LINERS: DURA TEX BY SYMONS CORP, DES PLAINES, IL
4. RUSTICATIONS: SYMONS CORP, DES PLAINES, IL

2.2 MATERIALS:

A. Lumber: Boards and framing lumber shall be graded and grade-marked in accordance with WCLB No. 17. Provide framing lumber or required strength, conforming with the above specified WCLB No. 17.

1. Boards: Provide all West Coast Species, 'Construction" or 'Standard' Boards. Use dressed side of lumber for surface in contact with concrete, and provide boards with dressed or tongue-and-groove edges to provide tight joints to prevent leakage.
2. Framing Lumber:
   a. Light Framing: Provide all West Coast Species, 'Construction" or 'Standard' light framing, dressed or rough. Where loads are not a factor, 'Utility' light framing will be accepted.
   b. Joists and Planks: Provide all West Coast Species, 'No.2' Structural joists and planks dressed or rough.
   c. Beam and Stringers: Provide all West Coast Species, 'Standard' Beam and Stringers or 'No.2 Structural' beams and stringers, dressed or rough.
3. Plywood (Plyform): Plywood shall be grade and grade-marked in accordance with U.S. Product Standard PS-1.
   a. B-B Plyform: Provide Class I, EXT-APA, sanded, APA trade marked.
   b. B-C Plyform: Provide ClassI, EXT-APA, APA trade marked.
   c. High Density Overlay (HDO) Plyform: Provide A-A, 60-60, Class I, EXT-APA, APA trade marked.
   d. Thickness: As required to maintain surface smoothness, without deflection, but not thinner than 5/8 inch.

C. Steel Forms: Proprietary, patented or fabricated steel forms, using standard or commercial, quality, uncoated steel sheet or plate, 3/16-inch minimum thickness for panel facing. Provide surfaces that will not impart corrosion residue to concrete. Include panel framing, reinforcement, and erection accessories.

D. Leakage Control Materials: Provide materials capable of producing flush, watertight, and nonabsorbent surfaces and joints and compatible with forming material and concrete ingredients. Seal form edges with gasketing material or sealant placed in the joint in such a way that neither a fin nor groove is made in the face of the cast concrete.

E. Form Release Agent: Commercial formulated, silicone-free form release agent, designed for use on all types of forms, which will not bond with, stain, nor adversely affect concrete surfaces, and which will not impair subsequent treatment of concrete surfaces requiring bond or adhesion nor

impede wetting surfaces which will be cured with water, steam or curing compounds.

F. Plugged Cone Form Ties: Rod type with ends or end fasteners which can be removed without spalling the concrete and which leave a hole equal in depth to the required reinforcement clearance.

Form ties shall be of a design in which the hole left by the removed end or end fastener is easily filled to match the surface of the hardened concrete. Provide removable cones 1-1/4 inches in diameter by 1/2 inches deep. Provide performed mortar plugs to match the color of the concrete, recessed 1/4 inch, adhered with an approved epoxy adhesive.

G. Inserts: Cast stainless steel or welded stainless steel, Type 316 or similar 300 Series, complete with anchors to concrete and fitting such as bolts, wedges and straps. Provide hanger inserts spaced to match grid of suspended ceiling.

H. Dovetail Anchor Slots: 22 gage or heavier galvanized steel dovetail slots, for anchoring of masonry veneer with galvanized steel dovetail anchors provided under Division 4 - Masonry.

I. Chamfer Strips: 3/4 inch by 3/4 inch triangular fillets milled from clear, straight-grain pine, surfaced each side, or extruded vinyl type with or without nailing flange.

J. Miscellaneous Joint Strips: Preformed strips for reveals, rustication, and similar joints fabricated of wood, metal or plastic.

K. Waterstops: Refer to Section 03 15 00 - Waterstops.

2.3 FABRICATION:

A. Formwork - General: Fabricate forms in accordance with approved shop drawings. Maintain forms clean, smooth and free from imperfections and distortion.

B. Joints:

1. Arrange from panels in symmetrical patters conforming to general line of the structure.

2. Unless otherwise indicated, orient panels on vertical surfaces with long dimension horizontal

and make horizontal joints level and continuous.

3. Align form panels on each side of the panel joint with fasteners common to both panels, and in a manner which will result in a continuous, unbroken concrete plane surface.

C. Steel Forms: Use material which is clean, smooth and free from warps, bends, kinks, rust, cracks and matter which may stain concrete. Fabricate panels in accordance with approved Shop Drawings. Deflection between form supports from concrete placement shall not exceed 1/240 of the span length.

PART 3 – EXECUTION

3.1 LAYOUT OF FORMWORK:

A. Locate and stake out all forms and establish all lines, levels and elevations.

3.2 CONSTRUCTION:

A. Construct formwork in accordance with the approved Shop Drawings, and in a manner that will produce finished concrete surfaces conforming to indicated design and within specified tolerances. Formwork for concrete not exposed to view in the finished work may be constructed of any material that will adequately support the weight of the concrete.

B. Make joints and seams mortar-tight. Install leakage control materials in accordance with the manufacturer's installation instructions, and in a manner that will maintain a smooth continuity of plane between abutting form panels and which will resist displacement by concreting operations.

C. Kerf wood inserts for forming keyways, reglets and recesses in a manner that will prevent swelling and ensure ease of removal.

D. Maintain forms clean and free from indentations and warpage. Do not use rust-stained steel surfaces for forms in contact with concrete. Do not sandblast steel form surfaces to remove rust or mill scale; remove these imperfections by grinding.

E. Brace temporary closures to prevent warpage or displacement and set tightly against forms in a manner that will prevent loss of concrete mortar.

F. Support joints with extra studs or girts, and in a manner that will ensure true, square intersections.

G. Assemble forms in a manner that will facilitate their removal without damage to the concrete.

H. Construct molding shapes, recesses and projections with smooth finish materials and install forms with sealing joints.

I. Provide camber in formwork as required to compensate for deflections caused by weight and pressures of fresh concrete and construction loads and as otherwise indicated. Provide camber strips to compensate for deflections due to permanent loads and long-term deflections due to shrinkage and creep as required.

J. Provide construction openings in forms where required for concrete pour pockets, vibrator access holes, and inspection openings to aid in proper placement and consolidation of concrete and close up openings during placement of concrete as applicable.

K. Provide inspection and cleanout openings on forms at bottom of walls and columns and elsewhere as required. Do not close cleanouts until inspected by Owner's representative just before placing concrete.

L. Drill air escape holes in bottom members of blockouts.

M. Ensure that formed stairs risers within a stair run are equal.

N. Set edge forms or bulkheads and intermediate screeds for slabs to obtain required elevations and contours in the finished slab surface. Support screeds substantially without penetrating any waterproof membranes and vapor barriers.

O. Form chamfers with 3/4 inch on each legs, unless otherwise indicated, and accurately shape and surface in a manner which will produce uniformly straight lines and edge joints and which will prevent mortar runs. Extend terminal edges to limits and miter chamfer strips at changes in direction.

P. Construction Joints:

1. Locate joints as indicated. Support forms for joints in concrete so as to rigidly maintain their positions during placement, vibration and curing of concrete. Install keys in all joints.
2. Locate and install construction joints, for which locations are not indicated, so as not to impair strength and appearance of the structure, and indicate such joints on Shop Drawings.
3. Position joints perpendicular to longitudinal axis of pier, beam or slab as the case may be.
4. Locate joints in walls, vertically as indicated; at top of footing; at top of slabs on grade; at bottom of door openings; and at underside of the deepest beam or girder framing into wall; or as required to conform to indicated details.
5. Provide keyways as indicated in construction joints in walls and slabs, and between walls and footings unless otherwise indicated. Place construction joints perpendicular to the main reinforcement. Continue reinforcement across construction joints.

Q. Load Support: Loads of construction of roof slabs and suspended floor slabs shall be carried down to on-grade base slabs. These loads shall not be carried by intermediate slabs at any time.

Formwork loads shall be carried only by structural elements that are supported directly by footings.

3.3 EMBEDDED ITEMS AND OPENINGS IN CONCRETE:

A. Install conduit, pipe sleeves, waterstops, appliance boxes, frames for items recessed in walls, door frames, drains, metal ties, inserts, nailing strips, blocking, grounds and other fastening devices required for anchorage or attachment of other work. Firmly secure products in position, located accurately as indicated, before beginning concrete placement.

B. Provide openings in concrete for passage of ducts and provide clearances therefore as indicated on approved Shop Drawings.

C. Where masonry walls will be tied to concrete construction in future construction, use dovetail anchor slots positioned for maximum flexibility for masonry installation.

3.4 FORM RELEASE MATERIAL:

A. Coat form contact surfaces with approved form release material before reinforcement is placed. Do not allow excess for release material to accumulate in the forms or to come in contact with surfaces that are required to be bonded to fresh concrete such as concrete reinforcement and embedded items. Apply for release material in compliance with manufacturer's application instructions.

B. Coat steel forms with non-staining, rust-preventative form release material or otherwise protect against rusting.

C. Apply form release material to bolts and rods that are to be removed or that are to be free to move.

3.5 FORM REMOVAL:

A. Remove forms by methods which will not injure, mar, gouge or chip concrete surfaces, overstress concrete members, or distort formwork. Use air pressure or other approved methods. Do not pry against concrete. Cut off nails flush. Leave surfaces clean and unblemished.

1. Where early form removal is not necessary and will not impact the Contractor's schedule leave forms in place at least 72 hours, unless otherwise approved by the Owner's representative.

B. When repair of surface defects or finishes is required at an early age, forms may be removed as soon as the concrete has hardened sufficiently to resist damage from removal operations and it own weight.

1. Concrete work that is damaged by removal operations shall be repaired as specified in Section 03 30 00 - Cast-In-Place Concrete. Where exposed surfaces are damaged beyond acceptable repairing measures, the damaged concrete shall be removed and replaced with new concrete.

C. Top forms on sloping surfaces of concrete may be removed as soon as the concrete has attained sufficient stiffness to prevent sagging. Any needed repairs or treatment required on such sloping surfaces shall be performed at once and shall be followed by the specified curing.

D. Wood forms for wall openings shall be loosened as soon as possible as this can be accomplished without damage to the concrete.

E. Formwork for columns, walls, sides of beams and other parts not supporting the weight of the concrete may be removed as soon as the concrete has hardened sufficiently so as not to be damaged by removal operations.

F. Forms and shoring in the formwork used to support the weight of concrete in beams, suspended

slabs, girders and other structural members shall remain in place until concrete has reached a minimum of 70 percent of the indicated compressive strength, unless otherwise approved in writing by the Owner's representative.

G. When shores and other vertical supports are so arranged that the non-load-carrying form-facing material may be removed without loosening or disturbing the shores and supports, the facing material my be removed at an earlier age provided the concrete surfaces are not damaged by such earlier removal.

H. Plan re-shoring operations in a manner that will ensure that areas of new construction will not be required to support their own weight. Re-shoring shall be in place before shoring is removed. During re-shoring, do not permit live loads on new construction. Do not locate re-shoring in a manner and location that will overstress members or induce tensile stresses where reinforcing bars have not been provided.

I. When removal of formwork or re-shoring is based on concrete reaching a specific strength, the concrete shall be presumed to have reached this strength when test cylinders, field cured along with the concrete they represent, have reached the strength specified for removal of the formwork or

re-shoring. Except for field curing and age at test, the cylinders shall be molded and tested as specified in Section 01 33 19 - Field Test Reporting.

3.6 FIELD QUALITY CONTROL:

A. Before placing concrete, check lines and grades of erected formwork and positioning of embedded inserts, blockouts and joints for correctness. Verify that embedded piping and conduit are free from obstructions. Verify that embedded piping and conduit are free from obstructions. Make corrections ensure proper size and location of concrete members and stability of forming systems.

B. While placing concrete, provide quality control to assure that formwork and related supports have not been displaced, that loss of cement paste through joints is prevented, and that completed work will be within specified tolerances.

C. During form removal, verify that architectural features meet the form and texture requirements of the samples approved by the Owner's representative.

3.7 DIRECTION OF MOVEMENT:

A. Check movement using methods, such as plumb lines, tell tales and survey equipment to detect movement for formwork during concrete placement.

3.8 RE-USE OF FORMS:

A. Clean and repair surfaces to be reused in the work. Split, frayed, delaminated or otherwise damaged form facing material will not be acceptable. Remove such material from the site. Apply for release coating as specified for new formwork.

END OF SECTION 031100

SECTION 031500

CONCRETE ACCESSORIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS:

A. All of the Contract Documents, including General and Supplementary Conditions, and Division 1 General requirements, apply to the work of this section.

1.2 WORK SUMMARY:

A. Furnish and install expanding bentonite-based waterstop as specified herein, illustrated on project drawings, or as required to complete the work to comply with waterproofing warranty requirements in Section 07 14 00.

1.3 RELATED SECTIONS:

A. Other specification Sections which directly relate to the work of this section include, but are not limited to, the following:

1. 03 11 00 – Concrete Formwork
2. 03 30 00 – Cast-In-Place Concrete
3. 07 14 00 - Fluid-Applied Waterproofing

1.4 QUALITY ASSURANCE:

A. Verification of Details: Contractor to notify the Architect immediately of any detail, note, or specification which does not comply with current manufacturer's installation requirements

B. Adhesion: Waterstop-RX is not a self-adhering product. Volclay WB-Adhesive is required to secure Waterstop-RX. No other adhesive should be used. Mechanical fasteners can be used in conjunction with WB-Adhesive, but should not be used solely to secure the waterstop.

C. Installation Instructions: Components and installation procedures shall be in accordance with current manufacturer's printed specifications and recommendations. Verify technical data submittals are the most current with manufacturer.

D. Expansion Joints: WATERSTOP-RX is not designed, nor intended for waterproofing or sealing expansion joints. Responsibility of waterproofing expansion joints is of others.

E. Concrete: Concrete shall be structural grade quality with a minimum 3000psi tensile strength, See Section 03 30 00. For RX-101 and RX-101T a minimum thickness of 8" with two rows of reinforcing steel is required. For RX-102 a minimum thickness of 5" with a single row of reinforcing steel is required.

1.5 SUBMITTALS:

A. Product Data: Submit manufacturer’s product data, with complete general and specific installation instructions, recommendations, and limitations.

B. Bentonite Content Certificate: Submit certificate signed by manufacturer certifying waterstop consists of 75% sodium bentonite and 25% butyl rubber compound and that the product is manufactured in the U.S.A.

C. NSF Standard 61 Certification: Submit Official NSF Listing for waterstop confirming that the work conforms to the requirements of NSF Standard 61 – Drinking Water System Components – Health Effects.

1.6 PRODUCT DELIVERY, STORAGE AND HANDLING:

A. Deliver materials in factory sealed and labeled packaging. Sequence deliveries to avoid delays, while minimizing on-site storage. Handle and store following manufacturer's instructions, recommendations and material safety data sheets. Protect from construction operation related damage, as well as, damage from weather, excessive temperatures and prolonged sunlight. Remove damaged material from site and dispose of in accordance with applicable regulations.

PART 2 – PRODUCTS

2.1 MANUFACTURER:

A. Provide Waterstop-RX bentonite waterstop and water-based adhesive as manufactured by Colloid Environmental Technologies Company (CETCO), 1500 West Shure Drive, Arlington Heights, Illinois 60004-1440, USA. Phone: (847)392-5800; Fax: (847)506-6195; Web-site: http://www.cetco.com.

2.2 MATERIALS:

A. Waterstop shall consist of 75% sodium bentonite and 25% butyl rubber compound formed into uniform coils.

B. NSF Certified: Bentonite waterstop shall be certified by NSF International to conform to the requirements of NSF Standard 61 – Drinking Water System Components – Health Effects.

C. BENTONITE WATERSTOPS:

1. WATERSTOP-RX 101: 1" x 3/4" x 16'8"' rolls of a flexible strip of bentonite and butyl rubber compound for use in concrete construction joints - not designed for expansion joints.

D. ADHESIVE:

1. CETSEAL: A multipurpose UV stable single component polyether moisture cure sealant/adhesive

PART 3 – EXECUTION

3.1 SUBSTRATE INSPECTION AND CONDITIONS:

A. The installer shall examine conditions of substrates and other conditions under which this section work is to be performed and notify the contractor, in writing, of circumstances detrimental to the proper completion of the work. Do not proceed with work until unsatisfactory conditions are corrected and are acceptable for compliance with manufacturer's warranty requirements.

B. Installation shall not proceed when work areas are flooded or wet to the extent that would cause bentonite waterstop to hydrate prior to concrete encapsulation.

3.2 SURFACE PREPARATION:

A. Remove dirt, debris, oil, grease, cement laitance, or other foreign matter, which will impair or negatively affect the installation of the water stop. Protect adjacent material surfaces from damage or contamination from during installation operations.

3.3 GENERAL INSTALLATION GUIDELINES:

A. Install WATERSTOP-RX in all applicable vertical and horizontal cast-in-place concrete construction joints; and around applicable penetrations and structural members. Place WATERSTOP-RX to allow for minimum 3” concrete coverage on all sides coverage for.

B. Apply WB-ADHESIVE by brush 1" to 1-1/4" wide, to dry, smooth concrete surface maintaining a minimum 3” depth within the concrete joint. Allow adhesive to dry until the adhesive cures black (5-10 minutes in warm weather; cold weather will extend drying time).

C. Remove release paper from coil of WATERSTOP-RX. Firmly press the entire length of WATERSTOP-RX against the cured (black) adhesive. Verify 3” minimum concrete coverage will be maintained over entire placement of water stop. Place in maximum practical lengths to minimize coil end joints.

D. Tightly butt coil ends together to form continuous waterstop. Do not overlap coil ends. Where required, cut coils with sharp knife or utility blade to fit coil ends together without overlapping.

E. Following Steps A-D, install waterstop around all applicable through wall pipes and mechanical penetrations; and around all applicable structural elements like metal H-Piles through the slab.

F. Protect installed waterstop from prehydration prior to concrete placement and product encapsulation. Replace any waterstop material that exhibits significant expansion prior to concrete encapsulation.

3.4 CLEAN UP:

A. Clean areas where adjacent finished surfaces are soiled by work of this Section. Remove all tools, equipment and remaining product on-site. Dispose of section work debris and damaged product following all applicable regulations.

END OF SECTION 031500

SECTION 032000

CONCRETE REINFORCEMENT

PART 1 – GENERAL

1.1 SECTION INCLUDES

A. Reinforcing steel for cast-in-place concrete.

B. Supports and accessories for steel reinforcement.

1.2 RELATED SECTIONS

A. Section 03 30 00 - Cast-in-Place Concrete.

1.3 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Shop Drawings: Comply with requirements of ACI SP-66. Include bar schedules, shapes of bent bars, spacing of bars, and location of splices.

C. Manufacturer's Certificate: Certify that reinforcing steel and accessories supplied for this project meet or exceed specified requirements.

D. Reports: Submit certified copies of mill test report of reinforcement materials analysis.

1.4 QUALITY ASSURANCE

A. Perform work of this section in accordance with ACI 301.

1. Maintain one copy of document on project site.

B. Provide Architect with access to fabrication plant to facilitate inspection of reinforcement.

C. Welders' Certificates: Submit certifications for welders employed on the project, verifying AWS qualification within the previous 12 months.

PART 2 – PRODUCT

2.1 REINFORCEMENT

A. Reinforcing Steel: ASTM A 615/A 615M Grade 60 (420).

1. Deformed billet-steel bars.

B. Steel Welded Wire Reinforcement: ASTM A 185, plain type.

1. Flat Sheets
2. Mesh Size and Wire Gage: As indicated on drawings.

C. Reinforcement Accessories:

1. Tie Wire: Annealed, minimum 16 gauge.
2. Chairs, Bolsters, Bar Supports, Spacers: Sized and shaped for adequate support of reinforcement during concrete placement.

2.2 FABRICATION

A. Fabricate concrete reinforcing in accordance with CRSI (DA4) - Manual of Standard Practice, ACI SP-66 - ACI Detailing Manual, ACI 318, and ASTM A 184/A 184M.

B. Welding of reinforcement is not permitted.

PART 3 – EXECUTION

3.1 PLACEMENT

A. Place, support and secure reinforcement against displacement. Do not deviate from required position.

B. Do not displace or damage vapor barrier.

C. Accommodate placement of formed openings.

D. Maintain concrete cover around reinforcing as indicated on the drawings

3.2 FIELD QUALITY CONTROL

A. An independent testing agency, as specified in Section 01 40 00, will inspect installed reinforcement for conformance to contract documents before concrete placement.

END OF SECTION 032000

SECTION 033000

CAST-IN-PLACE CONCRETE

PART 1 – GENERAL

1.1 WORK INCLUDES:

A. Provide all labor, materials and equipment necessary and required to complete all cast-in-place concrete as shown on the drawings and specified herein:

1. Concrete
2. Admixtures
3. Vapor Barriers
4. Curing Materials
5. Joint Materials
6. Reglets
7. Non-shrink Grout
8. Epoxy Mortar
9. Concrete bases for Mechanical and electrical equipment.
10. Concrete bases for Owner furnished equipment.
11. Concrete bases for utility company equipment.
12. Setting grout plates and anchor bolts.

1.2 REFERENCES:

Publications listed below form a part of this specification to extent referenced, Publications are referenced in text by basic designation only.

A. American Concrete Institute (ACI)

1. 117-10 – Tolerances For Concrete Construction and Materials.
2. 211.1-91(R2009) – Selecting Proportions for Normal, Heavyweight, And Mass Concrete.
3. 211.2-98(R2004) – Selecting Proportions for Structural Lightweight Concrete.
4. 214r-02 – Evaluation of Strength Test Results of Concrete.
5. 301-10 – Structural Concrete.
6. 304r-00(R2009) – Guide for Measuring, Mixing, Transporting and Placing Concrete.
7. 305r-10 – Hot Weather Concrete.
8. 306r-10 – Cold Weather Concrete.
9. 308r-01(R2008) – Standard Practice for Curing Concrete.
10. 309r-05 – Guide for Consolidation of Concrete.
11. 318-08 – Building Code Requirements for Reinforced Concrete and Commentary.
12. 347-04 – Guide To Formwork for Concrete.
13. Sp-66-04 – Aci Detailing Manual.

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

1. C31/C31m-09 – Practice for Making & Curing Concrete Test Specimens in The Field
2. C33-08 – Specification for Concrete Aggregates

3. C39/C39m-09–Test Method for Compressive Strength Of Cylindrical Concrete Specimens
4. C42 – Test Method for Obtaining & Testing Drilled Cores & Sewed Beams Of Concrete
5. C94/C94m-09 – Specification for Ready Mixed Concrete
6. C143/C143m-10 – Test Method for Slump of Hydraulic Cement Concrete
7. C150-09 – Specification for Portland Cement
8. C172 -08– Practice for Sampling Freshly Mixed Concrete.
9. C173-10 – Air Content of Freshly Mixed Concrete by The Volumetric Method.
10. C231-09 – Test Method for Air Content of Freshly Mixed Concrete by The Pressure Method.
11. C260-06 – Specification for Air Entraining Admixtures for Concrete
12. C309-07 – Specification for Liquid Membrane Forming Compounds for Curing Concrete
13. C330-09 – Lightweight Aggregates for Structural Concrete
14. C494/C494m-10 - Specification for Chemical Admixtures for Concrete
15. C618-08 – Specification for Fly Ash & Raw or Calcined Natural Pozzolan for Use as A Mineral Admixtures in Portland Cement Concrete
16. C666/C666m-03 – Resistance of Concrete to Rapid Freezing and Thawing.
17. C881/C881m-02 – Epoxy Resin Base Bonding Systems for Concrete.
18. C1107/C1107m-08 – Specification for Packaged Dry, Hydraulic Cement Grout (Non-Shrink)
19. C1116 – Specification for Fiber Reinforced Concrete & Shotcrete
20. C1315-08 – Liquid Membrane Forming Compounds Having Special Properties for Curing and Sealing Concrete.
21. D994 – Specification for Preformed Expansion Joint Filler for Concrete
22. D1751-04(R2008) – Specification for Preformed Expansion Joint Filler for Concrete Paving & Structural Construction
23. D1752 – Specification for Preformed Sponge Rubber & Cork Expansion Joint Fillers for Concrete Paving and Structural Construction
24. D4397-09 – Polyethylene Sheeting for Construction, Industrial and Agricultural Applications.
25. E1155-96(R2008) – Determining Ff Floor Flatness and Fl Floor Levelness Numbers.

C. Concrete Reinforcing Steel Institute (CRSI):
   1. Handbook – 2008 Edition.

D. PS1 US Product Standard For Construction & Industrial Plywood

1.3 RELATED SECTIONS:

A. 31 23 16 - Excavating, Backfilling and Compacting.
B. 32 16 13 - Concrete Curbs.
C. 32 13 13 - Concrete Paving.
D. 03 11 00 - Concrete Formwork.
E. 03 15 00 - Waterstops.
F. 03 20 00 - Concrete Reinforcement.
G. 03 86 00 – Post Tensioned Concrete.

H. 04 21 13 - Brick Masonry.
I. 05 40 00 - Cold Formed Metal Framing.
J. 06 10 00 - Rough Carpentry.
K. 07 92 00 - Joint Sealers.
L. 09 30 00 - Tile Work.
M. 09 65 00 - Resilient Flooring.
N. 09 68 00 - Carpet.
O. 09 97 23 - Floor Sealer

1.4 SUBMITTALS:

A. Product Data: Manufacturer's technical literature with installation and storage instructions for each product specified.

B. Design Data:

1. Design mix proportions shall be prepared by an independent testing laboratory. Proportions shall be in accordance with ACI 211 and ACI 318. Water cement ratio shall be determined by preliminary test made in accordance with ASTM C192. Tests shall be conducted in accordance with ASTM C39. Indicate the locations within the project where the mix design is to be used, types and quantities of material used, fresh unit weight, slump, air content, aggregate analysis, dry weight of aggregates, saturated weight of aggregates, and compressive strength at 28 days. A curve shall be established to represent the relationship between the water cement ratio and the average 28-day compressive strength at which the concrete is to receive its full working load. The range of values on the curve shall include all the compressive strengths as specified herein. The curve shall establish at least four sets of test specimens. Six copies of each design mix results and six copies of each graphed curve shall be furnished to the Architect and his review must be obtained prior to commencing any concrete operations.
2. Warrant by the submission of the design mix that such mix is totally representative of the concrete to be supplied and meets the requirements of the Contract Documents. Deviation from the design mix to delivered concrete shall be sufficient reason for rejection. Submit new design mixes for review when changes are required.

C. Test Reports:

1. Cement: Submit certified mill test reports to the Architect for each type and run of cement used in the work.
2. Aggregates:
   a. Submit a certified laboratory sieve analysis following ASTM C136 criteria of all coarse and fine aggregates used in the work.
   b. Upon request from the Architect or Building Official, submit certified laboratory chemicals and other analyses as deemed necessary by Architect.

1.5 QUALITY ASSURANCE :

A. Codes and Standards: Comply with provisions of the following, except as otherwise indicated:

1. ACI301 – SPECIFICATIONS FOR STRUCTURAL CONCRETE FOR BUILDINGS
2. ACI302 – GUIDE FOR CONCRETE FLOOR AND SLAB CONSTRUCTION
3. ACI304 – GUIDE FOR MEASURING, MIXING, TRANSPORTING & PLACING CONCRETE
4. ACI305 – HOT WEATHER CONCRETING
5. ACI306 – COLD WEATHER CONCRETING

6. ACI308 – STANDARD PRACTICE FOR CURING CONCRETE
7. ACI309 – STANDARD PRACTICE FOR CONSOLIDATION OF CONCRETE
8. ACI315 – DETAILS & DETAILING OF CONCRETE REINFORCEMENT
9. ACI318 – BUILDING CODE REQUIREMENTS FOR REINFORCEMENT CONCRETE
10. ACI347 – RECOMMENDED PRACTICE FOR CONCRETE FORMWORK
11. CRSI – MANUAL OF STANDARD PRACTICE
12. SP66 – ACI DETAILING MANUAL

B. Quality Control Testing During Construction: Contractor shall engage and independent concrete testing service approved by the Architect for quality control testing during concrete operations.

1. Notify testing service at least two working days in advance of field operations requiring concrete testing, or of resumption of operations after stoppages.
2. Coordinate concrete operations with testing service to facilitate quality control testing.
3. Sample and test concrete during placement of concrete as follows:
    a. Sampling Fresh Concrete: ASTM C172; except modified for slump to comply with ASTM C94.
    b. Slump: ASTM C143; One test for each concrete load at point of discharge and one for each set of compressive strength test specimens.
    c. Air Content: ASTM C231; Pressure method; one for each set of compressive strength specimens.
    d. Compression Test Specimens: ASTM C31; one set of six standard cylinders for each compressive strength test, unless otherwise directed. Accommodate testing service to store cylinders on site for the first 24-hours after molding.
    e. Concrete Temperature: Test hourly when air temperature is 40˚F and below, and when 80˚F and above; and each time that a set of compression test specimens is made.
    f. Compressive Strength Tests: ASTM C39; one set of each 100cuyds or fractions thereof, of each concrete class placed in any one day or for each 5000 square feet of surface area.

C. Contractor will have a minimum of 5-years experience in the field of structural concrete work.

1.6 DELIVERY, STORAGE AND HANDLING:

A. Deliver, handle and store material at the job site in a manner as to prevent damage. Packaged material shall be in original containers with seals unbroken and labels intact until time of use. Wrapped, or bundled material shall bear the name of the manufacturer and the product. All damaged or otherwise unsuitable material shall be immediately removed from the job site.

B. Store concrete material in accordance with ASTM C9.

1.7 JOB CONDITIONS:

A. In cold weather do not mix or place concrete when temperature is, or is predicted to be within the following 48-Hrs, below 40 degrees F, except as directed by the Architect unless proper provisions have been made for heating and protecting concrete; follow ACI306. Do not use salts or other chemicals to prevent freezing.

B. In hot weather take special precautions to prevent high temperatures in freshly poured concrete; follow ACI305.

C. Provide all labor and equipment necessary to remove water from excavated areas and maintain 'dry' conditions at all times.

D. The concrete work shall be coordinated with the other parts of the work and with other Contractors, to allow reasonable time to set sleeves, inserts and other accessories when shall be in position before concrete is placed.

E. Until this portion of the work is completed, remove all water from any source, in the area of construction that may interfere with the proper performance of the work and provide all sumps, pumps, well points, electric power and attendance for this purpose on a 24-Hr basis, until foundations are backfilled and ground bearing slabs have been placed.

PART 2 – PRODUCTS

2.1 FORMWORK: See Specification Section 031100

2.2. REINFORCING: See Specification Section 032000

2.3 WATERSTOPS: See Specification Section 031500

2.4 CONCRETE:

A. Cement:

1. Portland cement shall conform to ASTM "Standard Specifications for Portland Cement," C150 Type 1, 2 or 3 low alkali. Normal Portland Cement, uniform gray color from a single source.

2. Use one brand throughout the project.

B. Aggregates: All fine and coarse aggregate shall conform to ASTM C33 with clean, hard, uncoated particles and shall be as specified below. All aggregates when subjected to 5 cycles of the sodium sulfate soundness test (ASTM C88) shall not lose more than 15 percent by weight. This test may be omitted on material from a source known to produce a sound aggregate when so certified by the testing laboratory.

1. Fine aggregate shall be natural sand, or sand prepared from stone or gravel. Grains shall be clean, hard, durable, uncoated and free from silt, loam and clay. Do not use dune, bank run or manufactured sand. Fine aggregate shall comply with ASTM C33, Section 5.1 sieve analysis.

2. Coarse aggregate shall be crushed stone, gravel, or other approved inert materials of similar characteristics, or combinations thereof, having hard, strong, durable pieces free from adherent coatings. Maximum size of pieces shall be 3/4" to #4 except for footings, which may be 1-1/2". The maximum size of aggregate may not be larger than one-fifth of the narrowest dimension between forms, or larger than three-fourths of the minimum clear spacing between reinforcing bars. Comply with ASTM C33, Table 2.

C. Water: Water is to be clean, potable and free from injurious amounts of oil, acids, salts, organic or other deleterious matter.

D. Provide Ready-Mix Concrete unless otherwise approved or specified.

1. Ready-mix concrete shall conform to ASTM C94. The mixing agitation shall begin within 30 minutes, and the concrete shall be discharged from the truck within one hour after the water has been added to the concrete mix.

2. Concrete to be pumped shall be specifically designed for pumping.

E. Concrete Proportions:

1. Submit mix design to independent testing laboratory for review.

2. Strength: The compressive strength (f'c) of concrete for each portion of the project shall be as designated on the drawings.

a. Average strength shall exceed compressive strength as required in accordance with ACI 318.

3. The proportions of ingredients shall produce a mixture that will work readily into the corners and angles of the forms and around reinforcement by the method of placing and consolidation employed on the work but without permitting the materials to segregate or excessive free water to collect on the surface. Proportions shall also produce the specified strength, durability and slump.

4. For concrete of normal weight mix proportions to provide the specific characteristics to be developed using one of the methods as described in ACI301: Method 1 - Laboratory Trial Mixes; Method 2- Field Experience Method; Method 3 - Maximum Permissible Water Cement Ratios.

5. A water reduction admixture shall comply with ASTM C494 Type A and be used for all concrete. Amounts shall be as recommended by the manufacturer and shall be listed in the design mix.

6. All concrete exposed to exterior weather shall contain 5 percent to 7 percent air entrainment admixture.

7. Concrete shall be homogenous, and when hardened, shall have the required strength, resistance to deterioration, durability, water tightness and the properties as specified. normal weight concrete shall have a fresh unit weight of 145 to 152psf.

8. Design mixes to provide normal weight concrete with the following properties as indicated on drawings and schedules:

9. Select water to cement materials ratio required to produce a 28-day strength corresponding to over design mix, which is supported by sufficient experience data to assure that test results will fall within limits established in specification.

10. Slump due to water content alone (without the addition of super plasticizer) shall be as follows:

ALLOWABLE SLUMP	MIN-MAX (INCH)
REINFORCED FOUNDATION WALLS AND FOOTINGS	1-3
UNREINFORCED FOOTINGS, CAISSONS AND SUBSTRUCTURE WALLS	1-3
REINFORCED SLABS, BEAMS AND WALLS	1-4
BUILDING COLUMNS	2-3

11. Slump may be increased by the use of approved high-range water-reducing admixture (super plasticizer).Tolerances as established by ASTM C94. Concrete containing the high-range-water reducing admixture may have a maximum slump of 9-inches. The concrete shall arrive at the job site at a slump of 2 to 3 inches, and 3 to 4 inches for lightweight concrete. This shall be verified, and then the high-range-water-reducing admixture added to increase the slump to the approved level.

2.5 ADMIXTURES:

A. Air Entrained Concrete:

1. Use air entrained concrete for exterior exposed concrete including walls, walks, paving, etc.

2. Proportion air entrained concrete to attain minimum 28-Day compressive strength specified.

3. Total air-entrainment in concrete shall be not less than 5% and not more than 7% volume of concrete. Air content shall be determined by either ASTM C173 or ASTM C231.

4. Air entraining shall conform to ASTM C260.

B. Water Reducing Admixture: ASTM C494, Type A and not containing more chloride ions than are present in municipal drinking water.

C. High Range Water Reducing Admixture: ASTM C494, Type F or G and not containing more chloride ions than are present in municipal drinking water .

D. Non-Corrosive, Non-Chloride Water Reducing, Accelerating Admixture: ASTM C494, Type E and not containing more chloride ions than are present in municipal drinking water. Admixture manufacturer must have long-term non-corrosive test data from an independent testing laboratory of at least one year duration using an acceptable accelerated corrosion test method such as that using electrical potential measures.

E. Admixtures may be used by the Contractor at no additional expense to the Owner in order to provide workability at low slumps, increased compressive strength, retarding or acceleration of the concrete, if approved in writing by the Architect; however, the cement factor shall not be reduced and changes shall be made in the other mix proportions to insure the minimum strength requirements. Water reducing admixtures shall conform to ASTM C494.

F. Prohibited Admixtures: Calcium chloride, thiocyanates. Admixtures containing more the 0.05% chloride ions are not permitted.

G. Use water reducing admixture or high range water reducing admixture (super plasticizer) in all concrete.

H. Fly Ash: Fly ash shall be used in all concrete mixes. ASTM C618 Class ‘F’ fly ash shall be proportioned by weight of cement to provide fly ash to Portland cement ratio not less than 20% or greater than 25% of the sum of total weight of fly ash and cement. Fly ash is not permitted in cold weather concreting unless extended protection is provided. Protection and heating shall be maintained until 70 percent of specified design strength is achieved.

2.6 MOISTURE RETAINING COVER:

A. One of the following, complying with ASTM C171:

1. Waterproof paper.
2. Polyethylene film.
3. Polyethylene-coated burlap.

2.7 VAPOR RETARDER:

A. Polyethylene film, 15mil thickness complying with ASTM E154; provide under all concrete slabs on grade and at other locations indicated on drawings and shall have the following properties:

1. Permeance of less than 0.01 Perms per ASTM F1249 or ASTM E96.
2. Maintain permeance of less than 0.01 Perms after mandatory conditioning tests per ASTM E154 Sections 8,11,12 and 13.
3. Comply with ASTM E1745 Class A standards.

B. Provide the following accessories:

1. Seam Tape with a permeance of less then 0.30 Perms per ASTM F1249 or ASTM E96.
2. Vapor proofing mastic with a permeance less than 0.30 Perms per ASTM F1249 or ASTM E96.
3. Construct pipe boots from vapor barrier material, pressure sensitive tape and/or mastic per manufacturer’s instructions.

C. Exercise extreme care not to puncture membrane. No stakes shall be driven through the membrane. It is the Contractor's responsibility to devise means for placing the concrete to comply with these protective requirements.

2.8 CURING MATERIALS:

A. Compounds:

1. Material shall become integral part of concrete surface and leave floor free of residue or film. Meet requirements of ASTM C156 and C309, Type I with fugitive dye.

2. It shall be the contractor's responsibility to verify that compounds are compatible with the scheduled floor treatment such as paint and resilient flooring materials and shall not discolor concrete surface.

3. Manufacturers:

a "Polyseal" Chem-Masters Corp, Chagrin Falls, OH 216 247-4277.

b. "Cure-Hard" W.R. Meadows Inc., Elgin, IL, 312 683-4500.

c. "Dress & Seal" L&M Construction Chemicals, Inc, Omaha NE 800 362-3331.

d. "Kure-N-Seal" Sonneborn Bldg Products Inc, Minneapolis MN 612 835-3434.

B. Moisture Vapor Emissions & Alkalinity Control Sealers: 100% active colorless aqueous siliconate solution concrete surface treatment applied the day of the concrete pour in lieu of other curing methods for all concrete slabs receiving resilient flooring, such as sheet vinyl, vinyl plank, vinyl composite tile, rubber, wood flooring, carpet, epoxy coating and overlays.

1. ASTM C1315 Type 1, Class A, and ASTM C309 Type 1, Class A, penetrating product to have not less than 34% solid content, leaving no sheen, volatile organic compound (VOC) content rating as required to suite regulatory requirements. The product shall have at least a five year documented history in controlling moisture vapor emission from damaging floor covering and compatible with all finish materials.

2. MVE 15-year Warranty:

a. When floor covering is installed on a below grade, on grade, or above grade concrete slab treated with moisture vapor emission & alkalinity control sealer according to manufacturer’s instructions, sealer manufacturer shall warrant the floor covering system against failure due to moisture vapor migration or moisture-born contaminates for a period of 15-years from the date of substantial completion. The warranty shall cover all labor and materials needed to replace all floor covering that fails due to moisture vapor emission & moisture born contaminates.

C. Waterproof Sheet: Polyethylene, opaque-white, 0.006" (6 mil) thick, meeting the requirements of ASTM C171.

D. Sprayed Membrane:

1. Sprayed membrane may be employed upon written approval of Architect. Material used must be guaranteed not to prevent bond between concrete and flooring adhesives and be compatible with proposed flooring material. Manufacturer of approved curing treatment shall be required to bond the application and performance of their product.

2.9 JOINT MATERIALS:

A. Sealed Joints:

1. Filler: Non-bituminous rubber or cork conforming to ASTM D1752.

2. Seal: Neoprene conforming to ASTM D2628-Acme Highway Products, Amherst, NY

3. Seal Adhesive: "Prime-Lube" Acme Highway Products, Amherst, NY, 716.691-3001.

B. Non-sealed Joints:

1. Filler: Pre-molded bituminous type conforming to ASTM D1751.

2. Products:

a. "Flexcel" or "Elastite" Celotex Corporation, Tampa, FL, 813 871-4499.

b. "Seal Tight Fiber Expansion Joint" W.R.Meadows, Inc, Elgin, IL 312 683-4500.

C. Non-compressive Filler:
1. Provide one inch thick or two inch thick sheets as indicated on Drawings.
2. Products:
a. "Styrofoam SM" Dow Chemical USA, Midland, MI, (800) 258-2436.
b. "Foamular" U.C. Industries, Inc., Parsippanny, NJ, (800) 221-7888.

D. Compressive Filler:
1. Provide 1" thick or two thick sheets as indicated on Drawings.
2. Compression modulus within range of 15 to 25 pounds per square inch.
3. Type 1, Class A, with Class II flame spread rating.
4. Products:
a. "Ethafoam No. 4101" Dow Chemical USA, Midland, MI, (800) 258-2436.
b. "Rodofoam No. 423" Electrovert, USA Corp., Elmsford, NY, (914) 592-7322.

E. Filler Adhesive:
1. General Purpose Mastic No. II Down Chemical USA, Midland, MI, (800) 258-2436.
2. Rodofast - Electrovert USA Corp., Elmsford, NY, (914) 592-7322.

2.10 REGLETS:

A. Dayton Superior Corp., Miamisburg, OH, (800) 252-3680.

B. Fry Reglet Corporation, Norcross, GA, (404) 441-2337.

B. Hohmann and Barnard, Inc., Hauppauge, NY, (516) 234-0600.

2.11 NON-SHRINK GROUT:

A. Pre-mixed non-metallic formula having the following characteristics:
1. No shrinkage after placement or expansion after set by ASTM C827.
2. 3-day compressive strength of 3000psi minimum by ASTM C109 and 5000psi at 28 days.
3. Initial set time of not less than 45 minutes by ASTM C191.
4. Grout shall conform to ASTM C1107.
5. Furnish test data from independent laboratory indicating that grout when placed at a fluid consistency shall achieve 95% bearing under a 4 foot by 4 foot base plate.
6. Where high fluidity or increased placing time is required, furnish test data from an independent laboratory indicating that the grout when placed at a fluid consistency shall achieve 95% under an 18 inch by 36 inch base plate.

B. Products:
1. Non-Ferrous, Non-Shrink Burke Company, San Mateo, CA, 415.349-7600.
2. Crystex L&M Construction Chemicals, Inc., Omaha, NE, 800.362-3331.
3. Five Star Grout FiveStar Products Inc, Shelton, CT, 800-243-2206.
4. Multi-Purpose #262 Bostik Const. Prod./Upco, Huntington, PA, 800.221-8726.

C. Curing Compound for Grout:
1. Polyclear Bostik Const. Prod./Upco, Huntington, PA, 800. 221-8726.
2. Spartan Cote/Cure-Seal Burke Company, San Mateo, CA, 415.349-7600.

2.12 EPOXY MORTAR:

A. Primer: Neat epoxy resin.

B. Mortar Patch Material: One part epoxy resin and three parts aggregate by volume.

C. Products:

1. Flexocrete Dural International, Deer Park, NY, 516.586-1655, or as approved by Architect.
2. Euco Poly Patch Euclid Chemical Co., Cleveland, OH, 216.531-9222.
3. Epopatch L&M Construction Chemicals, Inc., Omaha, NE, 402.453-6608.
4. "Sonopatch" Sonneborn Building Products, Minneapolis, MN, 612. 835-3434.

2.13 EVAPORATION CONTROL:

A. Monomolecular film-forming compound applied to exposed concrete slab surfaces for temporary protection from rapid moisture loss.

2.14 BONDING AGENT:

A. For patching and surfacing hardened concrete and where approved in writing by the Architect.

1. Sikadur 32 Hi-Mod (Sika Corp)
2. Epobond (L&M Construction Chemicals)
4. Euco-Epoxy 460 (Euclid)

2.15 PATCHING AND SURFACING COMPOUND:

1. SikaTop 122 (Sika Corp)
2. Duratop (L&M Construction Chemicals)

2.16 NON SLIP ABRASIVE:

1. Grip-It AO (L&M Construction Chemicals)
2. Frictex N.S. (Sonneborn)
5. Non Slip (Euclid)

2.17 SLEEVES:

1. ASTM A120, hot-dipped galvanized.

2.18 FIBER REINFORCING:

A. Use fiber reinforcing only where indicated on the Construction Documents.

B. Synthetic Fibers: Monofilament or fibrillated polypropylene fibers for secondary reinforcing of concrete members. Use appropriate length and 1.5 pounds per cubic yard unless indicated otherwise. Product shall have a UL rating.

C. Steel Fibers: ASTM A820, Type I cold drawn, high tensile steel wire for use as primary reinforcing in slab-on-grade. Minimum dosage rate of 30 pounds per cubic yard unless indicated otherwise.

2.19 MIXING:

A. The concrete mixing, measuring and delivery equipment shall be certified by the National Ready Mixed Concrete Association. The methods shall be subject to Architect's review and in accordance with ACI614. Chlorides shall not be added to the mix.

B. Ready mixed concrete shall conform to ASTM C94 except as specified.

C. Obtain duplicate delivery tickets from the ready mixed concrete producer with each load of concrete delivered to the job site. Retain one copy and submit one to the Architect.

1. Deliver tickets shall provide the following information:

a. DATE
b. NAME OF READY MIX CONCRETE PLANT
c. CONTRACTOR
d. JOB LOCATION
e. TYPE (STANDARD OR H.E.S.) AND BRAND OF CEMENT
f. CEMENT CONTENT IN BAGS PER CUBIC YARD CONCRETE
g. TRUCK NUMBER
h. TIME DISPATCHED AND TIME UNLOADED
i. AMOUNT OF CONCRETE IN LOAD IN CUBIC YARDS
j. ADMIXTURES IN CONCRETE
k. TYPE AND MAXIMUM SIZE OF AGGREGATE
l. WATER ADDED AT SITE.

D. Maximum delivery temperature of concrete is 100 degrees F. Minimum delivery temperature shall be as follows:

ATMOSPHERIC TEMPERATURE	MINIMUM CONCRETE TEMPERATURE
30 DEGREES to 40 DEGREES F.	60 DEGREES F.
0 DEGREES to 30 DEGREES F.	70 DEGREES F.

2.20 DELIVERY:

A. Concrete slabs placed at air temperatures below 50 degrees F shall use non-corrosive, non-chloride Accelerator. Concrete required to be air entrained shall use approved air entraining admixture. Pumped concrete, synthetic fiber concrete, architectural concrete, concrete required to be watertight, And concrete with a water/cement ratio below 0.50 shall use a high-range-water-reducing admixture.

PART 3 – EXECUTION

3.01 EXAMINATION:

A. Examine areas in which work is to be performed. Report in writing to Architect all prevailing conditions that will adversely affect satisfactory execution of work. Do not proceed with work until unsatisfactory conditions have been corrected.

B. Starting work constitutes acceptance of the existing conditions and this Contractor shall then, at his expense, be responsible for correcting all unsatisfactory and defective work encountered.

3.02. VAPOR BARRIER:

A. INSTALLATION:

1. Install under-slab vapor barrier in accordance with manufacturer's written instructions and ASTM E 1643-98 (2005).
   a. Unroll vapor barrier with the longest dimension parallel with the direction of the concrete pour.
   b. Lap vapor barrier over footings and/or seal to foundation walls.
   c. Overlap joints minimum of 6" and seal with manufacturer's tape.
   d. Seal all penetrations (including pipes) per manufacturer's instructions.
   e. No penetration of the vapor barrier is allowed except for reinforcing steel and permanent utilities.
   f. Repair damaged areas by cutting patches of vapor barrier, overlapping damaged area minimum of 6" and taping all four sides with tape.

3.03 MOISTURE VAPOR EMISSIONS & ALKALINITY CONTROL SEALER:

A. Sealer is applied on the day of the concrete pour or as soon as harsh weather permits, prior to any other chemical treatment for concrete slabs either on grade, below grade or above grade receiving resilient flooring, such as, sheet vinyl, vinyl planking, vinyl composite tile, wood flooring, carpet, epoxy coatings and other overlays.
   1. Apply sealer to concrete slabs as soon as final finishing operations are completed and the concrete has hardened sufficiently to sustain floor traffic without damage.
   2. Spray apply sealer at a rate of 200 square feet per gallon. Lightly broom product evenly over
      the substrate and product has completely penetrated the surface.
   3. If within 2-hours after initial application areas are subjected to heavy rainfall and puddling occurs, reapply sealer product to these areas as soon as weather conditions permits.

3.03 JOINTS:

A. Expansion Joints:
   1. Expansion joints in the superstructure shall be located as shown on the Drawings.
   2. Inspect joints, which are to receive work of this section. Notify the Architect of conditions, which may prevent satisfactory installation, or performance of seal. Commencement of work on any joint will be considered acceptance of condition of said joint.
   3. Joints to receive seal shall be thoroughly cleaned of mortar or any other foreign materials in an approved manner before any seal is applied. Concrete shall be fully cured, free of release agents, curing compounds, loose aggregate or other surface treatments. Test for adhesion before proceeding with seal installation if any surface treatments are present.
   4. Joint spaces and surfaces shall be thoroughly dry before installation of seal adhesive. Unless approved means of drying joint is employed, do not install seal when temperature is below 40^{o}F, or during and after rain and fog.
   5. Filler material used for forming the joint under the seal shall be adequately held in place between the adjacent concrete surfaces so that after removal of forms and after subsequent joint movement, filler will remain in place without falling out of joint.

B. Preformed Joints: Where exterior concrete grade slabs abut the building and at other locations as shown on the Drawings, preformed joints shall be formed with filler which shall extend the full thickness of the slab.

C. Compressible and Non-compressible Filler: Filler shall be applied to surfaces as detailed and shown on the Drawings or as specified. Adhesive shall be applied in strict accordance with manufacturer's recommendations. Adequate curing time shall be allowed for the adhesive prior to placing concrete against the filler surface.

D. Construction and Control Joints:

1. Construction joints and/or control joints in walls and floors shall be made as specified or as approved by the Architect. Locate and install construction joints so they do not impair strength or appearance of the structure, as acceptable to Architect. The Contractor shall submit his proposed joint and casting schedule for walls, beams, columns, and slabs for review by the Architect.
2. Bulkheads, to limit each pour of the pre-determined construction joints, shall be set normal and vertical to the section to be poured, and shall be left in place until concrete has sufficiently set. Care shall be used when removing bulkheads to prevent spalling of the concrete surface. Any concrete passing bulkhead shall be removed before adjacent pour is commenced.
3. Walls between vertical construction joints shall be brought up to full height in one continuous operation.
4. Provide keyways at least 1-1/2" deep in construction joints in walls and slabs and between walls and footings. Bulkheads designed and accepted for this purpose may be used for slabs.
5. Place construction joints perpendicular to main reinforcement. Continue reinforcement across construction joints except as indicated other wise. Do not continue reinforcement through sides of strip placements.
6. Use bonding agent on existing concrete surfaces that will be joined with fresh concrete.
7. Vertical construction joints in walls and grade beams shall be placed not over 50' apart to minimize the effect of early shrinkage of the concrete. At least 72 hours shall elapse before continuation of pours.
8. Joints not indicated on the Drawings shall be formed and located so as not to significantly impair the strength of the structure. Where a joint is to be formed, the surface of the concrete shall be thoroughly cleaned and all latency removed. In addition to the foregoing, vertical joints shall be thoroughly wetted and sloshed with a coat of wet cement grout immediately before placing of new concrete.
9. Vertical construction joints using approved bulkheads may be made at center of beam and slab spans where a stop in concrete work is necessary.
10. No horizontal construction joints are to be made in slabs, beams or walls except as shown on Drawings and sections.

3.04. EMBEDDED ITEMS:

A. Before placing concrete, all items to be embedded in the concrete by this Contractor, such as sleeves, box outs, inserts, anchors, hangers, metal nosings, bolts, slots, and fastening devices shall be firmly and securely fastened in place to formwork and reinforcing as required.

B. Embedded items and/or penetrations, except for items normally installed by sub-trades such as plumbers, electricians, fire protection, mechanical, or others, shall be furnished by the respective trades and installed by this Contractor.

C. All embedded items shall be located so as not to reduce the strength of the construction. They shall be thoroughly clean and free from coating, rust, scale, oil and any other foreign matter. No wood shall be permanently embedded in concrete.

D. Sufficient time between erection of forms and placing of concrete shall be given to the various trades to permit the proper installation of their work. See Drawings and other sections of the specifications for extent, location and details of items to be embedded or placed in concrete.

E. Embedments such as plumbing and sprinkler sleeves, chases, mechanical duct openings, electrical sleeves and conduits, inserts, hangers for mechanical, plumbing and electrical trades which are furnished and installed by other trades shall be maintained in position and protected until the concreting is complete.

3.05 PLACING REINFORCEMENT:

A. See Specification Section 03 20 00 – 'Concrete Reinforcement' for placement information.

B. Provide minimum cover for reinforcement of cast in place concrete as specified on drawings.

3.06 PREPARATION OF FORM SURFACES:

A. See Specification Section 03 11 00 - 'Concrete Formwork' for requirements.

3.07 PLACEMENT OF WATERSTOPS:

A. See Specification Section 03 15 00 - Waterstops.

3.08 PREPARATIONS FOR PLACING CONCRETE:

A. Remove water from excavations. Before placement of concrete, remove wood chips, shavings, debris and hardened concrete from forms.

1. Clean all equipment.
2. Wet forms, except in freezing weather, or oil forms.

B. Earth shall be uniformly moist when concrete is placed. Sprinkling method shall not be such as to form mud or pools of water. Watering sub-grade immediately prior to placing concrete is not sufficient to make the soil uniformly moist.

C. Notify other crafts to permit installation of their work. Coordinate installation of joint materials and moisture barriers with placement of forms and reinforcing steel.

D. Provide runways for wheeling equipment to convey concrete to point of deposit. Keep equipment on runways which are not supported by or bear on reinforcement, Provide similar runways for protection of vapor barrier on coarse fill.

3.09. PLACING CONCRETE:

A. Before placing concrete, formwork shall have been completed; foreign material shall have been removed, reinforcement shall have been secured in place and the Inspector prior to placing concrete shall have approved the entire preparation. Inspector, testing company and Architect shall be notified at least 24 hours prior to desired time of inspection.

B. Before pouring footings and foundations, see that bottoms of excavations are undisturbed earth and engineered fill, free from frost, properly leveled off, and tamped. Wet wood forms prior to placing concrete. Footings shall be free of loose cuttings, groundwater, etc., prior to placement of concrete.

C. General: Comply with ACI 304, 'Guide for Measuring, Mixing Transporting, and Placing Concrete' and as specified.

D. Deposit concrete continuously or in layers of such thickness that no new concrete will be placed on concrete that has hardened sufficiently to cause seams or planes of weakness. If a section cannot be placed continuously, provide construction joints as specified. Deposit concrete as nearly as practicable to its final location to avoid segregation caused by re-handling or flowing. Avoid splashing of forms or reinforcement with concrete in advance of placing concrete.

E. Placing Concrete in Forms: Deposit concrete in forms in horizontal layers no deeper than 24" and in a manner to avoid inclined construction joints. Where placement consists of several layers, place each layer while preceding layer is still plastic to avoid cold joints.

1. Consolidate placed concrete by mechanical vibrating equipment supplemented by hand-spading, rodding, or tamping. Use equipment and procedures for consolidation of concrete complying with ACI 309.
2. Do not use vibrators to transport concrete inside forms. Insert and withdraw vibrators vertically at uniformly spaced locations no father than the visible effectiveness of the machine. Place vibrators to rapidly penetrate placed layer and at least 6" into preceding layer. Do not insert vibrators into lower layers of concrete that have begun to set. At each insertion, limit duration of vibration to time necessary to consolidate concrete and complete embedment of reinforcement and other embedded items without causing mix to segregate.
3. Discharge contents of tremies or flexible spouts in horizontal layers not exceeding 20 inches in thickness and space tremies such as to provide a minimum of lateral movement of concrete.
4. Continuously place concrete until an entire unit between construction joints is placed. Rate and method of placing concrete shall be such that no concrete between construction joints will be deposited upon or against partly set concrete, after it's initial set has taken place, or after 45 minutes of elapsed time during concrete placement.
5. On bottom of members with severe congestion of reinforcement, deposit 1 inch layer of flowing concrete containing the specified high-range-water-reducing admixture. Successive concrete lifts may be a continuation of this concrete or concrete with a conventional slump.
6. Concrete on metal deck shall be minimum thickness shown. Allow for deflection of steel beams and metal deck under the weight of wet concrete in calculating concrete quantities slab. The contractor shall become familiar with deflection characteristics of structural frame to include proper amount of additional concrete due to beam/deck deflection.

E. Cold-Weather Placement: Protect concrete work from physical damage or reduced strength, which could be caused by frost, freezing actions, or low temperatures; comply with ACI 306 and these specifications.
1. Mix and place concrete only when temperature is at least 40˚F and rising, unless permission to pour is obtained from Architect.
2. Do not use frozen materials or materials containing ice or snow. Do not place concrete on frozen sub-grade or on sub-grade containing frozen materials.
3. Do not use calcium chloride, salt and other materials containing antifreeze agents or chemical accelerators.
4. When approval is obtained to place concrete at or below an atmospheric temperature of 40˚F, heat water or aggregates, or both. Provide suitable enclosures and heating devices.
5. Record temperature of concrete for each truck as delivered and after placement in forms.
6. Provide heating equipment or methods capable of heating water and aggregates uniformly
7. Heat materials to temperature not greater than 150˚F.
8. After concrete placement, provide suitable measures to maintain concrete surface temperature at 40˚F or above for a period not less than 14 days.

F. Hot Weather Placement: When hot weather conditions exist that would impair quality and strength of concrete, place concrete complying with ACI 305 and as specified.
1. Cool ingredients before mixing to maintain concrete temperature at time of placement to below 90ºF. Mixing water may be chilled or chopped ice may be used to control temperature, provided water equivalent of ice is calculated to total amount of mixing water. Using liquid nitrogen to cool concrete is Contractor's option.

2. Cover reinforcing steel with water soaked burlap if it becomes too hot, so that steel temperature will not exceed the ambient air temperature immediately before embedding in concrete.
3. Fog spray forms, reinforcing steel, and subgrade just before placing concrete. Keep subgrade moisture uniform without puddles or dry areas.
4. Use water reducing retarding admixture when required by high temperatures, low humidity, or other adverse placing conditions, as acceptable to Architect.
5. When necessary to prevent excessive moisture loss, provision for windbreaks, shading, sprinkling, ponding, or wet covering with a light colored material shall be made in advance of placement, and such protection measures shall be taken as quickly as concrete hardening and finishing operations will allow.

H. Pumping Equipment: All oil or other rust inhibitors shall be removed from the pressure pumps. The equipment shall be of adequate size and design to ensure a continuous flow of concrete without any separation of materials. The use of aluminum pipe for conveying concrete is strictly prohibited.

I. Provide adequate runways, chutes and other means of conveying concrete into place without causing segregation or loss of ingredients. Do not drop concrete freely more than 10-feet for concrete containing high-range-water-reducing admixtures or 5-feet for conventional concrete. Where greater drops are required, use a tremie or flexible spout attached to a suitable hopper.

J. Place concrete immediately after mixing and in no case more than 90 minutes after water has been added. Minimum mixing shall be revolutions at mixing speed. Deposit in uniform, horizontal layers, not more than 24" deep: work around all reinforcing and in corners of forms. Properly spade and puddle by the use of rods, shovels and hand spades and agitate by means of internal or external vibrators to obtain the densest concrete without over vibrating to the point where separation results. Deposit concrete continuously until the completion of each section or unit.

K. Size of concrete placement shall not exceed 1,000 SqFt for any slab on grade. Provide keyed construction joints and lap mesh. Roughen and clean construction joints and moisten just prior to placing additional concrete. Place slabs in a checkerboard pattern with 24-hour intervals between placements.

L. Isolation Joints in Slabs-On-Grade: Construct isolation joints in slabs-on-grade at points of contact between slabs-on- grade and vertical surfaces, such as column pedestals, foundation walls, grade beams, and other locations, as indicated.
   1. Joint fillers and sealants are specified in Section 2.08 'Protection'.

M. Platforms: Where shown, construct platforms at entrances of size indicated, except that subgrade shall be 5" of sand or pit run gravel thoroughly tamped. Saw cut joints.

N. Foundation Pads: Construct 6" high, unless shown otherwise, pads for all electrical and mechanical equipment of size indicated on Drawings, or as determined by equipment to be located on pad. Verify sizes with appropriate subcontractors.

O. Grout Plates and Anchor Bolts: Accurately set all grout plates and anchor bolts other than those on masonry walls. Grout plates and anchor bolts are specified in Section 05 12 00. Use nonshrinking cement grout. Anchor bolt and foundation tolerances shall be as follows:
   1. Elevation of concrete surfaces - 3/8"
   2. Elevator of top of anchor bolts - 1" to -3/8"
   3. Out of position anchor bolts - 1/8"

P. Concrete Topping (Floor Fill): Shall be 2' or 2-1/2" as indicated course slab (deferred placement, not heavy duty). Maximum aggregate size shall be 3/8". Bonding agents other than cement grout shall not be used. Finish and tolerance shall be as specified herein. Care shall be taken to maintain welded wire fabric in center of fill.

3.10 CURING AND PROTECTION:

A. No construction loads exceeding the structural design live loads shall be supported upon any un-shored portion of the structure under construction. No construction load shall be supported upon, nor any shoring removed from any part of the structure under construction until that portion of the structure has attained sufficient strength to support safely its weight and the loads placed thereon without noticeable deflection.

1. The use of salts, chemicals or other foreign materials in the mix to lower the freezing point of concrete is prohibited.
2. Hot and Cold Weather: During hot or cold weather or when directed by the Architect, concrete shall be sprayed, covered protected and otherwise cured according to the ACI recommended best standard practices and local regulations.

B. Provide moisture curing by the following methods:

1. Keep concrete surface continuously wet by covering with water.
2. Use continuous water-fog spray.
3. Cover concrete surface with specified absorptive cover, thoroughly saturate cover with water, and keep continuously wet. Place absorptive cover to provide coverage of concrete surfaces and edges, with a 4" lap over adjacent absorptive covers.

C. Provide moisture retaining cover curing as follows:

1. Cover concrete surfaces with moisture retaining cover for curing concrete, placed in widest practicable width with sides and ends lapped at least 3" and sealed by waterproof tape or adhesive. Immediately repair any holes or tears during curing period using cover material and waterproof tape.

D. Curing:

1. All freshly deposited concrete shall be protected from premature drying, from excessively hot or cold temperature and mechanical injury according to provisions of ACI 301, Chapter 12. During placing, all concrete flatwork exposed to or subject to rapid evaporation of moisture under drying conditions (including hot weather, low humidity, wind and/or sunlight) shall be protected immediately following screeding with evaporation retarder applied in accordance with the recommendations of manufacturer. Application shall precede and shall be in addition to specified curing.
2. All concrete shall be maintained in a continuously moist condition for at least 7 days after placement. Curing shall begin as soon as possible after concrete has been placed and finished. Materials and methods of curing shall be submitted to Architect for review.
3. Curing and protection for surfaces not in contact with forms and surfaces in contact with forms for less than seven days.
    a. Curing shall be by water curing, application of liquid membrane curing/sealing compound of by application of curing sheet materials. Curing compounds shall be applied in accordance with manufacturer's recommendations. Liquid membrane curing compound used on floor slabs receiving applied finish flooring shall be guaranteed by the manufacturer, in writing, not to impair bonding of adhesive.
    b. For slabs use a curing treatment of water curing, curing sheet materials, or by applying and removing curing/sealing compound. The curing compounds must be applied immediately after final finishing. For curing by water curing or curing sheet materials, the concrete must be continually moist-cured for at least 7 days. Curing shall begin immediately after finishing.
    c. For other surfaces (footings, walls, etc.) curing shall be by one of the accepted treatments listed above.
    d. Restore curing protection on all freshly cut joint edges and faces when sawing joints or removing forms.

4. Concrete placed under cold weather conditions shall be cured by completely covering exposed surfaces of concrete with curing sheet material with sheeting completely sealed around edges. All concrete shall be cured for a minimum of 14 days with temperatures at or above 40 degrees F of for a minimum of 7 days with temperatures at or above 70°F.

E. All freshly placed concrete shall be adequately protected from damage or injury due to water, falling objects, persons, or anything that may mar or injure the finish surface of the concrete. Any surfaces that are damaged due to lack of protective measures shall be removed and replaced with fresh concrete at the expense of the Contractor. Fresh concrete placed in the vicinity of public traffic shall be adequately protected with barriers, lights and any other protective measures necessary.

3.11 TOLERANCES:

A. The limits and tolerances in the following table represent a maximum acceptable deviation from perfectly true and accurate concrete work, for individual cases. True and accurate work is expected in every instance, and this table is designed for the purpose of setting forth limits and tolerances governing maximum, rather than an index of acceptability.

1. VARIATIONS FROM THE PLUMB.
   a. IN THE LINES & SURFACES OF PIERS, WALLS AND IN ARISES IN ANY 10' OF LENGTH 1/4"

      MAXIMUM FOR ENTIRE LENGTH 1"

   b. FOR EXPOSED CORNER COLUMNS, CONTROL-JOINT GROOVES AND OTHER CONSPICUOUS LINES IN ANY 20' OF LENGTH 1/4"

      MAXIMUM FOR ENTIRE LENGTH 1/2"

2. VARIATION FROM THE LEVEL OR FROM THE GRADES INDICATED ON THE DRAWINGS.
   a) IN SLAB SOFFITS, CEILINGS, BEAM SOFFITS AND IN ARISES IN ANY 10' OF LENGTH 1/4"

      IN ANY BAY OR IN ANY 20' OF LENGTH 3/8"

      MAXIMUM FOR ENTIRE LENGTH 3/4"

3. FLATNESS OF CONCRET SUPPORTING PREFABRICATED COLD FORMED PANELS
   a) SPECIFIED OVERALL FLATNESS (SOFf) PER ASTM E1155 AND ACI 302.1 35

4. IN EXPOSED LINTELS, SILLS, PARAPETS, HORIZONTAL GROOVES AND OTHER CONSPICUOUS LINES

   IN ANY BAY OR IN ANY 20' OF LENGTH 1/4"

   MAXIMUM FOR ENTIRE LENGTH 1/2"

5. VARIATIONS OF DISTANCE BETWEEN WALLS, COLUMNS, PARTITIONS AND BEAMS.
   a) 1/4" PER 10' OF DISTANCE BUT NOT MORE THAN 1/2" IN ANY ONE BAY AND NOT MORE THAN 1" TOTAL VARIATION

6. VARIATION OF LINEAR BUILDING LINES FROM ESTABLISHED POSITION IN PLAN 1"

7. VARIATION IN THE SIZES AND LOCATIONS OF SLEEVES FLOOR OPENINGS AND WALL OPENINGS.

   MINUS 1/4"

   PLUS 1/2"

8. VARIATION IN CROSS-SECTIONAL DIMENSIONS OF COLUMNS AND BEAMS AND IN THE THICKNESS OF SLABS AND WALLS

MINUS	1/4"
PLUS	1/2"

9. FOOTINGS VARIATION IN DIMENSIONS IN PLAN

MINUS	1/2"
PLUS	2"

10. WHEN FORMED OR PLUS 3" WHEN PLACED AGAINST UNFORMED EXCAVATION MISPLACEMENT OR ECCENTRICITY 2% OF THE FOOTING WIDTH IN THE DIRECTION OF MISPLACEMENT BUT NOT MORE THAN 2" REDUCTIONS IN THICKNESS MINUS 5% OF SPECIFIED THICKNESS
11. VARIATION IN STEPS

a) IN A FLIGHT OF STAIRS

RISE:	1/8"
TREAD:	1/4"

b) IN CONSECUTIVE STEPS

RISE:	1/16"
TREAD:	1/8"

3.12 CONCRETE FINISHING:

A. Surfaces other than horizontal slabs:

1. Patching: Within 12 hours after forms are removed correct surface defects as follows:
   a. Fins and loose material, honeycomb, aggregate pockets, voids over 1/4" in diameter and holes left by the rods or bolts shall be cut out to solid concrete thoroughly wetted, brush-coat with neat cement grout and filled with mortar.
   b. Patch work shall finish flush and in the same plane as adjacent surfaces. Exposed patch work shall be finished to match the adjoining surfaces in texture color.
   c. Damp cure patches for 72 hours. Protruding portions of bar supports shall be ground flush with concrete surfaces that will be exposed.
   d. Apply bonding agent where patching occurs.

B. Unspecified Non-Slab Finish:

1. Rough Form Finish: For all concrete surfaces not exposed to view.
2. Smooth Form Finish: For all concrete surfaces exposed to view. Surfaces shall be considered exposed even though coating type finish will be applied.

C. Surfaces of Horizontal Slabs:

1. Finished slab surfaces shall be true plane surfaces with no deviation in excess of 1/8" when tested with a 10’ straightedge, non-accumulative, and with no coarse aggregate showing.
2. Particular attention should be paid to concrete work receiving other coatings. Fins and joints shall be ground smooth and holes patched.
3. Slab Finishes: As per ACI" 301, Para 11.7 and as follows:
   a. Scratched Finish: On slabs which are to receive a bonded cementitious topping. Do not use curing compounds on these surfaces.
   b. Float Finish: On walks, unless other finishes have been indicated or specified.

c. Machine Float Finish: On slabs, which are to receive fluid membrane waterproofing and rigid insulation. Bevel outside corners of slabs where membrane waterproofing extends down side of slab.

d. Trowel Finish: On interior slabs and stairs exposed in the finished work, and where interior floors and stairs are to receive adhesive applied flooring such as resilient tile and carpet.

e. Broom or Belt Finish: On stair treads with nosings and on level walks and color-conditioned areas. Broom in direction perpendicular to travel and approved sample panel. Submit joint pattern layout prior to starting work.

D. Use of Epoxy Binder:

1. The two components of the binder shall be mixed and cured in accordance with the manufacturer's printed instructions. The Contractor shall estimate the time required to complete a patch or patches and mix the volume of materials needed. Mix only the number of containers of material that can be placed before the expiration of the pot life.

2. Mixing of the binder shall be done with a special paddle, designed for the purpose and driven by a low-speed electric drill (500 to 600rpm) or other approved mixing equipment. Mixing of the components shall be continued for not less than three minutes and until the mixed material contains no streaks or lumps. Special care shall be taken to scrape the sides and bottom of the containers while mixing.

3. To the properly prepared and primed surfaces, and while the primer is still wet or tacky, apply the epoxy mortar with a steel dowel. During the application, it may be desirable to wipe down the trowels with a rag and toluene. This will act as a trowel lubricant, making trowelling easier and provide a smoother and more uniform finished surface. Do not add toluene or any other type of solvent to the mixed epoxy.

3.13. FIELD QUALITY CONTROL:

A. Ready-Mix Concrete:

1. Delivery tickets are to accompany each concrete truck and shall be kept in the job superintendent's file. Delivery tickets must indicate the following information or be subject to rejection:

NAME OF PROJECT	DATE OF DELIVERY
MIX DESIGN NUMBER	BRAND OF CEMENT
SUPPLIER OF CEMENT	CEMENT CONTENT
TRUCK IDENTITY & TICKET SERIAL NUMBER	STRENGTH CLASSIFICATION
BATCHING TIME	ADMIXTURE CONTENT
POINT OF DEPOSIT	NAME OF CONTRACTOR
TOTAL AMOUNT OF WATER	NAME OF DRIVER
WEIGHT OF AGGREGATE	TIME LOADED & FIRST MIXING, TIME UNLOADED
DAILY TEMPERATURE OF CONCRETE	READING OF REVOLUTION COUNTER
TYPE AND MAXIMUM SIZE OF AGGREGATE	
NUMBER OF CUBIC YARDS IN LOAD	

B. Testing:

1. Samples of concrete and grout will be taken in accordance with ASTM C172 during the progress of the work for determination of slump, air content, compression strength, and fresh unit weight. Samples shall be taken by the Independent Testing Laboratory with assistance furnished by the Contractor. The Contractor may perform his own testing. Indicate on the test reports if water is added to concrete by anyone. Concrete and grout for slump tests and

cylinders shall be taken from the end of the hose for pumped concrete.

2. See Specification Section 01 33 19 – 'Inspections and Testing ' for specific testing requirements.
3. The Contractor is responsible for obtaining the specified strength of concrete and for proper placing of concrete and reinforcing steel. Concrete or steel improperly placed or testing below specified strength shall be replaced without additional expense to Owner.
4. The use of testing services shall not relieve the Contractor of his responsibility to furnish materials and construction in full compliance with the contract documents.
5. Contractor shall cooperate with the Testing Laboratory.
6. Testing Laboratory shall provide stable, temperature controlled insulated storage of cylinders in the first 24 hours after molding as required by ASTM C31.

C. Test Evaluation:

1. Concrete cylinder tests will be evaluated by the Structural Engineer in accordance with ACI 318 and ACI 214.
2. In the event that 28-day test results indicate that concrete strength is not as specified, the concrete shall be cored as directed by the Structural Engineer. Core holes shall be plugged solid as specified under "Patching" of these specifications.
3. In the event that such additional coring tests do not show the strength required or as determined by load tests made in accordance with ACI 318, and if such tests indicate the necessity, the defective parts shall be removed and replaced, or shall be reinforced as directed by the Structural Engineer.
4. If core test results fall below the design strength specified, changes shall be made in the design mixture for future batches at no additional cost to the Owner.
5. The expense of any and all re-inspection, retesting, redesign and/or replacement of the work that is required due to failure of concrete to meet all contract document requirements, as determined by the Architect or Structural Engineer, shall be borne by the Contractor.

3.14. REMOVAL OF FORMS:

A. Remove in a manner to assure complete safety of structure after the following conditions have been met.

1. Where structure as a whole is supported on shores, forms for beams and girder sides, columns, and similar vertical structural members may be removed after 24 hours, provided concrete has hardened sufficiently to prevent surface damage and curing is continued without any lapse in time as specified for exposed surfaces.
2. Take particular care in removing forms of architectural exposed concrete to ensure surfaces are not marred or gouged, and that corners and arises are true, sharp and unbroken.

B. Control Test: Use to determine if the concrete has attained sufficient strength and curing to permit removal of supporting forms. Cylinders required for control tests taken in accordance with ASTM C172, molded in accordance with ASTM C31, and tested in accordance with ASTM C39. Control cylinders cured and protected in the same manner as the structure they represent. Supporting forms or shoring not removed until strength of control test cylinders have attained at least 70 percent of minimum 28-day compressive strength specified. For post-tensioned systems supporting forms and shoring not removed until stressing is completed. Exercise care to assure that newly unsupported portions of structure are not subjected to heavy construction or material loading.

C. Reshoring: Reshoring is required if superimposed load plus dead load of the floor exceeds the capacity of the floor at the time of loading.

3.15. CONCRETE SURFACE REPAIRS:

A. Patching Defective Areas: Immediately after form removal, cut out honeycomb, rock pockets, voids over ¼" in any dimension, and holes left by the rods and bolts, down to solid concrete but, in no case to a depth of less than 1".

1. Cut edges perpendicular to concrete surface.
2. Thoroughly clean, dampen with water, and brush coat area to be patched with neat cement grout or proprietary bonding agent before placing cement mortar or proprietary patching compound.

B. Exposed To View Surfaces: Blend white Portland cement and standard Portland cement so that patching mortar will match surrounding color when dry.

1. Provide test areas at inconspicuous locations to verify mixture and color match before proceeding with patching.
2. Compact mortar in place and strike-off slightly higher than surrounding surface.

C. Repair of Formed Surfaces: Remove and replace concrete of defective surfaces if defects cannot be repaired to satisfaction of SDR.

1. Surface defects include color and texture irregularities, cracks, spalls, air bubbles, honeycomb, rock pockets, fins and other projections on surface, and stains and other discolorations that cannot be removed by cleaning.
2. Flush out form tie holes, fill with dry pack mortar, or precast cement cone plugs secured in place with bonding agent.
3. Where possible, repair concealed formed surfaces that contain defects that affect concrete durability. If defects cannot be repaired, remove and replace concrete.

D. Repair of Unformed Surfaces: Test unformed surfaces, such as monolithic slabs, for smoothness and verify surface plane to tolerances specified for each surface and finish. For unformed surfaces sloped to drain, use template having required slope to test for trueness.

1. Surface defects include crazing, cracks greater than 0.01" 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 finished unformed surfaces that contain defects, which affect concrete durability.
3. Correct high areas in unformed surfaces by grinding after concrete has cured at least 14-days.
4. 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. Finish to blend into adjacent concrete. Use only approved proprietary patching compounds.
5. Repair defective areas, with the exception of random cracks and single holes not exceeding l" diameter, by cutting out and replacing with fresh concrete.
    a. Remove defective areas to sound concrete with clean, square cuts and expose reinforcing steel with at least ¾" clearance all around.
    b. Dampen concrete surfaces in contact with patching concrete and brush with neat cement grout, or apply concrete bonding agent.
    c. Mix patching concrete of same materials to provide concrete of same type of class as original concrete.
    d. Place, compact and finish to blend with adjacent finished concrete. Cure in the same manner as adjacent concrete.

3.16. CONCRETE TRUCK DISCHARGE:

A. Excess Concrete: Discharge excess concrete in mixer trucks that cannot be immediately used to area where it will not create an obstruction or hazard during construction. Remove excess concrete from site in a timely manner.

B. Wash Water Discharge: Discharge wash water from mixer trucks to ground surface in manner and at location where discharge cannot escape construction site, or be washed away to storm sewers, or sanitary sewers by precipitation or other surface flows.

1. Prior to project completion, remove wash water residue from the site.
2. Clean wash water discharge site free of debris.

END OF SECTION 033000

SECTION 035400
CAST UNDERLAYMENTS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Sound attenuation. (Treadstone) (R2) (R2) (Elite) (Elite Duo) (M2) (M3) (P1) (Sound Mat Tape)

B. Sub floor preparation. (Treadstone) (TP1) (Technical Felt)

C. Gypsum underlayments. (Treadstone) (FR25) (FE30) (FR30P

D. Levelers (Treadstone) (Sitemix Leveler) (Sitemix SL) (Sitemix Ultra)

E. Components. (Elevation) (TTP) (BES) (Pan Sealant) (FT Tape)

F. Sheet waterproofing membrane products. (Elevation) (S60) (SM2) (S40)

G. Seamless waterproofing membrane products (Elevation) (L1) (L-Flash) (L1 Caulk)

H. Accessories. (Elevation) (DM1) (SP1) (T-Bar) (RSE)

I. Floor prep. (Hydrophase) (APS) (APMB)

J. Levelers (Hydrophase) (P150 SL) (C150 SL)

1.02 RELATED SECTIONS

A. Section 03 30 00 - Cast-in-Place Concrete.

B. Section 06 11 16 - Mechanically Graded Lumber.

C. Section 07 27 19 - Plastic Sheet Air Barriers .

D. Section 09 30 00 - Tiling.

E. Section 09 60 00 - Flooring.

1.03 REFERENCES

A. ASTM International (ASTM):

1. ASTM C109 - Standard Test Method for Compressive Strength of Hydraulic Cement Mortars (Using 2-in. or [50-mm] Cube Specimens).
2. ASTM C309 - Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete.
3. ASTM C661 - Standard Test Method for Indentation Hardness of Elastomeric-Type Sealants by Means of a Durometer.
4. ASTM C836 - Standard Specification for High Solids Content, Cold Liquid-Applied Elastomeric Waterproofing Membrane for Use with Separate Wearing Course.
5. ASTM C920 - Standard Specification for Elastomeric Joint Sealants.
6. ASTM C1315 - Standard Specification for Liquid Membrane-Forming Compounds Having Special Properties for Curing and Sealing Concrete.
7. ASTM C1708 - Standard Test Methods for Self-leveling Mortars Containing Hydraulic Cements.
8. ASTM E96 - Standard Test Methods for Gravimetric Determination of Water Vapor Transmission Rate of Materials.
9. ASTM D56 - Standard Test Method for Flash Point by Tag Closed Cup Tester.
10. ASTM D412 - Standard Test Methods for Vulcanized Rubber and Thermoplastic Elastomers - Tension.
11. ASTM D570 - Standard Test Method for Water Absorption of Plastics.
12. ASTM D624 - Standard Test Method for Tear Strength of Conventional Vulcanized Rubber and Thermoplastic Elastomers.
13. ASTM D751 - Standard Test Methods for Coated Fabrics.
14. ASTM D903 - Standard Test Method for Peel or Stripping Strength of Adhesive Bonds.
15. ASTM D1002 - Standard Test Method for Apparent Shear Strength of Single-Lap-Joint Adhesively Bonded Metal Specimens by Tension Loading (Metal-to-Metal).

16. ASTM D1621 - Standard Test Method for Compressive Properties of Rigid Cellular Plastics.
17. ASTM D1644 - Standard Test Methods for Nonvolatile Content of Varnishes.
18. ASTM D1970 - Standard Specification for Self-Adhering Polymer Modified Bituminous Sheet Materials Used as Steep Roofing Underlayment for Ice Dam Protection.
19. ASTM D2196 - Standard Test Methods for Rheological Properties of Non-Newtonian Materials by Rotational Viscometer.
20. ASTM D2240 - Standard Test Method for Rubber PropertyDurometer Hardness.
21. ASTM D2369 - Standard Test Method for Volatile Content of Coatings.
22. ASTM D2697 - Standard Test Method for Volume Nonvolatile Matter in Clear or Pigmented Coatings.
23. ASTM D4491 - Standard Test Methods for Water Permeability of Geotextiles by Permittivity.
24. ASTM D4533 - Standard Test Method for Trapezoid Tearing Strength of Geotextiles.
25. ASTM D4751 - Standard Test Methods for Determining Apparent Opening Size of a Geotextile.
26. ASTM D4833 - Standard Test Method for Index Puncture Resistance of Geomembranes and Related Products.
27. ASTM D5199 - Standard Test Method for Measuring the Nominal Thickness of Geosynthetics.
28. ASTM D5261 - Standard Test Method for Measuring Mass per Unit Area of Geotextiles.
29. ASTM D5385 - Standard Test Method for Hydrostatic Pressure Resistance of Waterproofing Membranes.
30. ASTM E154 - Standard Test Methods for Water Vapor Retarders Used in Contact with Earth Under Concrete Slabs, on Walls, or as Ground Cover.
31. ASTM F710 - Standard Practice for Preparing Concrete Floors to Receive Resilient Flooring.
32. ASTM F1869 - Standard Test Method for Measuring Moisture Vapor Emission Rate of Concrete Subfloor Using Anhydrous Calcium Chloride.
33. ASTM F2170 - Standard Test Method for Determining Relative Humidity in Concrete Floor Slabs Using in situ Probes.
34. ASTM F3010 - Standard Practice for Two-Component Resin Based Membrane-Forming Moisture Mitigation Systems for Use Under Resilient Floor Coverings.
35. ASTM G154 - Standard Practice for Operating Fluorescent Ultraviolet (UV) Lamp Apparatus for Exposure of Nonmetallic Materials.

B. British Standards Institution (EN):
   1. EN 964 - Geotextiles and Geotextile-Related Products - Determination of Thickness at Specified Pressures Part 1: Single Layers.
   2. EN 965 - Geotextiles and Geotextile-Related Products - Determination of Mass per Unit Area
   3. EN 1849 - Flexible sheets for waterproofing - Determination of thickness and mass per unit area - Part 2: Plastics and rubber sheets for roof waterproofing.
   4. EN 29073 - Textiles; test method for nonwovens; part 1: determination of mass per unit area (ISO 9073-1:1989),

C. International Building Code (IBC):
   1. IBC 1607.8.1 - Loads on Handrails and Guards.

D. South Coast Air Quality Management District (SCAQMD):
   1. SCAQMD VOC Requirements.

E. U.S. General Services Administration (GSA):
   1. TT-S-00230-C - Sealing Compound: Elastomeric Type, Single Component (for Caulking, Sealing, and Glazing in Buildings and Other Structures.

F. Occupational Safety and Health Administration (OSHA):

1. OSHA 1910.23(e)(3)(v) - Spacing of the posts in between modular guardrail system sections.

G. Underwriters Laboratories (UL):

1.04 SUBMITTALS

A. Submit under provisions of Section 01 30 00 - Administrative Requirements.

B. Product Data:
1. Manufacturer's data sheets on each product to be used.
2. Preparation instructions and recommendations.
3. Storage and handling requirements and recommendations.
4. Typical installation methods.

C. Verification Samples: Two representative units of each type, size, pattern, and color.

D. Shop Drawings: Include details of materials, construction, and finish. Include relationship with adjacent construction.

1.05 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section with a minimum five years documented experience.

B. Installer Qualifications: Company specializing in performing Work of this section with minimum two years documented experience with projects of similar scope and complexity.

C. Source Limitations: Provide each type of product from a single manufacturing source to ensure uniformity.

D. Mock-Up: Construct a mock-up with actual materials in sufficient time for Architect's review and to not delay construction progress. Locate mock-up as acceptable to Architect and provide temporary foundations and support.
1. Intent of mock-up is to demonstrate quality of workmanship and visual appearance.
2. If mock-up is not acceptable, rebuild mock-up until satisfactory results are achieved.
3. Retain mock-up during construction as a standard for comparison with completed work.
4. Do not alter or remove mock-up until work is completed or removal is authorized.

1.06 PRE-INSTALLATION CONFERENCE

A. Convene a conference approximately two weeks before scheduled commencement of the Work. Attendees shall include Architect, Contractor and trades involved. Agenda shall include schedule, responsibilities, critical path items and approvals.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Store and handle in strict compliance with manufacturer's written instructions and recommendations.

B. Protect from damage due to weather, excessive temperature, and construction operations.

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 WARRANTY

A. Manufacturer's standard limited warranty unless indicated otherwise.

1.10 REFERENCE STANDARDS

A. ASTM C309 - Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete; 2011.

B. ASTM C472 - Standard Test Methods for Physical Testing of Gypsum, Gypsum Plasters and Gypsum Concrete; 1999 (Reapproved 2014).

C. ASTM C661 - Standard Test Method for Indentation Hardness of Elastomeric-Type Sealants by Means of a Durometer; 2015.

D. ASTM C920 - Standard Specification for Elastomeric Joint Sealants; 2018.

E. ASTM C1315 - Standard Specification for Liquid Membrane-Forming Compounds Having Special Properties for Curing and Sealing Concrete; 2011.

F. ASTM D56 - Standard Test Method for Flash Point by Tag Closed Cup Tester; 2021a.

G. ASTM D412 - Standard Test Methods for Vulcanized Rubber and Thermoplastic Elastomers--Tension; 2016.

H. ASTM D570 - Standard Test Method for Water Absorption of Plastics; 2022.

I. ASTM D624 - Standard Test Method for Tear Strength of Conventional Vulcanized Rubber and Thermoplastic Elastomers; 2000 (Reapproved 2020).

J. ASTM D751 - Standard Test Methods for Coated Fabrics; 2019.

K. ASTM D903 - Standard Test Method for Peel or Stripping Strength of Adhesive Bonds; 1998 (Reapproved 2017).

L. ASTM D1002 - Standard Test Method for Apparent Shear Strength of Single-Lap-Joint Adhesively Bonded Metal Specimens by Tension Loading (Metal-to-Metal); 2010 (Reapproved 2019).

M. ASTM D1621 - Standard Test Method for Compressive Properties Of Rigid Cellular Plastics; 2016.

N. ASTM D2240 - Standard Test Method for Rubber Property--Durometer Hardness; 2015e1.

O. ASTM D2369 - Standard Test Method for Volatile Content of Coatings; 2020.

P. ASTM D4751 - Standard Test Methods for Determining Apparent Opening Size of a Geotextile; 2021a.

Q. ASTM D5199 - Standard Test Method for Measuring the Nominal Thickness of Geosynthetics; 2012 (Reapproved 2019).

R. ASTM D5261 - Standard Test Method for Measuring Mass per Unit Area of Geotextiles; 2010 (Reapproved 2018).

S. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2018.

T. ASTM F710 - Standard Practice for Preparing Concrete Floors to Receive Resilient Flooring; 2017.

U. ASTM F1869 - Standard Test Method for Measuring Moisture Vapor Emission Rate of Concrete Subfloor Using Anhydrous Calcium Chloride; 2016a.

V. ASTM F2170 - Standard Test Method for Determining Relative Humidity in Concrete Floor Slabs Using in situ Probes; 2017.

W. ASTM F3010 - Standard Practice for Two-Component Resin Based Membrane-Forming Moisture Mitigation Systems for Use Under Resilient Floor Coverings; 2018.

X. ASTM G154 - Standard Practice for Operating Fluorescent Ultraviolet (UV) Lamp Apparatus for Exposure of Nonmetallic Materials; 2023.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Acceptable Manufacturer: Formulated Materials LLC, which is located at: 3010 N.W. 149th St. Suite 100; Oklahoma City, OK 73134; Tel: 844-405-3676; Email: request info (Info@formulatedmaterials.co); Web: https://formulatedmaterials.com

B. Substitutions: Not permitted.

C. Requests for substitutions will be considered in accordance with provisions of Section 01 60 00 - Product Requirements.

2.02 SOUND ATTENUATION (TREADSTONE)

A. Product: Treadstone R1 Sound Attenuating Mat as manufactured by Formulated Materials. Loose-laid over the substrate and then covered with a uniform thickness of an approved Treadstone Underlayment Product. Mechanical Fastening is not required, providing a system profile thickness as thin as 7/8 inch (22.23 mm).
   1. A waterproof, odor barrier protecting adjacent floors from moisture and odors/
   2. Super low profile of 1/8 inch (3 mm).
   3. Underlayment depth of 3/4 inches (19 mm) reduces overall weight of assembly and reduces drying time.
   4. Compression resistance increase lifespan and acoustical performance of the floor assembly.
   5. Embedded System: Noise problems are reduced, even when floor coverings are changed or replaced.
      a. UL listed in over 116 designs.
   6. Mechanical Resistance:
      a. Pressure: 315 psf (1,537.97 kg/m2). Deflection: 0.071 inches (0.18 mm).
      b. Pressure: 982 psf (4,794.54 kg/m2). Deflection: 0.0141 inches (0.36 mm).
      c. Pressure: 2994 psf (14,617.99 kg/m2). Deflection: 0.0283 inches (0.72 mm).
      d. Pressure: 5306 psf (25,906.16 kg/m2). Deflection: 0.0425 inches (1.08 mm).
      e. Pressure: 7952 psf (38,825.06 kg/m2). Deflection: 0.0567 inches (1.44 mm).
      f. Pressure: 10019 psf (48,917.04 kg/m2). Deflection: 0.0709 inches (1 .8 mm).
   7. Technical Data:
      a. Thickness: 1/8 inch (3 mm).
      b. Color: Black with white water-resistant fabric.
      c. Underlayment Depth: Minimum 0.75 (19 mm).
      d. Roll Width: 44-3/8 inches (127 mm).
      e. Roll Length: 100 ft (30.48 m).
      f. Coverage Area per Roll: 370 sq ft (34.37 sq m).
      g. Weight per Roll: 43.2 lbs. (19.6 kg).

B. Product: Treadstone R2 Sound Attenuating Mat as manufactured by Formulated Materials. Loose-laid over the substrate and then covered with a uniform thickness of an approved Treadstone Underlayment Product. Mechanical Fastening is not required, providing a system profile thickness as thin as 7/8 inch (22 mm).
   1. In conjunction with 1 inch of Treadstone Underlayment, the installed system can reduce impact noise (IIC) up to 12 dB in wood framed assemblies. Refer to Treadstone Acoustical Design Guide for acoustical test performance or contact Formulated Materials for specific test data.
   2. Polypropylene barrier fabric.
   3. Low profile: 0.15 inches (4 mm).
   4. Excellent noise control performance with a spectrum of floor covering options.
   5. Industry leading compression resistance.
   6. Because this system is embedded, noise problems are reduced, even when floor coverings are changed or replaced.
   7. UL listed in over 110 designs.
   8. Technical Data:
      a. Fabric:
         1) Raw Material: Polypropylene.
         2) Weight per EN 1849-1:
            (a) oz / yd (75 gram / sq m) plus or minus 10 percent.
         3) Thickness per EN 1849-1:

(a) inches (0.75 mm) plus or minus 15 percent.
4) Width: 45 inches (1.10 m) plus or minus 2 percent.
5) Mean Tensile strength per EN 29073: 25.8 lbf (115 N) plus or minus 15 percent.
6) Elongation at max load (mean) per EN 29073/3: 90 percent.

b. Core:
1) Raw material: Mix of Polyethylene and Polypropylene
2) Weight: 0.1 lbs per sq ft (500 grams per sq m) plus or minus 10 percent
3) Width: 3.54 ft (1.08 m) plus or minus 2 percent.

c. Product:
1) Weight per EN 965: 0.12 lbs per sq ft (575 grams per sq m)
2) Thickness per EN 964-1: 0.15 inches (3.8 mm).
3) Adhesive Tape for Overlapping: Butyl strip.
4) Width of Flap:45.0 inches (1.14 m)

d. Mechanical Resistance
1) Pressure: 41.8 psf (2 kPa). Time: 0.
(a) Residual thickness: 0.15 inches (3.9 mm).
2) Pressure: 104.4 psf (5 kPa). Time: 0.
(a) Residual thickness: 0.15 inches (3.8 mm).
3) Pressure: 104.4 psf (5 kPa). Time: 1 week.
(a) Residual thickness: 0.15 inches (3.73 mm).
4) Pressure: 104.4 psf (5 kPa). Time: 1 month.
(a) Residual thickness: 0.15 inches (3.72 mm).
5) Pressure: 104.4 psf (5 kPa). Time: 3 months.
(a) Residual thickness: 0.15 inches (3.70 mm).

C. Product: Treadstone Elite as manufactured by Formulated Materials. Multi-layer sound attenuation mat comprised of a monolithic, rolled polyethene and polypropylene, high compression resistance cuspated HOPE design bonded to a 95 gram non-woven polypropylene fabric. Lays flat and smooth. High compression and deflection resistance and acoustical performance
1. Light/ flexible.
2. Strength: 20,000 psf (957.6 kPa) for 0.04 inches (1 mm) of deflection.
3. Twenty times stronger than monofilament sound mats
4. Permanent moisture and odor barrier.
5. Post-Consumer Recycled Content: 80 percent.
6. UL Listed in 116 designs
7. Can increase IIC values up to 12 db in wood framed construction.
8. Technical Data:
a. Thickness: 1/4 inch (6 mm).
b. Color: Black with bonded Black Fabric.
c. Underlayment Depth: Minimum 0.75 inch (19 mm)
d. Roll Width: 46 inch (117 cm)
e. Roll Length 105 ft (32 m)
f. Coverage Area per Roll: 400 sq ft (37.2 sq m)
g. Weight per Roll: 54 lbs (24.5 kg)
9. Mechanical Resistance:
a. Pressure: 67.4 psf (3,290.76 kg/m2). Deflection: 0.0098 inch (.25 mm)
b. Pressure: 5,000 psf (24,412.14 kg/m2) . Deflection: 0.0197 inch (.5 mm)
c. Pressure: 21,000 psf (102,531 kg/m2) . Deflection: 0.0394 inch (1 mm)

D. Product: Treadstone Elite Duo as manufactured by Formulated Materials. Monolithic, rolled plastic core membrane comprised of polyethene and polypropylene, in a high compression resistance cuspated HDPE design. Provides compression/deflection resistance never seen in an acoustical sound mat product. Needle punched non-woven polyester low frequency benefit.

1. Strength: 20,000 psf (957.6 kPa) for (1 mm) of deflection.
2. Reduced underlayment thickness allows for faster underlayment drying time. Ready for floor covering in 7 to 10 days.
3. Post-Consumer Recycled Content: 98 percent.
4. Provides a moisture-vapor and odor barrier.
5. Ideal for concrete construction.
6. UL Listed in 116 designs.
7. Can increase IIC values 15-17 db in wood framed construction.
8. LEED Credits; Materials and Resources: MR 3, MR 4, MR 5, MR 6; Indoor Environmental Quality IEQ 1, IEQ 2; Innovation and Design Process - IDP 1.
9. Physical Properties:
    a. Weight: 0.164 psf (7.8 Pa)
    b. Thickness: 3/8 inch (9 mm
    c. Width: 3.75 ft (1.14).
    d. Length: 90 ft (27.4).
    e. Area per Roll: 333 sq ft (30.9 sq m)
    f. Roll Weight: 55 lbs (24.9 kg)
10. Mechanical Resistance:
    a. Pressure: 674 psf (3,290.76 kg/sq m). Deflection: 0.0098 inch (0.25 mm).
    b. Pressure: 5,000 psf (24,412.14 sq m) Deflection: 0.0197 inch (0.5 mm).
    c. Pressure: 21,000 psf (102,531 sq m) Deflection: 0.0394 inch (1 mm).
    d. sound control between floor levels, with long term benefits due to its excellent mechanical
    e. compression resistance.

E. Product: Treadstone M2 Sound Attenuating Mat as manufactured by Formulated Materials. Loose-laid over the substrate and then covered with a uniform thickness of an approved Treadstone Underlayment Product. Excellent noise control performance with a spectrum of floor covering options. Mechanical Fastening is not required, providing a system profile thickness as thin as 1-1/4 inch (32 mm).
    1. In conjunction with 1 inch (25 mm) of Treadstone Underlayment.
        a. The installed system can reduce impact noise (IIC):
            1) Wood Framed Assemblies: Up to 10 dB
            2) Concrete Assemblies: Up to 20 dB
    2. Polypropylene barrier fabric.
    3. Flexible and resilient, while maintaining compression resistance.
    4. Embedded System: Noise problems are reduced, even when floor coverings are changed or replaced.
        a. UL listed in over 116 designs.
    5. Technical Data:
        a. Thickness: 1/4 inch (6 mm). Low profile.
        b. Color: Black with white water-resistant fabric
        c. Underlayment Depth: Minimum 1.5 inch (32 mm)
        d. Roll Width: 55 (140 cm)
        e. Roll Length: 115 ft (35 m)
        f. Coverage Area per Roll: 526 sq ft (48.9 sq m)
        g. Weight per Roll: 41.5 lbs. (18.8 kg)
    6. Mechanical Resistance:
        a. Pressure: 160 psf (781.91 kg/sq m). Deflection: 0.0156 inch (.395 mm).
        b. Pressure: 688 psf (3,359.11 kg/ sq m). Deflection: 0.0622 inch (1.58 mm).
        c. Pressure: 1536 psf (7,499.41 kg/ sq m). Deflection: 0.0124 inch (3.16 mm).
        d. Pressure: 2218 psf (10,829.22 kg/ sq m). Deflection: 0.0155 inch (3.95 mm).

F. Product: Treadstone M3 Sound Attenuating Mat as manufactured by Formulated Materials. Loose-laid over the substrate and then covered with a uniform thickness of an approved Treadstone Underlayment Product. Excellent noise control performance with a spectrum of floor covering options. Mechanical Fastening is not required, providing a system profile thickness as thin as 1 7/8 inches (47.6 mm).
   1. In conjunction with 1.5 inch (32 mm) of Treadstone Underlayment.
      a. The installed system can reduce impact noise (IIC):
         1) Wood Framed Assemblies: Up to 16 dB
         2) Concrete Assemblies: Up to 20 dB
   2. Polypropylene barrier fabric.
   3. Flexible and resilient, while maintaining compression resistance.
   4. Embedded System: Noise problems are reduced, even when floor coverings are changed or replaced.
      a. UL listed in over 116 designs.
   5. Technical Data:
      a. Thickness: 3/8 inch (9 mm). Low profile.
      b. Color: Black with white water-resistant fabric
      c. Underlayment Depth: Minimum 1.5 inch (32 mm)
      d. Roll Width: 55 (140 cm)
      e. Roll Length: 115 ft (35 m)
      f. Coverage Area per Roll: 526 sq ft (48.9 sq m)
      g. Weight per Roll: 41.5 lbs. (18.8 kg)
   6. Mechanical Resistance:
      a. Pressure: 193 psf (942.31 kg/ sq m). Deflection: 0.0197 inch (0.5 mm).
      b. Pressure: 396 psf (1933.44 kg/ sq m). Deflection: 0.0394 inch (1 mm).
      c. Pressure: 827 psf (4037.77 kg/ sq m). Deflection: 0.0787 inch (2 mm).
      d. Pressure: 1512 psf (7382.23 kg/ sq m). Deflection: 0.1181 inch (3 mm).

G. Product: Treadstone P1 Perimeter Isolation as manufactured by Formulated Materials. A polyethylene foam strip to reduce impact vibration transfer by isolating Treadstone Underlayment and finished floor covering from walls and subfloor. Allows easy transition from wall to wall, providing minimal seams or overlap. Adhesive backing for easier installation.
   1. Raw Material: Polyethylene.
   2. Color: White.
   3. Thickness: 0.125 inches (3 mm).
   4. Roll Width: 3 inches 76 mm().
   5. Roll Length: 225 ft (68.6 ft).
   6. Gross Weight: 1.5 lbs (0.68 kg).

H. Product: Treadstone Sound Mat Tape as manufactured by Formulated Materials. Poly Hot-Melt tape to seal joints between seams of Treadstone Sound Mat products and join Treadstone Acoustical Mats to Treadstone Perimeter Isolation Strips at perimeter walls and plumbing or other floor penetrations. Provides adhesion and waterproof seal to sound mats and perimeter isolation strips. Used to repair tears in fabric of Treadstone Acoustical Mats.
   1. Raw Material: Poly / Hot Melt.
   2. Color: White with Blue Lettering
   3. Roll Width: 3 inches (76 mm)
   4. Roll Length: 1000 ft (305 m)
   5. Peel Adhesion per AFERA 5001: 2.284 lbs per inch (4 N per cm)
   6. Elongation per AFERA 5004: 160 percent
   7. Shelf Life: 6 months.

2.03 SUB FLOOR PREPARATION (TREADSTONE)

A. Product: Treadstone TP1 as manufactured by Formulated Materials. A Low VOC acrylic primer suitable for priming wood substrates prior to installing Treadstone fire-rated underlayments and

self-levelers. Dries quickly and prepares surface, allowing poured underlayments to positively bond with subfloor while controlling moisture absorption of substrate, controlling cracking and decoupling. Not approved for exterior applications.

1. Application: Roller or 5 gallon (18.9 Liters) sprayer.
2. Low VOC Formula. Non-reactive and non-toxic.
3. Low odor formula.
4. Approved for use with all Treadstone Underlayments and self-levelers
5. Approved for sealing Treadstone Underlayments and self-levelers
6. Physical State: Liquid.
7. Color: White.
8. Agent: Latex.
9. Vehicle: Liquid.
10. Weight per Gallon: 8.5 lbs (3.85 kg)
11. condition of substrate, and environmental conditions.
12. Typical Coverage: 300 sq ft per gal. (27.87 sq m)

B. Product: Treadstone Technical Felt as manufactured by Formulated Materials. A reinforced, durable, leak-proof, vapor retarding membrane that speeds preparation of subfloors that would otherwise require extensive mechanical preparation or repair before installation of poured underlayments and self-levelers. Technical Felt's double layer polypropylene construction provides protection for the existing subfloor from moisture and eliminates many underlayment adhesion issues due to the presence of absorbed oils and solvents in the subfloor. Technical Felt also provides floor protection for cured underlayments and finished floor goods.

1. Physical Properties:
    a. Raw Material: Polypropylene.
    b. Color: Gray.
    c. Weight per EN 1849-2: 4.42 oz per sq yd (149.9 grams per sq m). Plus or minus 12 percent.
    d. Tensile Strength per EN 12311-2: 486 lbs per ft (723.2 kg per m). Plus or minus 15 percent.
    e. Tensile Strength CMD per EN 12311-2: 322 lbs per ft (479.2 kg per m). Plus or minus 15 percent.
    f. Elongation per EN 12311-2: 18 percent. Plus or minus 15 percent.
    g. Elongation CMD per EN 12311-2: 15 percent. Plus or minus 15 percent.
    h. Tear Strength per EN 12310-2: 74 lbs (329 N). Plus or minus 20 percent
    i. Tear Strength CMD per EN 12310-2: 83 lbs (369 N). Plus or minus 20 percent.
    j. Vapor Permeability per EN 1931 / EN 12572: 590.5 inches (15 m). Plus or minus 20 percent.
    k. Water Penetration: W3

2.04 GYPSUM UNDERLAYMENTS (TREADSTONE)

A. Product: Treadstone FR25 as manufactured by Formulated Materials. Approved for use over concrete, precast, wood, and Treadstone Sound Attenuating Mats; thickness limitations apply. Mixed onsite with locally sourced sand and water, providing a dense monolithic, smooth, lightweight underlayment ready to receive a wide variety of floor coverings.

1. Mixing: Onsite with locally sourced aggregates reducing carbon footprint.
2. Fast setting. Light Trade Traffic: 4 hours. Normal Trade Traffic: 24 hours.
3. Little to no surface prep. Prime with Treadstone TP1 Primer/sealer and pour.
4. Provides enhanced Sound Attenuation (STC and IIC) between floors.
5. Installation: Technically trained Network of Licensed Dealers.
6. Physical Properties:
    a. Color: Grey
    b. Physical State: Powder
    c. Flow: High Flow, Self-Leveling Properties
    d. Water Per Bag: 4.5 to 6.5 US Gal., Resistive assemblies listed in 116 designs

e. Sand Per Bag: 1.4 to 2.1 cu. ft. of Washed Mason or Concrete Sand meeting Formulated Materials minimum gradation criteria
f. Mix Designs per ASTM C472M having yielding compressive strengths from 2000 to 3200 psi.
g. Weight: 7.2 lbs per sq ft.
h. Dry Density: 110 to 120 lbs per cu ft.
i. Thickness: 3/8 to 3 inches () in a single pour.
j. Surface Burning Characteristics: ASTM E84.
1) Flame Spread: 0. Fuel Contribution: 0. Smoke Density: 0
k. Fire Resistive Assemblies: Refer to UL Fire Resistive Directory, listed in over 90 designs
l. UL listed in over 116 designs.
m. Storage: 6 months.

B. Product: Treadstone FR30 as manufactured by Formulated Materials. Approved for use over concrete, precast, wood, and Treadstone Sound Attenuating Mats; thickness limitations apply. Mixed onsite with locally sourced sand and water, providing a monolithic, smooth, lightweight underlayment ready to receive a wide variety of floor coverings.
1. Mixed onsite with locally sourced aggregates reducing carbon footprint
2. Fast setting. Light Trade Traffic: 1 hour. Normal Trade Traffic: 24 hours.
3. Little to no surface prep. Prime with Treadstone TP1 Primer/sealer and pour.
4. Provides enhanced Sound Attenuation (STC and IIC) between floors.
5. Installation: Technically trained Network of Licensed Dealers.
6. Physical Properties:
a. Color: Grey
b. Physical State: Powder
c. Flow: High Flow, Self-Leveling Properties
d. Water Per Bag: 4.5 to 6.5 US Gal., Resistive assemblies listed in 116 designs
e. Sand Per Bag: 1.4 to 2.1 cu. ft. of Washed Mason or Concrete Sand meeting Formulated Materials minimum gradation criteria
f. Mix Designs per ASTM C472M having yielding compressive strengths from 2500 to 3800 psi.
g. Weight: 7.2 lbs per sq ft.
h. Dry Density: 11 0 to 120 lbs. per cu ft
i. Thickness: 3/8 to 3 inches () in a single pour.
j. Surface Burning Characteristics: ASTM E84.
1) Flame Spread: 0. Fuel Contribution: 0. Smoke Density: 0
k. Fire Resistive Assemblies: Refer to UL Fire Resistive Directory, listed in over 90 designs.
l. UL listed in over 116 designs.
m. Storage: 6 months.

C. Product: Treadstone FR30P as manufactured by Formulated Materials. Approved for pre-pour applications in multifamily or hospitality applications.
1. Pre-Pour Applications Only.
2. Mixed onsite with no aggregate, reducing carbon footprint.
3. Leak protection for floors below.
4. Uses no sand and eliminates silica dust.
5. Requires little to no surface prep; prime with recommended primer and pour.
6. Enhanced Sound Attenuation (STC and IIC) between floors.
7. Installation: Technically trained Network of Licensed Dealers.
8. Physical Properties:
a. Color: Grey.
b. Physical State: Powder.
c. Flow: Slow Flow, Self-Leveling Properties.

d. Water Per Bag: 4 to 5 US Gal.
e. Mix Designs per ASTM C472M having yielding compressive strengths from 2000 to 3200 psi.
f. Weight: 7.2 lbs per sq ft.
g. Dry Density: 110 to 120 lbs. per cu ft
h. Thickness: Up to 1.5 inches (38 mm) in a single pour.
i. Surface Burning Characteristics: ASTM E84.
    1) Flame Spread: 0. Fuel Contribution: 0. Smoke Density: 0
j. Fire Resistive Assemblies:
k. UL listed in over 116 designs.
l. Storage: 6 months.

2.05 LEVELERS (TREADSTONE)

A. Product: Treadstone Sitemix Leveler as manufactured by Formulated Materials. Approved for use over concrete, wood, corrugated steel deck, and Treadstone Sound Attenuating Mats; thickness limitations apply. Blended onsite Sitemix Leveler is an economical choice for fast paced projects. Its dense durable surface stands up to trade traffic during the construction process.
    1. Mixed onsite with locally sourced aggregates, reducing carbon footprint and cost
    2. Little to no surface prep, prime with recommended primer, and pour
    3. Fast setting, light trade traffic in 1 hour, normal trade traffic in 24 hrs.
    4. Dense, smooth surface meeting the toughest of floor covering tolerances
    5. Requires little to no surface prep; prime with recommended primer and pour.
    6. Enhanced Sound Attenuation (STC and IIC) between floors.
    7. Installation: Technically trained Network of Licensed Dealers.
    8. Physical Properties:
        a. Color: Grey
        b. Physical State: Powder
        c. Flow: High Flow, Self-Leveling Properties
        d. Water Per Bag: 4.5 to 6.5 US Gal., Resistive assemblies listed in 116 designs
        e. Sand Per Bag: 0.8 to 1.4 cu. ft. of Washed Mason or Concrete Sand meeting Formulated Materials minimum gradation criteria
        f. Mix Designs per ASTM C472M having yielding compressive strengths from 3000 to 4500 psi.
        g. Dry Density: 115 to 125 lbs per cu ft.
        h. Thickness: 3/8 to 1-1/2 inches (9 to 38 mm) in a single pour. Thinner applications depend on aggregate size and site conditions
        i. Surface Burning Characteristics: ASTM E84.
            1) Flame Spread: 0. Fuel Contribution: 0. Smoke Density: 0
        j. Fire Resistive Assemblies: Refer to UL Fire Resistive Directory,
        k. UL listed in over 116 designs.
        l. Storage: 6 months.

B. Product: Treadstone Sitemix SL as manufactured by Formulated Materials. Approved for use over fully cured or existing concrete, wood, or other clean structurally sound substrates meeting L/360 deflection criteria.
    1. Engineered blended cement, containing polymer modified Portland cement.
    2. Fast setting, light trade traffic 4 hours, normal traffic 24 hours
    3. Requires little to no surface prep: clean substrate, prime using approved primer, pour
    4. Ideal for smoothing out of level, old, or damaged concrete substrates
    5. Dense, smooth, abrasion and crack resistant surface
    6. Installed by a technically trained Network of Licensed Dealers
    7. Physical Properties:
        a. Color: Grey.

b. Physical State: Powder.
c. Flow: Self Leveling.
d. Water Per Bag: 3 to 4 US Gal.
e. Compressive Strengths per ASTM C472: Up to 4500 psi.
f. Dry Density: 90 to 100 lbs. per cu ft.
g. Thickness: 1/8 to 1 inch (3 to 25) in a single pour.
h. Yield: 46 sq ft *4.27 sq m) at 1/4 inch (6 mm) depth.
i. UL listed in over 116 designs.

C. Product: Treadstone Sitemix Ultra as manufactured by Formulated Materials. Approved for use fully cured or existing concrete, wood, or other clean structurally sound substrates meeting U360 deflection criteria.
1. Fast setting, light trade within hours.
2. Factory proportioned ingredients mixed on-site by automated batch controlled proportioning equipment
3. Low-prep formulation; bead blasting not required for pedestrian traffic use
4. Dense, smooth, abrasion and crack resistant surface.
5. No hand troweling required.
6. Physical Properties:
a. Color: Gray.
b. Physical State: Powder.
c. Flow: Self-Leveling.
d. Water per Bag: 3.5 to 4.5 US Gal.
e. Sand per Bag: 0.80 to 1.40 cu ft of approved washed mason or concrete sand
f. Compressive Strength: ASTM C109, air cure 28 days - up to 5,000 psi
g. Density: 110 to 125 lbs/cu ft.
h. Recommended Thickness: 3/8 to 2 inch (9 to 51 mm) in a single pour.

2.06 COMPONENTS (ELEVATION)

A. Product: Elevation TTP T-Bar Termination Pocket as manufactured by Formulated Materials.
1. A component of the Elevation ONE Waterproofing System
2. Heavy gauge aluminum with welded Seams.
3. Installed at exterior corners, channels incidental water that may enter the pocket away from the building fascia. Ensures that moisture flows away from the building.
4. Installed using no sealant to complete corner details.
5. Warranty: Material Defects: 5 years.
6. Warranty: 10 years when used as a component of the Elevation ONE Waterproofing System.
7. Physical Properties:
a. Material: Aluminum
b. Color: Natural (paintable)
c. Width: Flat: 5-7/8 inch (15 cm). Corner: 9-3/4 inch (24.7 cm)
d. Height: Flat: 8-5/8 inch (22 cm), Corner: 9-3/4 inch (24.7 cm)
e. Pocket Dimensions: Flat: 1-1/2 inch (3.8 cm). Corner: 3 inch (7.6 cm)

B. Product: Elevation BES Balcony Embed System as manufactured by Formulated Materials. A seamless, foolproof waterproofing system for balconies and breezeways.
1. Embedded Pan is installed surrounding the embedded steal rail plates. The cavity created is filled with 1/2 inch (13 mm) of Elevation Pan encapsulating the mounting plates and fastening bolts. The Sealant conforms to contours of plate and fasteners, permanently bonding to the embedded plate and wood decking.
2. Physical Properties:
a. Color: Cream
b. Width: 12 inches (30.5 cm).
c. Height: 1/2 inches (1.27 cm).

d. Cavity Width: 5-1/2 inch (14 cm).
e. Cavity Height: 1/2 inch (1.27 cm).

C. Product: Elevation Pan Sealant as manufactured by Formulated Materials. Bitumen free and light blue in color, allowing pinholes in the surface to be exposed and treated unlike other sealants.
1. Standards Compliance:
a. ASTM C836.
b. ASTM E96: 0.05 US Perms.
c. SCAQMD VOC Requirements.
2. Seamless; no breakdown or penetration of seams.
3. Excellent adhesion.
4. Compatible with Rubberized Asphalt Sheet Membranes.
5. Non-Gassing.
6. Fast Curing.
7. Highly Flexible over extreme temperatures.
8. No Odor.
9. Resistant to Bacterial Growth.
10. Fills Ponds and Low Areas.
11. Physical Properties:
a. Hardness per ASTM D2240: 25 plus or minus 5 Shore A.
b. Tear Resistance, Die C, per ASTM D624: 50 plus or minus 10 pli (21 plus or minus 3.5 kNm).
c. Tensile Strength, ASTM D412: 300 plus or minus 50 psi (3.45 plus or minus 0.3 MPa).
d. Ultimate Elongation, ASTM D412: 650 plus or minus 50 percent.
e. Specific Gravity: 1.12.
f. Total Solids by Weight, ASTM D236: 95 plus or minus 2 percent.
g. Total Solids by Volume, ASTM D2697: 94 plus or minus 2 percent.
h. Viscosity, at 80 degrees F (27 degrees C): 4500 plus or minus 2000 cps.
i. Service Temperature: Minus 25 to 200 degrees F (Minus 31.7 to 93.3 degrees C).

D. Product: Elevation FT Tape as manufactured by Formulated Materials.
1. Raw Material: Aluminum/Rubber.
2. Color: Silver.
3. Roll Width: 2.5 inches (63 mm).
4. Roll Length: 150 ft (45 m).
5. Backing Thickness: 2 mils (0.05 mm).
6. Total Thickness: 3.5 mils (0.09 mm).
7. Tensile Strength: 3.5 mils (0.09 mm).
8. Elongation: 3 percent.
9. Adhesion to Steel and Aluminum: 90 oz per in (25 N per 25 mm)

2.07 SHEET WATERPROOFING MEMBRANE PRODUCTS (ELEVATION)

A. Product: Elevation S60 Sheet Waterproofing Membrane as manufactured by Formulated Materials. For use with Elevation ONE Waterproofing System.
1. Facer: A woven synthetic coated on both sides increasing tear and abrasion resistance.
a. UV Resistance: 120 day.
b. Marked every 3 inches (76 mm) to ensure proper overlap is maintained during installation providing a visual reference for quality control.
c. Rubberized Asphalt Coating: Self-sealing and highly adhesive. Protected by a split release liner.
d. Warranty: Product: 5 year. Elevation ONE Waterproofing System: 10 years.
2. Physical Properties:
a. Width: 35.875 to 36.125 inches (91.1 - 91.75 cm).

b. Length: 67-67.5 ft (20.4 - 20.5 m).
c. Weight per roll: 64 lbs (29 kg).
d. Product weight per ASTM D5261: 1613 grams per sq m.
e. Bitumen weight per ASTM D5261: 1461 grams per sq m.
f. Thickness per ASTM D1970: Greater than 60 mils.
g. Tensile Strength per ASTM D412 C: Greater than 2,430 psi.
h. Elongation per ASTM D412 C: 600 percent.
i. Puncture Resistance per ASTM E154: Greater than 235 lbf.
j. Water Absorption per ASTM D570: Less than 0.1 percent.
k. Low Temperature Flexibility per ASTM D1970: Pass. Minus 20 degrees F.
l. Moisture Vapor Permeation per ASTM E96: Less than 0.13 perms.
m. Cracking Cycle per ASTM C836: No Cracking.
n. Lap Adhesion per ASTM D903: Less than or equal to 9.0 lbs per inch width.
o. Hydrostatic Head per ASTM D5385: Pass. 231 ft.

B. Product: Elevation SM2 Technical Sealant as manufactured by Formulated Materials. A multi-purpose, gun-grade sealant. Combines the best properties of silicone and polyurethane. Used to seal seams, terminations, and edges of membranes, providing an additional line of defense against the intrusion of liquid water below the waterproofing system. Bonds and cures in the presence of liquid water and will tolerate water immersion immediately after application allowing it to be applied in wet weather and on damp substrates. Allows for flood testing of balcony immediately after completing the balcony waterproofing system installation.
1. Physical Properties:
a. Gun Grade: Non-Sagging.
b. Specific Gravity: 1 .48 to 1 .58 grams per cu m.
c. Weight per Gallon: 12.7 lbs (5.7 kg).
d. Total Solids: 99 percent.
e. VOC Content: 30 grams per L maximum.
f. Tack Free Time: 60 minutes. Plus or minus 10 minutes.
g. Elongation at Break: Greater than 200 percent.
h. Hardness, Shore A: 40 to 50.
i. Shrinkage: None visible after 14 days.
j. UV Stability: 6 months.
k. Tensile Strength: Greater than 150 psi.
l. Corrosive Properties: Non-corrosive.

C. Product: Elevation S40 Advanced as manufactured by Formulated Materials. a 40-mil thick composite waterproof membrane with a proprietary non-asphaltic adhesive, laminated to a polyethylene/polypropylene top scrim providing advanced tear and abrasion resistance.
1. Features:
a. Asphalt Free.
b. Recycled Content: 45 percent.
c. Adheres to Common Construction Materials: Exterior gypsum board, CMU, concrete, stone, wood, and metal.
d. UV Resistance: 120 days.
e. High tack proprietary adhesive provides superior adhesion.

2.08 SEAMLESS WATERPROOFING MEMBRANE PRODUCTS (ELEVATION)

A. Product: Elevation L1 Seamless Waterproofing Membrane as manufactured by Formulated Materials. A primerless, low modulus, fast, water curable, high-performance interior or exterior elastic waterproofing membrane adhesive and coating for balconies, deck coatings, roofing, and waterproofing under Flexi-Ply, below grade, exposed and concealed applications. A long lasting, weather tight seal to a variety of common building substrates.
1. Seamless; no breakdown or penetration of seams.
2. Economical; Labor Saving.

3. Excellent adhesion.
4. Primerless.
5. Non-Gassing.
6. Fast Curing.
7. Highly Flexible over extreme temperatures.
8. No Odor.
9. Resists Dirt.
10. No Mixing.
11. Meets ASTM C836 and ASTM E96 criteria.
12. Meets SCAQMD VOC requirements.
13. Standards Compliance:
    a. ASTM C920, Type S, Grade S, Class 25, use T and M.
    b. Federal Specification TT-S-00230-C Type I, Class A.
    c. Corps of Engineers CRD-C-541, Type I, Class A.
    d. Canadian Standards Board CAN 19, 13-M82.
14. Physical Properties:
    a. Color: Limestone Grey.
    b. Hardness Shore A, ASTM C661: 30 plus or minus 5 Shore A.
    c. Tear Resistance, Die C, ASTM D1002: 150 plus or minus 10 psi (21 plus or minus 3.5 kNm).
    d. Elongation at Break, ASTM D412: 300-400 percent plus or minus 50 psi.
    e. Ultimate Elongation, ASTM D412: 700 plus or minus 50 percent.
    f. Specific Gravity: 1.60 (13.113.5 lbs/gal.) depending on color.
    g. Total Solids by Weight, ASTM D236: 100 percent.
    h. Total Solids by Volume, ASTM D2697: 100 percent.
    i. Viscosity, at 80 degrees F (27 degrees C): 40,00 cps Brookfield RVFTF spindle 4 RPM, 73 degrees F.
    j. Service Temperature: Minus 25 to 200 degrees F (Minus 31. 7 to 93.3 degrees).
    k. Meets ASTM C836 criteria.
    l. Meets ASTM E96 criteria.

B. Product: Elevation L-Flash Waterproofing Reinforcing Flashing Tape as manufactured by Formulated Materials. For changes of plane in the structure and joints of the Elevation Seamless Waterproofing System. Ideal for the most difficult of conditions. The fabric face on the top side of L Flash provides reinforcement for the Elevation Seamless Waterproof Membrane.
    1. Physical Properties:
        a. Raw Material: Polyolefin / Polypropylene
        b. Color: Grey.
        c. Roll Width: 4 and 8 inch (102 and 203 mm).
        d. Roll Length: 75 ft (22.86 m)
        e. Tensile Strength - ASTM D751:
            1) Machine Direction (Force): 130 lbs
            2) Cross Direction (Force): 124 lbs
        f. Trapezoidal Tear Strength - ASTM D4533-91:
            1) Machine Direction (Force): 46 lbs
            2) Cross Direction (Force): 44 lbs
        g. Mullen Burst - ASTM D751-95: 180 psi
        h. UV Exposure (2000 hours) - ASTM G154-98: 90 percent.
        i. Permeability:
            1) MVTR - ASTM E96 - B: Less than 0.075 Perms1
            2) TAPPI-460: Greater than 5000 Sec per 1000 cc

C. Product: Elevation L1 Caulk as manufactured by Formulated Materials. A high performance interior or exterior joint sealant for use in both moving and nonmoving joint applications. Provides a long lasting weather tight seal to a variety of building substrates and may be applied to clean damp surfaces without risk of gassing or bubbling.
   1. Seamless; no breakdown or penetration of seams.
   2. Non-Gassing, fast curing, highly flexible over extreme temperatures, no odor, dirt resistant, and no mixing.
   3. Standards Compliances:
      a. ASTM C836 criteria.
      b. ASTM C920, Type S, NS, Grade NS, Class 25, use NT, T, M, G, A, and O.
      c. ASTM E96 criteria.
      d. Federal Specification TT-S-00230-C Type II, Class A.
      e. Corps of Engineers CRD-C-541.
      f. Canadian Standards Board CAN 19, 13-M82.
      g. LEED 2.2 for New Construction and Major Renovations: Low Emitting Materials (Section 4.1) 1 Point.
      h. NAHB Model Green Home Building Guidelines: 5 Global Impact Points.
      i. SCAQMD VOC Requirements.
      j. VOC Content: less than 25 grams / Liter ASTM D2369 EPA Method 24. Tested at 240 degrees F (115 degrees C).
   4. Color: Limestone Grey.

2.09 ACCESSORLES (ELEVATION)

A. Product: Elevation DM1 Balcony Drain Mat as manufactured by Formulated Materials.
   1. A cylindrical studded membrane made with UV Stabilized polyolefin bonded to a polypropylene filter fabric. Once installed, creates a continuous sheet of polyolefin plastic covering entire surface of the balcony, providing an additional layer of water protection and a physical protective barrier to help protect and prevent damage to the waterproofing membrane beneath.
   2. Physical Properties:
      a. Fabric Properties:
         1) Raw Material: Polypropylene.
         2) Fabric Color: White.
         3) Weight per ASTM D5261: 2.18 oz per sq yard (73.9 grams per sq m).
         4) Puncture Strength per ASTM D4833: 70 lbs (.31 kN).
         5) AOS per ASTM D4751: 270 to 325 us sieve (0.052 mm).
         6) Flow Rate per ASTM D4491: 21.26 gal per min per sq ft (14.44 Liter per sec per sq m).
      b. Core Properties:
         1) Raw Material: Mix of Polyethylene and Polypropylene.
         2) Thickness per ASTM D5199: 26 mils.
         3) Weight per EN 965: 0.12 lbs per sq ft (500 grams per sq m).
         4) Compression Resistance per ASTM D1621: Less than 10,000 psf (480 kPa).
      c. Composite Material Properties:
         1) Weight per EN 965: 0.12 lbs per sq ft (575 grams per sq m).
         2) Thickness per EN-964-1: 0.14 inches (3.5 mm).

B. Product: Elevation SP1 Primer as manufactured by Formulated Materials. A strong, elastic, low Tg polymer resin and special additives in a water vehicle. SP1 exhibits permanent surface tack.
   1. Viscosity per ASTM D2196: 500 cps.
   2. Solids by Weight per ASTM D1644: 45 percent.
   3. Solids by Volume per ASTM D2697: 44 percent.
   4. Weight Per Gallon per ASTM D1147: 8.5 lbs.
   5. Flash Point per ASTM D56: NA

6. VOC per EPA 24: Less than 5 grams per Liter.
7. Color: White. Dries clear.

C. Product: Elevation T-Bar as manufactured by Formulated Materials. Properly installed, the T-Bar provides a pour stop for the wear layer on a waterproofed balcony and maintains a weep system to ensure proper removal of moisture trapped beneath the wear layer.
1. Wider nailer flange eases installation.
2. Consistent dimensions assure proper wear layer pour depth.
3. Physical Properties:
   a. Raw Material: 6063-T5 Aluminum.
   b. Color: Silver.
   c. Finish: Milled or Anodized.
   d. Height: 3-7/8 inches (98 mm).
   e. Flange: 3 inches (76 mm).
   f. Thickness: 0.058 inches (1.47 mm).
   g. Tensile Strength: 17 ksi minimum.

D. Product: Elevation RSE Railing Embed Support as manufactured by Formulated Materials. A steel stanchion using two pieces of 1/4 inch steel welded to a 1-1/2 inch steel post for use with Elevation Balcony and Breezeway Waterproofing Systems. A mounting plate for railing systems to weld to once the finished concrete is installed.
1. Due to the offset top plate and post, you lose less square footage of the balcony.
2. Primer coating withstands the elements.
3. Once waterproofing and concrete installation is complete, weld railing to RSE for a secure railing system.
4. Physical Properties:
   a. Standards Compliance: IBC 1607.8.1andOSHA 1910.23(e)(3)(v)for minimum force requirements.
   b. Raw Material: Primed steel, Thickness: 0.25 inches (6 mm). 1-1/2 inch (32 mm) steel tube.
   c. Color: Light Grey.
   d. Width: Bottom Plate: 4.5 x 4.5 inches (). Top Plate: 3 x 3 inch Offset.
   e. Weight: 2.5 lbs.

2.10 FLOOR PREP (HYDROPHASE)

A. Product: HydroPhase APS Advanced Primer and Sealer as manufactured by Formulated Materials. an environmentally friendly copolymer acrylic with low odor and low VOC that significantly enhances bond strengths to substrate when correctly applied.
1. Penetrates deeply into substrate
2. Use over freshly placed concrete, gypsum, wood, and adhesive residues
3. Tolerant of high pH.
4. Fast drying.
5. Quick Drying, ready for HydroPhase C150 SL, finished floor covering and many coatings in 60 minutes or less
6. Low VOC Water-based, non-toxic
7. Standards Compliance:
   a. ASTM F3010 - Standard Practice for Two-Component Resin Based Membrane-Forming Moisture Mitigation Systems for Use Under Resilient Floor Coverings
   b. ASTM C1315 - Standard Specification for Liquid Membrane-Forming Compounds Having Special Properties for Curing and Sealing Concrete
   c. ASTM C309 - Standard Specification for Liquid Membrane-Film Forming
   d. ASTM E96 - Standard Test Methods for Water Vapor Transmission of Materials
   e. ASTM F2170 - Standard Test Method for Determining Relative Humidity in Concrete Floor Slabs Using In Situ Probes
8. Physical Properties:

a. Physical State: Liquid.
b. Color: Milky White. Clear when dry.
c. Percentage Solids: 23 percent.
d. VOCs: Less than 1 gram per Liter.
e. Dry Time: 30 to 60 min per coat.
f. Recommended Ambient Temperature: 45 to 100 degrees F (7 to 38 degrees C).
g. Recommended Substrate Temperature: Min 40 degrees F (6 degrees C).
h. Total Coverage: 400 to 600 sq ft per gallon.
i. Shelf Life: 12 Months Unopened.
j. Storage Requirements: 50 to 90 degrees F (9 to 35 degrees C).

B. Product: HydroPhase APMB Advanced Primer and Moisture Barrier as manufactured by Formulated Materials. A Nanotechnology Reactive Polymer. One-step primer and moisture barrier with superior performance, rapid installation, and permanent moisture control.
1. Use in up to 100 percent relative humidity.
2. Use in up to 14 pH.
3. Use where up to 25 lbs MVER.
4. Quick Drying, ready for HydroPhase C150 SL, finished floor covering and many coatings in 60 minutes or less.
5. Standards Compliance:
a. ASTM F3010 - Standard Practice for Two-Component Resin Based Membrane-Forming Moisture Mitigation Systems for Use Under Resilient Floor Coverings
b. ASTM C1315 - Standard Specification for Liquid Membrane-Forming Compounds Having Special Properties for Curing and Sealing Concrete
c. ASTM C309 - Standard Specification for Liquid Membrane-Film Forming
d. ASTM E96 - Standard Test Methods for Water Vapor Transmission of Materials
e. ASTM F2170 - Standard Test Method for Determining Relative Humidity in Concrete Floor Slabs Using In Situ Probes
6. Physical Properties:
a. Physical State: Liquid.
b. Color: Milky White. Clear when dry.
c. Percentage Solids: 27 percent.
d. VOCs: 0 grams per Liter.
e. Dry Time: 30 to 60 min per coat.
f. Recommended Ambient Temperature: 45 to 100 degrees F (7 to 38 degrees C).
g. Recommended Substrate Temperature: Min 40 degrees F (6 degrees C).
h. Total Coverage: 400 to 600 sq ft per gallon.
i. Shelf Life: 12 Months Unopened.
j. Storage Requirements: 50 to 90 degrees F (9 to 35 degrees C).

2.11 LEVELERS (HYDROPHASE

A. Product: HydroPhase P150 SL Self-Leveling Cement as manufactured by Formulated Materials. Zero shrinkage. Clean, prime, and pour. Mix and apply using manufacturer-approved, locally sourced sand. An engineered multi-component blended cement, containing polymer modified hydraulic cements.
1. Fast setting. Light trade traffic in 4 hours. Normal traffic in 24 hours.
2. Recommended thickness 1/8 to 1-1/2 inch (3 to 38 mm) in a single lift.
3. Requires no mechanical surface prep: clean substrate, prime, and pour.
4. Ideal for smoothing out of level, old, or damaged concrete substrates.
5. Dense, smooth, and abrasion and crack resistant surface.
6. Standards Compliance:
a. ASTM F1869 Standard Test Method for Measuring Moisture Vapor Emission Rate of Concrete Subfloor Using Anhydrous Calcium Chloride.

b. ASTM F2170 Standard Test Method for Determining Relative Humidity in Concrete Floor Slabs Using in situ Probes.
c. ASTM F710 Standard Practice for Preparing Concrete Floors to Receive Resilient Flooring.
d. ASTM C1708 Standard Test Methods for Self-leveling Mortars Containing Hydraulic Cements.

7. Physical Properties:
   a. Physical State: Dry Powder.
   b. Color: Gray.
   c. Flammability: Flame Spread 0; Fuel Contribution 0; Smoke Development 0.
   d. Mixing Ratio: One 50 lbs of Powder to 4.75 - 5.5 quarts of water.
   e. Yield: 28 to 29 sq ft at 1/4 inch (6 mm) depth.
   f. Dry Density 110 lb./cu. ft.
   g. Compressive Strength per ASTM C109.
      1) 24 Hour Compressive: Greater than 2000 psi.
      2) 7 Day Compressive: Greater than 4000 psi.
      3) 28 Day Compressive: Greater than 5000 psi.
   h. Recommended Thickness: 1/16 to 1-1/2 inch in a single lift.

B. Product: HydroPhase C150 SL as manufactured by Formulated Materials. A multi-component blended cement, containing polymer modified hydraulic cements. Zero shrinkage. Clean, prime, and pour. Mixed and applied using manufacturer-approved, locally sourced sand.
1. Fast setting. Light trade traffic in 4 hours. Normal traffic in 24 hours.
2. Recommended thickness 1/8 to 1-1/2 inch (3 to 38 mm) in a single lift.
3. Requires no mechanical surface prep: clean substrate, prime, and pour.
4. Ideal for smoothing out of level, old, or damaged concrete substrates.
5. Dense, smooth, and abrasion and crack resistant surface.
6. Standards Compliance:
   a. ASTM F1869 - Standard Test Method for Measuring Moisture Vapor Emission Rate of Concrete Subfloor Using Anhydrous Calcium Chloride.
   b. ASTM F2170 - Standard Test Method for Determining Relative Humidity in Concrete Floor Slabs Using in situ Probes.
   c. ASTM F710 - Standard Practice for Preparing Concrete Floors to Receive Resilient Flooring.
   d. ASTM C1708 - Standard Test Methods for Self-leveling Mortars Containing Hydraulic Cements.
7. Physical Properties:
   a. Physical State: Dry Powder.
   b. Color: Gray.
   c. Flammability: Flame Spread 0; Fuel Contribution 0; Smoke Development 0.
   d. Mixing Ratio: 50 lbs of powder, 50 lbs of sand, to 9.5 - 11 quarts of water.
   e. Yield: 46 to 48 sq ft at 1/4 inch (6 mm) depth.
   f. Dry Density 110 lb./cu. ft.
   g. Compressive Strength per ASTM C109
      1) 24 Hour Compressive: Greater than 2000 psi
      2) 7 Day Compressive: Greater than 4000 psi
      3) 28 Day Compressive: Greater than 5000 psi
   h. Recommended Thickness: 1/16 to 1-1/2 inch in a single lift

PART 3 EXECUTION

3.01 EXAMINATION

A. Do not begin installation until substrates have been properly constructed and prepared.

B. If substrate preparation is the responsibility of another installer, notify Architect in writing of unsatisfactory preparation before proceeding.

3.02 PREPARATION

A. Clean surfaces thoroughly prior to installation.

B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

3.03 INSTALLATION

A. Install in accordance with manufacturer's instructions, approved submittals, and in proper relationship with adjacent construction.

3.04 FIELD QUALITY CONTROL

A. Field Inspection: Coordinate field inspection in accordance with appropriate sections in Division 01.

B. Manufacturer's Services: Coordinate manufacturer's services in accordance with appropriate sections in Division 01.

3.05 CLEANING AND PROTECTION

A. Clean products in accordance with the manufacturers recommendations.

B. Touch-up, repair or replace damaged products before Substantial Completion.

END OF SECTION

SECTION 035410
GYPSUM CEMENTITIOUS UNDERLAYMENT

PART 1 – GENERAL

1.01 SUMMARY

A. Description of Work: Work of this section includes gypsum-based, flat-smooth underlayment for interior finish flooring and is not limited to the following:
   1. Formulated Materials Fire Rated Underlayment and sound matt covering normal project conditions and applications.

1.02 REFERENCES

A. Underwriters Laboratory Fire Resistance Volume 1 www.ul.com

B. ASTM C472 Compressive Strength

C. ASTM C33 Sand Aggregate

D. ASTM D4263 Standard Test Method for Indicating Moisture in Concrete

E. ASTM F2419 Standard Test Method for Installation of Thick Poured Gypsum Concrete and Preparation of Surface to Receive Resilient Flooring

F. ASTM E492 Impact Isolation Class (IIC)

G. ASTM E90 Sound Transmission Class (STC)

H. ASTM E84 Standard Test Method of Surface Burning Characteristics of Building Materials

1.03 RELATED WORK SPECIFIED ELSEWHERE

A. See Section 9 for acceptable flooring materials including vinyl, tile, wood, and laminates.

1.04 PRESITE / PREINSTALLATION MEETINGS

A. Pre-construction meetings between General Contractor and Sub-Contractor’s recommended

1.05 SUBMITTALS

A. Product Data: Submit manufacturer’s specifications and installation instructions with project conditions and materials clearly identified or detailed for each required product or system.

B. Acoustic Data: Submit sound tests according to IBC code criteria ASTM E492 (IIC) and ASTM E90 (STC).
   1. Submit in writing that all sound tests or data provided has been tested according to UL (Underwriters Laboratory) fire resistive design number.

C. Product Certificates: Signed by manufacturers of underlayment and floor-covering systems certifying that products are compatible.

D. Sound Transmission Characteristics: Where indicated, provide gypsum-cement underlayment systems identical to those of assemblies tested for STC and IIC ratings per ASTM E 90 and ASTM E 492 by a qualified testing agency

1.06 QUALITY ASSURANCE

A. Installer / Dealer Qualifications: Sub-contractor specializing in performing the work of this section is required to be licensed, technically trained in the field, and authorized by the manufacturer for application of underlayment products.

B. Product Compatibility: Manufacturer of Underlayment Systems certify in writing that products are compatible.

C. Coordinate application of underlayment with requirements of floor-covering products and adhesives, to ensure compatibility of products.
   1. Fire-Resistance Ratings: Where indicated, provide gypsum-cement underlayment systems identical to those of assemblies tested for fire resistance per ASTM E 119 by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

a. Indicate design designations from UL's "Fire Resistance Directory" or from the listings of another qualified testing agency.

1.07 DELIVERY, STORAGE AND HANDLING

A. Store products in manufacturer’s unopened packaging until ready for installation.

B. Follow manufacturer’s storage requirements. Keep dry and protect from direct sunlight exposure, freezing and ambient temperature greater than 105 degrees.

1.08 REGULATORY

A. Conform to all applicable code for fire resistive and acoustic requirements.

1.09 FIELD CONDITIONS

A. Environmental Limitations: Comply with manufacturer’s written instructions for substrate temperature, ventilation, ambient temperature and humidity, and other conditions affecting underlayment performance.
   1. Place Fire Rated underlayment only when ambient temperature and temperature of substrate are above 50 degrees F.

PART 2 - PRODUCTS

2.01 PERFORMANCE REQUIREMENTS

A. Fire-Resistive Ratings: Comply with ASTM E119; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
   1. Indicate design designations for UL’s “Fire Resistance Directory” or from the listings of another qualified testing agency

B. STC-Rated Assemblies: For STC-rated assemblies, provide materials and construction identical to those tested in assembly indicated, according to ASTM E 90 and classified according to ASTM E 413 by an independent testing agency.

C. IIC-Rated Assemblies: For IIC-rated assemblies, provide materials and construction identical to those tested in assembly indicated, according to ASTM E 492 and classified according to ASTM E 989 by an independent testing agency

D. FIRE RATED UNDERLAYMENT
   1. Underlayment: Gypsum-cement-based, flat-smooth product that can be applied in minimum uniform thickness of 3/8 inch and that can be feathered at edges to match adjacent floor elevations.
   2. Basis of Design Product: Formulated Materials; Treadstone FR25
   3. Cement Binder: Gypsum or blended gypsum cement as defined by ASTM C219.
   4. Compressive Strength: Not less than 2000psi at 28 days when tested according to ASTM C 109/C 109M.
   5. Underlayment Additive: Resilient-emulsion product of underlayment manufacturer, formulated for use with underlayment when applied to substrate and conditions indicated.

E. Aggregate: Well-graded, washed gravel, 1/8” to 1/4”; or coarse sand as recommended by underlayment manufacturer.
   1. Provide aggregate when recommend in writing by underlayment manufacturer for underlayment thickness required.
   2. Water: Potable and at a temperature of not more than 70 deg F.
   3. Primer: Product of underlayment manufacture recommend in writing for substrate, conditions, and application indicated.
   4. Primer shall have a VOC content of 200 g/L or less when calculated according to 40 CFR 59, Subpart D.
   5. Surface Sealer: Designed to reduce porosity as recommended by manufacturer for type of floor covering to be applied to underlayment.
   6. Basis of Design Product: Vinavil 5707.

2.02 ACCESSORIES

A. Sound Isolation Acoustic Underlayment

B. Approved equal requirements – must meet or exceed acoustical performance whentested by third party accredited lab, must require no more than ¾" thickness of fire- rated underlayment, must meet or exceed deflection properties.

2.03 UNDERLAYMENT SITE MIXING AND PLACING

A. Mix Fire Rated Underlayment according to manufacturer's recommendations.
   a. 1. Optional - Required for use – SMART BATCH SYSTEMS - Automated batch mixing/pumping machine that provides batch by batch data to assure required compressive strength is achieved throughout. Require summary of batch reports be provided to General Contractor and Architect for review.

PART 3 – EXECUTION

3.01 EXAMINATION

1. Use Manufacturer provided pre-mobilization checklist to confirm all requirements that will affect scope of work are coordinated between General Contractor and Sub Contractor. Examine substrates, with installer present and floor covering installer, for conditions affecting performance.
2. Proceed with application only after unsatisfactory conditions have been corrected.
3. Gaps / holes larger than 1/8" in diameter.
4. Soft spots in the substrate.
5. Bellowing or warping of substrate.
6. Proceed with application only after unsatisfactory conditions have been corrected.

3.02 PREPARATION

A. Prepare and clean substrate according to manufacturer's written instructions.
   a. 1. Treat nonmoving substrate cracks according to manufacturer's written instructions to prevent cracks from telegraphing (reflecting) through the underlayment.
   b. 2. Fill substrate voids to prevent underlayment from leaking.

B. Wood Substrates: Mechanically fasten loose boards and panels to eliminate substrate movement and squeaks. Sand to remove coating that might inhibit underlayment bond and remove sanding dust.

C. Provide Temporary pour stops at all floor openings, stairs, elevators and exterior doors prior to pouring underlayment. Remove pour stops after underlayment has cured.

D. Sound Control Mat: Install sound control materials according to manufacturer's written instructions.

3.03 APPLICATION

A. Mix and apply underlayment components according to manufacturer's written instructions.
   a. 1. Close areas to traffic during underlayment application and for time period after application recommended in writing by manufacturer.
   b. 2. Coordinate application of components with other general contractor to optimize performance and site conditions.
   c. 3. At substrate expansion, isolation, and other moving joints, allow joint of same width to continue through the underlayment.

B. Apply primer over prepared substrate at manufacturer's recommended spreading rate.

C. Apply underlayment to produce uniform, flat surface that will follow contour of substrate.

D. Cure underlayment according to manufacturer's written instructions. Prevent contamination during application and curing processes.

E. Do not install floor coverings over underlayment until after time period recommended in writing by underlayment manufacturer.

F. Apply surface sealer at rate recommended by manufacturer.

3.04 PROTECTION

A. Protect underlayment from concentrated and rolling loads for remainder of construction period.

END OF SECTION

SECTION 042000
UNIT MASONRY

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Concrete block.

B. Clay facing brick.

C. Mortar and grout.

D. Reinforcement and anchorage.

E. Accessories.

1.02 RELATED REQUIREMENTS

A. Section 04 7200 - Cast Sone Stone Masonry - for lintels and sills.

B. Section 055000 - Metal Fabrications: Loose steel lintels.

C. Section 061000 - Rough Carpentry: Nailing strips built into masonry.

D. Section 076200 - Sheet Metal Flashing and Trim: Through-wall masonry flashings.

E. Section 078400 - Firestopping: Firestopping at penetrations of fire-rated masonry and at top of fire-rated walls.

F. Section 079200 - Joint Sealants: Sealing control and expansion joints.

1.03 REFERENCE STANDARDS

A. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware; 2016a.

B. ASTM A615/A615M - Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement; 2016.

C. ASTM C67/C67M - Standard Test Methods for Sampling and Testing Brick and Structural Clay Tile; 2018.

D. ASTM C90 - Standard Specification for Loadbearing Concrete Masonry Units; 2016a.

E. ASTM C91/C91M - Standard Specification for Masonry Cement; 2018.

F. ASTM C140/C140M - Standard Test Methods of Sampling and Testing Concrete Masonry Units and Related Units; 2017a.

G. ASTM C144 - Standard Specification for Aggregate for Masonry Mortar; 2017.

H. ASTM C150/C150M - Standard Specification for Portland Cement; 2018.

I. ASTM C207 - Standard Specification for Hydrated Lime for Masonry Purposes; 2018.

J. ASTM C270 - Standard Specification for Mortar for Unit Masonry; 2014a.

K. ASTM C404 - Standard Specification for Aggregates for Masonry Grout; 2011.

L. ASTM C476 - Standard Specification for Grout for Masonry; 2018.

M. ASTM C780 - Standard Test Method for Preconstruction and Construction Evaluation of Mortars for Plain and Reinforced Unit Masonry; 2018a.

N. ASTM C979/C979M - Standard Specification for Pigments for Integrally Colored Concrete; 2016.

O. ASTM D226/D226M - Standard Specification for Asphalt-Saturated Organic Felt Used in Roofing and Waterproofing; 2017.

P. ASTM D4637/D4637M - Standard Specification for EPDM Sheet Used in Single-Ply Roof Membrane; 2015.

Q. BIA Technical Notes No. 7 - Water Penetration Resistance – Design and Detailing; 2017.

R. BIA Technical Notes No. 13 - Ceramic Glazed Brick Exterior Walls; 2017.

S. TMS 402/602 - Building Code Requirements and Specification for Masonry Structures; 2016.

1.04 SUBMITTALS

A. See Section 013000 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide data for masonry units, fabricated wire reinforcement, mortar, and masonry accessories.

C. Shop Drawings: Indicate pertinent dimensions, materials, anchorage, size and type of fasteners, and accessories for brickwork support system.
   1. Include calculations or selections from the manufacturer's prescriptive design tables that indicate compliance with the applicable building code and project conditions.

D. Samples: Submit four samples of decorative block and facing brick units to illustrate color, texture, and extremes of color range.

1.05 QUALITY ASSURANCE

A. Comply with provisions of TMS 402/602, except where exceeded by requirements of Contract Documents.

1.06 MOCK-UP

A. Construct a masonry wall as a mock-up panel sized 8 feet long by 6 feet high; include mortar, accessories, structural backup, and flashings (with lap joint, corner, and end dam) in mock-up.

B. Locate where directed.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Deliver, handle, and store masonry units by means that will prevent mechanical damage and contamination by other materials.

PART 2 PRODUCTS

2.01 CONCRETE MASONRY UNITS

A. Concrete Block: Comply with referenced standards and as follows:
   1. Size: Standard units with nominal face dimensions of 16 by 8 inches and nominal depth of 8 inches.

B. Load-Bearing Units: ASTM C90, normal weight.
   1. Solid block, as indicated.
   2. Exposed Faces: Manufacturer's standard color and texture.
   3. Manufacturers:
      a. Echelon Masonry; Cordova Stone
      b. Substitutions: See Section 016000 - Product Requirements.

2.02 BRICK UNITS

A. Manufacturers, see basis of design:
   1. Belden Brick; Belcrest: www.beldenbrick.com/#sle.
   2. Endicott Clay Products Co: www.endicott.com/#sle.
   3. Glen-Gery Brick Co.
   4. Substitutions: See section 016000 - Product Requirements.

B. Facing Brick: ASTM C216, Grade SW.
   1. Nominal size: King size.
   2. Special shapes: Molded units as required by conditions indicated, unless standard units can be sawn to produce equivalent effect.
   3. Compressive strength: measured in accordance with ASTM C67/C67M.

2.03 MORTAR AND GROUT MATERIALS

A. Masonry Cement: ASTM C91/C91M, Type N.

1. Colored Mortar: Premixed cement as required to match Architect's color sample.

B. Portland Cement: ASTM C150/C150M, Type I; color as required to produce approved color sample.
   1. Not more than 0.60 percent alkali.

C. Hydrated Lime: ASTM C207, Type S.

D. Mortar Aggregate: ASTM C144.

E. Grout Aggregate: ASTM C404.

F. Pigments for Colored Mortar: Pure, concentrated mineral pigments specifically intended for mixing into mortar and complying with ASTM C979/C979M.
   1. Color(s): As selected by Architect from manufacturer's full range.
   2. Manufacturers:
      a. Davis Colors, a division of Venator Materials PLC: www.daviscolors.com/#sle.
      b. Lambert Corporation: www.lambertusa.com/#sle.
      c. Solomon Colors, Inc: www.solomoncolors.com/#sle.
      d. Substitutions: See Section 016000 - Product Requirements.

G. Water: Clean and potable.

2.04 REINFORCEMENT AND ANCHORAGE

A. Reinforcing Steel: ASTM A615/A615M, Grade 40 (40,000 psi), deformed billet bars; galvanized.

B. Joint Reinforcement: Use ladder type joint reinforcement where vertical reinforcement is involved and truss type elsewhere, unless otherwise indicated.

C. Flexible Anchors: 2-piece anchors that permit differential movement between masonry and building frame, sized to provide not less than 5/8 inch of mortar coverage from masonry face.

D. Masonry Veneer Anchors: 2-piece anchors that permit differential movement between masonry veneer and structural backup, hot dip galvanized to ASTM A 153/A 153M, Class B.
   1. Anchor plates: Not less than 0.075 inch thick, designed for fastening to structural backup through sheathing by two fasteners; provide design with legs that penetrate sheathing and insulation to provide positive anchorage.
   2. Wire ties: Manufacturer's standard shape, 0.1875 inch thick.
   3. Vertical adjustment: Not less than 3-1/2 inches.
   4. Seismic Feature: Provide lip, hook, or clip on end of wire ties to engage or enclose not less than one continuous horizontal joint reinforcement wire of 0.1483 inch diameter.

2.05 ACCESSORIES

A. Preformed Control Joints: Rubber material. Provide with corner and tee accessories, fused joints.

B. Joint Filler: Closed cell polyvinyl chloride; oversized 50 percent to joint width; self expanding; in maximum lengths available.

C. Cavity Mortar Control: Semi-rigid polyethylene or polyester mesh panels, sized to thickness of wall cavity, and designed to prevent mortar droppings from clogging weeps and cavity vents and allow proper cavity drainage.
   1. Mortar Diverter: Semi-rigid mesh designed for installation at flashing locations.

D. Building Paper: ASTM D226/D226M, Type I ("No.15") asphalt felt.

E. Weeps:
   1. Type: Polyester mesh.
   2. Color(s): As selected by Architect from manufacturer's full range.

F. Cleaning Solution: Non-acidic, not harmful to masonry work or adjacent materials.

2.06 MORTAR AND GROUT MIXING

A. Mortar for Unit Masonry: ASTM C270, using the Proportion Specification.
   1. Masonry below grade and in contact with earth: Type S.
   2. Exterior, loadbearing masonry: Type N.
   3. Interior, loadbearing masonry: Type N.

B. Grout: ASTM C476; consistency required to fill completely volumes indicated for grouting; fine grout for spaces with smallest horizontal dimension of 2 inches or less; coarse grout for spaces with smallest horizontal dimension greater than 2 inches.

C. Admixtures: Add to mixture at manufacturer's recommended rate and in accordance with manufacturer's instructions; mix uniformly.

D. Mixing: Use mechanical batch mixer and comply with referenced standards.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that field conditions are acceptable and are ready to receive masonry.

B. Verify that related items provided under other sections are properly sized and located.

C. Verify that built-in items are in proper location, and ready for roughing into masonry work.

3.02 PREPARATION

A. Direct and coordinate placement of metal anchors supplied for installation under other sections.

B. Provide temporary bracing during installation of masonry work. Maintain in place until building structure provides permanent bracing.

3.03 COLD AND HOT WEATHER REQUIREMENTS

A. Comply with requirements of TMS 402/602 or applicable building code, whichever is more stringent.

3.04 COURSING

A. Establish lines, levels, and coursing indicated. Protect from displacement.

B. Maintain masonry courses to uniform dimension. Form vertical and horizontal joints of uniform thickness.

C. Concrete Masonry Units:

D. Brick Units:

3.05 PLACING AND BONDING

A. Lay solid masonry units in full bed of mortar, with full head joints, uniformly jointed with other work.

B. Lay hollow masonry units with face shell bedding on head and bed joints.

C. Buttering corners of joints or excessive furrowing of mortar joints is not permitted.

D. Remove excess mortar and mortar smears as work progresses.

E. Remove excess mortar with water repellent admixture promptly. Do not use acids, sandblasting or high pressure cleaning methods.

F. Interlock intersections and external corners, except for units laid in stack bond.

G. Do not shift or tap masonry units after mortar has achieved initial set. Where adjustment must be made, remove mortar and replace.

H. Perform job site cutting of masonry units with proper tools to provide straight, clean, unchipped edges. Prevent broken masonry unit corners or edges.

3.06 WEEPS/CAVITY VENTS

A. Install weeps in veneer and cavity walls at 24 inches on center horizontally on top of through-wall flashing above shelf angles and lintels and at bottom of walls.

3.07 CAVITY MORTAR CONTROL

A. Do not permit mortar to drop or accumulate into cavity air space or to plug weep/cavity vents.

B. Install cavity mortar diverter at base of cavity and at other flashing locations as recommended by manufacturer to prevent mortar droppings from blocking weep/cavity vents.

3.08 REINFORCEMENT AND ANCHORAGE - GENERAL, SINGLE WYTHE MASONRY, AND CAVITY WALL MASONRY

A. Unless otherwise indicated on drawings or specified under specific wall type, install horizontal joint reinforcement 16 inches on center.

B. Place masonry joint reinforcement in first and second horizontal joints above and below openings. Extend minimum 16 inches each side of opening.

C. Place continuous joint reinforcement in first and second joint below top of walls.

D. Embed longitudinal wires of joint reinforcement in mortar joint with at least 5/8 inch mortar cover on each side.

E. Lap joint reinforcement ends minimum 6 inches.

F. Fasten anchors to structural framing and embed in masonry joints as masonry is laid. Unless otherwise indicated on drawings or closer spacing is indicated under specific wall type, space anchors at maximum of 36 inches horizontally and 24 inches vertically.

3.09 REINFORCEMENT AND ANCHORAGE - MASONRY VENEER

A. Stud Back-Up: Secure veneer anchors to stud framed back-up and embed into masonry veneer at maximum 16 inches on center vertically and 24 inches on center horizontally. Place additional anchors at perimeter of openings and ends of panels, so maximum spacing of anchors is 8 inches on center.

B. Seismic Reinforcement: Connect veneer anchors with continuous horizontal wire reinforcement before embedding anchors in mortar.

3.10 MASONRY FLASHINGS

A. Whether or not specifically indicated, install masonry flashing to divert water to exterior at all locations where downward flow of water will be interrupted.

B. Terminate flashing up 8 inches minimum on vertical surface of backing:

C. Extend metal flashings through exterior face of masonry and terminate in an angled drip with hemmed edge. Install joint sealer below drip edge to prevent moisture migration under flashing.

D. Extend plastic, laminated, EPDM, and _____ flashings to within 1/2 inch of exterior face of masonry and adhere to top of stainless steel angled drip with hemmed edge.

3.11 LINTELS

A. Install loose steel lintels over openings per structural drawings.

3.12 GROUTED COMPONENTS

A. Reinforce bond beams with 2, No. 4 bars, 1 inch from bottom web.

B. Reinforce columns with 4, No. 4 bars, placed ____.

C. Lap splices minimum 24 bar diameters.

D. Support and secure reinforcing bars from displacement. Maintain position within 1/2 inch of dimensioned position.

E. Place and consolidate grout fill without displacing reinforcing.

3.13 CONTROL AND EXPANSION JOINTS

A. Do not continue horizontal joint reinforcement through control or expansion joints.

B. Install preformed control joint device in continuous lengths. Seal butt and corner joints in accordance with manufacturer's instructions.

3.14 BUILT-IN WORK

A. As work progresses, install built-in metal door frames and glazed frames and other items to be built into the work and furnished under other sections.

B. Install built-in items plumb, level, and true to line.

C. Bed anchors of metal door and glazed frames in adjacent mortar joints. Fill frame voids solid with grout.
   1. Fill adjacent masonry cores with grout minimum 12 inches from framed openings.

D. Do not build into masonry construction organic materials that are subject to deterioration.

3.15 TOLERANCES

A. Maximum Variation From Unit to Adjacent Unit: 1/16 inch.

B. Maximum Variation from Plane of Wall: 1/4 inch in 10 ft and 1/2 inch in 20 ft or more.

C. Maximum Variation from Plumb: 1/4 inch per story non-cumulative; 1/2 inch in two stories or more.

D. Maximum Variation from Level Coursing: 1/8 inch in 3 ft and 1/4 inch in 10 ft; 1/2 inch in 30 ft.

E. Maximum Variation of Mortar Joint Thickness: Head joint, minus 1/4 inch, plus 3/8 inch.

F. Maximum Variation from Cross Sectional Thickness of Walls: 1/4 inch.

3.16 CUTTING AND FITTING

A. Obtain approval prior to cutting or fitting masonry work not indicated or where appearance or strength of masonry work may be impaired.

3.17 FIELD QUALITY CONTROL

A. An independent testing agency will perform field quality control tests, as specified in Section 014000 - Quality Requirements.

B. Concrete Masonry Unit Tests: Test each variety of concrete unit masonry in accordance with ASTM C140/C140M for compliance with requirements of this specification.

C. Mortar Tests: Test each type of mortar in accordance with ASTM C780, testing with same frequency as masonry samples.

3.18 CLEANING

A. Remove excess mortar and mortar droppings.

B. Replace defective mortar. Match adjacent work.

C. Clean soiled surfaces with cleaning solution.

3.19 PROTECTION

A. Without damaging completed work, provide protective boards at exposed external corners that are subject to damage by construction activities.

END OF SECTION

SECTION 047200
CAST STONE MASONRY

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. Cast stone trim, including the following:
      a. Window sills.
      b. Lintels.
      c. Wall caps.

B. Related Sections:
   1. Section 042000 "Unit Masonry" for installing cast stone unit masonry and cast stone units in unit masonry.

1.03 ACTION SUBMITTALS

A. Product Data: For each type of product indicated.
   1. For cast stone units, include construction details, material descriptions, dimensions of individual components and profiles, and finishes.

B. Shop Drawings: Show fabrication and installation details for cast stone units. Include dimensions, details of reinforcement and anchorages if any, and indication of finished faces.
   1. Include building elevations showing layout of units and locations of joints and anchors.

C. Samples for Initial Selection: For type and configuration of cast stone unit masonry and for colored mortar.

D. Samples for Verification:
   1. For each color and texture of cast stone required, 10 inches (250 mm) square in size.
   2. For colored mortar. Make Samples using same sand and mortar ingredients to be used on Project.

1.04 INFORMATIONAL SUBMITTALS

A. Qualification Data:
   1. Include copies of material test reports for completed projects, indicating compliance of cast stone with ASTM C 1364.

B. Material Test Reports: For each mix required to produce cast stone, based on testing according to ASTM C 1364, including test for resistance to freezing and thawing.
   1. Provide test reports based on testing within previous two years.

1.05 QUALITY ASSURANCE

A. Manufacturer Qualifications: A qualified manufacturer of cast stone units similar to those indicated for this Project, that has sufficient production capacity to manufacture required units, and is a plant certified by the Cast Stone Institute.

B. Testing Agency Qualifications: Qualified according to ASTM E 329 for testing indicated.

C. Source Limitations for Cast Stone: Obtain cast stone units through single source from single manufacturer.

D. Source Limitations for Mortar Materials: Obtain mortar ingredients of a uniform quality, including color, from one manufacturer for each cementitious component and from one source or producer for each aggregate.

E. Mockups: Furnish cast stone for installation in mockups specified in Section 042000 "Unit Masonry."

F. Mockups: Build mockups to verify selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.
   1. Build mockup of typical wall area as shown on Drawings.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Coordinate delivery of cast stone with unit masonry work to avoid delaying the Work and to minimize the need for on-site storage.

B. Pack, handle, and ship cast stone units in suitable packs or pallets.
   1. Lift with wide-belt slings; do not use wire rope or ropes that might cause staining. Move cast stone units, if required, using dollies with wood supports.
   2. Store cast stone units on wood skids or pallets with nonstaining, waterproof covers, securely tied. Arrange to distribute weight evenly and to prevent damage to units. Ventilate under covers to prevent condensation.

C. Store cementitious materials on elevated platforms, under cover, and in a dry location. Do not use cementitious materials that have become damp.

D. Store mortar aggregates where grading and other required characteristics can be maintained and contamination can be avoided.

1.07 PROJECT CONDITIONS

A. Cold-Weather Requirements: Do not use frozen materials or materials mixed or coated with ice or frost. Do not build on frozen substrates. Comply with cold-weather construction requirements in ACI 530.1/ASCE 6/TMS 602.
   1. Cold-Weather Cleaning: Use liquid cleaning methods only when air temperature is 40 deg F (4 deg C) and above and will remain so until cast stone has dried, but no fewer than seven days after completing cleaning.

B. Hot-Weather Requirements: Comply with hot-weather construction requirements in ACI 530.1/ASCE 6/TMS 602.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Acceptable Manufactuer: CastleStone, 11668 Lilburn Park Road, St Louis, MO 63146; Tel: 314.997.1600; Email: Tom@CastleStoneProducts.com; Web: www.CastleStoneProducts.com.

B. Acceptable Manufacturer: Midwest Cast Stone, 1610 State Ave.; Kansas City, KS 66102 ; Tel: 913-371-3300 ; Fax: 888-830-1954; Email:request info (darin@midwestcaststone.com); Web:www.midwestcaststone.com

C. Acceptable Manufacturer: Caliber Cast Stone, #2 Cool Springs Court, O'Fallon, MO 63366; Tel: 636.978.4000; Email request info mseidel@calibercaststone.com; Web: www.calibercaststone.com.

D. Requests for substitutions will be considered in accordance with provisions of Section 01 60 00 - Product Requirements.

2.02 ARCHITECTURAL CAST STONE

A. Unit Sizes and Shapes: Provide Architectural Cast Stone in the sizes and shapes indicated on the Drawing and matching the colors(s) and finish(es) of the Samples on File at the Architects location. Architectural cast stone shall comply with the requirements of ASTM C 1364 and be provided with the following physical properties:

B. Compressive Strength ASTM C 1194: 6,500 psi minimum at 28 days.

C. Absorption ASTM C 1195: 6 percent maximum by the cold water method, or 10 percent maximum by the boiling method at 28 days.

D. Air Content ASTM C 173 or C 231: For wet cast product 4 to 8 percent for units exposed to freeze-thaw environments. Air entrainment is not required for VDT products.

E. Freeze-thaw ASTM C 1364: CPWL shall be less than 5 percent after 300 freeze/ thaw cycles.

F. Linear Shrinkage ASTM C 426: Not exceed 0.065 percent.

2.03 CAST STONE MATERIALS:

A. MATERIALS SHALL MATCH THOSE REQUIRED TO PRODUCT RESULTS MATCHING THE PHYSICAL PROPERTIES SPECIFIED, THE COLORS AND FINISHES OF THE ARCHITECTS FILE SAMPLE AND THE FOLLOWING:

B. Portland cement: Type I or Type III, white and/or grey, ASTM C 150.

C. Coarse aggregates: Granite, quartz or limestone, ASTM C 33, except for gradation.

D. Fine aggregates: Manufactured or natural sands, ASTM C 33, except for gradation.

E. Colors: Inorganic iron oxide pigments, ASTM C 979 except that carbon black pigments shall not be used.

F. Admixtures: Comply with the following:

G. ASTM C 260 for air-entraining admixtures.

H. ASTM C 494/C 495M Types A - G for water reducing, retarding, accelerating and high range admixtures.

I. Other admixtures: Integral water repellents and other chemicals, for which no ASTM Standard exists, shall be previously established as suitable for use in concrete by proven field performance or through laboratory testing.

J. STM C 618 mineral admixtures of dark and variable colors shall not be used in surfaces intended to be exposed to view.

K. ASTM C 989 granulated blast furnace slag may be used to improve physical properties. Tests are required to verify these features

L. Water: Potable.

M. Reinforcing Bars: ASTM A 615/A 615M: Grade 40 or 60 steel galvanized or epoxy coated when cover is less than 1.5 inches.

N. Welded Wire Fabric: ASTM A 185 where applicable for wet cast units.

O. Fiber reinforcement (optional): ASTM C 1116

P. Anchors, dowels and other anchoring devices and shims shall be standard building stone anchors commercially available in a non-corrosive material such as zinc plated, galvanized steel, brass, or stainless steel Type 302 or 304

2.04 RELATED PRODUCTS:

A. Anchors: As scheduled or indicated on Drawings.

B. Cleaners: Prosoco Enviro Klean Safety Klean.

C. Mortar: Type N, ASTM C 270 as specified in Section 04 05 13.23 - Surface Bonding Masonry Mortaring Masonry Mortar.

D. Joint Sealant: As specified in Section 07 91 26 - Joint Fillers.

E. Water Repellant: Prosoco Sure Klean Weather Seal Siloxane WB.

F. Water Repellant: Prosoco Sure Klean Weather Seal Siloxane PD.

2.05 FABRLCATLON

A. Cast Stone Shapes: Unless otherwise indicated on Drawings, provide:

B. Suitable wash on exterior sills, copings, projecting courses, and units with exposed top surfaces.

C. Drips on projecting units, wherever possible.

2.06 COLOR AND FINISH:

A. Match sample(s) on file at the Architect's location.

B. Surfaces intended to be exposed to view shall have a fine-grained texture similar to natural stone, with no air voids in excess of 1/32 inch and the density of such voids shall be less than 3 occurrences per any 1 square inch area and not obvious under direct daylight illumination at a 5 foot distance.

C. Units shall exhibit a texture approximately equal to the approved sample when viewed under direct daylight illumination at a 10 foot distance.

D. ASTM D 2244 permissible variation in color between units of comparable age subjected to similar weathering exposure.

E. Total color difference - not greater than 6 units.

F. Total hue difference - not greater than 2 units.

G. Minor chipping resulting from shipment and delivery shall not be grounds for rejection. Minor chips shall not be obvious under direct daylight illumination from a 20-ft distance.

H. The occurrence of crazing or efflorescence shall not constitute a cause for rejection.

I. Remove cement film, if required, from exposed surfaces prior to packaging for shipment

2.07 REINFORCING:

A. Reinforce the units as required by the Drawings and as recommended by the manufacturer for safe handling and structural stress.

B. Minimum reinforcing shall be 0.25 percent of the cross section area.

C. Reinforcement shall be noncorrosive where faces exposed to weather are covered with less than 1.5 inches of concrete material. All reinforcement shall have minimum coverage of twice the diameter of the bars.

D. Panels, soffits and similar stones greater than 24 inches (600 mm) in one direction shall be reinforced in that direction. Units less than 24 inches (600 mm) in both their length and width dimension shall be non-reinforced unless otherwise specified.

E. Welded wire fabric reinforcing shall not be used in dry cast products.

F. Curing:
   1. Cure in a warm curing chamber approximately 100 degrees F (37.8 degrees C) at 95 percent relative humidity for approximately 12 hours, or cure in a 95 percent moist environment at a minimum 70 degrees F (21.1 degrees C) for 16 hours after casting.
   2. Additional yard curing at 95 percent relative humidity shall be 350 degree days (i.e. 7 days @ 50 degrees F (10 degrees C) or 5 days @ 70 degrees F (21 degrees C)) prior to shipping.
   3. Form cured units shall be protected from moisture evaporation with curing blankets or curing compounds after casting.

G. Production Tolerances:
   1. Cross section dimensions shall not deviate by more than +/- 1/8 inch from approved dimensions.
   2. Length of units shall not deviate by more than length/ 360 or +/- 1/8 inch, whichever is greater, not to exceed +/- 1/8 inch.
   3. Maximum length of any unit shall not exceed 15 times the average thickness of such unit unless otherwise agreed by the Architect.
   4. Warp, bow or twist of units shall not exceed length / 360 or +/- 1/8 inch, whichever is greater.
   5. Location of dowel holes, anchor slots, flashing grooves, false joints and similar features; on formed sides of unit, 1/8 inch, on unformed sides of unit, 3/8 inch maximum deviation.

2.08 SOURCE QUALITY CONTROL

A. Test compressive strength and absorption from specimens taken from every 500 cubic feet of product produced.

B. Perform tests in accordance ASTM C 1194 and C 1195.

C. Have tests performed by an independent testing laboratory every six months.

D. New and existing mix designs shall be tested for strength and absorption compliance prior to producing units.

E. Retain copies of all test reports for a minimum of two years.

PART 3 EXECUTION

3.01 EXAMINATION

A. Examine substrates and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of work.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 SETTING CAST STONE IN MORTAR

A. Install cast stone units to comply with requirements in Section 042000 "Unit Masonry."

B. Set cast stone as indicated on Drawings. Set units accurately in locations indicated with edges and faces aligned according to established relationships and indicated tolerances.
   1. Install anchors, supports, fasteners, and other attachments indicated or necessary to secure units in place.
   2. Coordinate installation of cast stone with installation of flashing specified in other Sections.

C. Wet joint surfaces thoroughly before applying mortar or setting in mortar.

D. Set units in full bed of mortar with full head joints unless otherwise indicated.
   1. Set units with joints 1/4 to 3/8 inch (6 to 10 mm) wide unless otherwise indicated.
   2. Build anchors and ties into mortar joints as units are set.
   3. Fill dowel holes and anchor slots with mortar.
   4. Fill collar joints solid as units are set.
   5. Build concealed flashing into mortar joints as units are set.
   6. Keep head joints in coping and other units with exposed horizontal surfaces open to receive sealant.
   7. Keep joints at shelf angles open to receive sealant.

E. Rake out joints for pointing with mortar to depths of not less than 3/4 inch (19 mm). Rake joints to uniform depths with square bottoms and clean sides. Scrub faces of units to remove excess mortar as joints are raked.

F. Point mortar joints by placing and compacting mortar in layers not greater than 3/8 inch (10 mm). Compact each layer thoroughly and allow it to become thumbprint hard before applying next layer.

G. Tool exposed joints slightly concave when thumbprint hard, using a jointer larger than joint thickness unless otherwise indicated.

H. Provide sealant joints at copings and other horizontal surfaces, at expansion, control, and pressure-relieving joints, and at locations indicated.
   1. Keep joints free of mortar and other rigid materials.
   2. Build in compressible foam-plastic joint fillers where indicated.
   3. Form joint of width indicated, but not less than 3/8 inch (10 mm).
   4. Prime cast stone surfaces to receive sealant and install compressible backer rod in joints before applying sealant unless otherwise indicated.
   5. Prepare and apply sealant of type and at locations indicated to comply with applicable requirements in Section 079200 "Joint Sealants."

3.03 SETTING ANCHORED CAST STONE WITH SEALANT-FILLED JOINTS

A. Set cast stone as indicated on Drawings. Set units accurately in locations indicated with edges and faces aligned according to established relationships and indicated tolerances.
   1. Install anchors, supports, fasteners, and other attachments indicated or necessary to secure units in place.
   2. Shim and adjust anchors, supports, and accessories to set cast stone in locations indicated with uniform joints.

B. Keep cavities open where unfilled space is indicated between back of cast stone units and backup wall; do not fill cavities with mortar or grout.

C. Fill anchor holes with sealant.
   1. Where dowel holes occur at pressure-relieving joints, provide compressible material at ends of dowels.

D. Set cast stone supported on clip or continuous angles on resilient setting shims. Use material of thickness required to maintain uniform joint widths. Hold shims back from face of cast stone a distance at least equal to width of joint.

E. Keep joints free of mortar and other rigid materials. Remove temporary shims and spacers from joints after anchors and supports are secured in place and cast stone units are anchored. Do not begin sealant installation until temporary shims and spacers are removed.
   1. Form open joint of width indicated, but not less than 3/8 inch (10 mm).

F. Prime cast stone surfaces to receive sealant and install compressible backer rod in joints before applying sealant unless otherwise indicated.

G. Prepare and apply sealant of type and at locations indicated to comply with applicable requirements in Section 079200 "Joint Sealants."

3.04 INSTALLATION TOLERANCES

A. Variation from Plumb: Do not exceed 1/8 inch in 10 feet (3 mm in 3 m), 1/4 inch in 20 feet (6 mm in 6 m), or 1/2 inch (12 mm) maximum.

B. Variation from Level: Do not exceed 1/8 inch in 10 feet (3 mm in 3 m), 1/4 inch in 20 feet (6 mm in 6 m), or 1/2 inch (12 mm) maximum.

C. Variation in Joint Width: Do not vary joint thickness more than 1/8 inch in 36 inches (3 mm in 900 mm) or one-fourth of nominal joint width, whichever is less.

D. Variation in Plane between Adjacent Surfaces (Lipping): Do not vary from flush alignment with adjacent units or adjacent surfaces indicated to be flush with units by more than 1/16 inch (1.5 mm), except where variation is due to warpage of units within tolerances specified.

3.05 ADJUSTING AND CLEANING

A. Remove and replace stained and otherwise damaged units and units not matching approved Samples. Cast stone may be repaired if methods and results are approved by Architect.

B. Replace units in a manner that results in cast stone matching approved Samples, complying with other requirements, and showing no evidence of replacement.

C. In-Progress Cleaning: Clean cast stone as work progresses.
   1. Remove mortar fins and smears before tooling joints.
   2. Remove excess sealant immediately, including spills, smears, and spatter.

D. Final Cleaning: After mortar is thoroughly set and cured, clean exposed cast stone as follows:
   1. Remove large mortar particles by hand with wooden paddles and nonmetallic scrape hoes or chisels.
   2. Test cleaning methods on sample; leave one sample uncleaned for comparison purposes. Obtain Architect's approval of sample cleaning before proceeding with cleaning of cast stone.
   3. Protect adjacent surfaces from contact with cleaner by covering them with liquid strippable masking agent or polyethylene film and waterproof masking tape.

4. Wet surfaces with water before applying cleaners; remove cleaners promptly by rinsing thoroughly with clear water.
5. Clean cast stone by bucket-and-brush hand-cleaning method described in BIA Technical Notes 20.
6. Clean cast stone with proprietary acidic cleaner applied according to manufacturer's written instructions.

END OF SECTION 047200

SECTION 051200

STRUCTURAL STEEL

PART 1 – GENERAL

1.1 SECTION INCLUDES

A. Structural steel framing members.

B. Base plates, shear stud connectors

C. Grouting under base plates.

1.2 RELATED SECTIONS

A. Section 05 2100 - Steel Joists.

B. Section 05 3100 - Steel Deck: Support framing for small openings in deck.

C. Section 05 5000 - Metal Fabrications: Steel fabrications affecting structural steel work.

D. Section 07 8100 - Sprayed-On Fireproofing: Fireproof protection to framing and metal deck systems.

1.3 UNIT PRICES - MEASUREMENT AND PAYMENT

A. See Section 01270 - Unit Prices, for additional unit price requirements.

B. Structural Steel Framing:

1. Basis of Measurement: By the ton.

2. Basis of Payment: Includes structural members fabricated, placed and anchored.

1.4 REFERENCES

A. AISC M016 - ASD Manual of Steel Construction; American Institute of Steel Construction, Inc.; 1989, Ninth Edition.

B. AISC S303 - Code of Standard Practice for Steel Buildings and Bridges; American Institute of Steel Construction, Inc.; 2000.

C. AISC S348 - Specification for Structural Joints Using ASTM A325 or A490 Bolts; 2000.

D. ASTM A 36/A 36M - Standard Specification for Carbon Structural Steel; 2001.

E. ASTM A 53/A 53M - Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless; 2002.

F. ASTM A 108 - Standard Specification for Steel Bars, Carbon, Cold Finished, Standard Quality; 1999.

G. ASTM A 123/A 123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products; 2002.

H. ASTM A 153/A 153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware; 2002.

I. ASTM A 242/A 242M - Standard Specification for High-Strength Low-Alloy Structural Steel; 2001.

J. ASTM A 307 - Standard Specification for Carbon Steel Bolts and Studs, 60 000 PSI Tensile Strength; 2002.

K. ASTM A 325 - Standard Specification for Structural Bolts, Steel, Heat Treated, 120/105 ksi

Minimum Tensile Strength; 2002.

L. ASTM A 325M - Standard Specification for High-Strength Bolts for Structural Steel Joints (Metric); 2000.

M. ASTM A 449 - Standard Specification for Quenched and Tempered Steel Bolts and Studs; 2000.

N. ASTM A 490 - Standard Specification for Structural Bolts, Alloy Steel, Heat-Treated, 150 ksi Minimum Tensile Strength; 2002.

O. ASTM A 490M - Standard Specification for High-Strength Steel Bolts, Classes 10.9 and 10.9.3, for Structural Steel Joints (Metric); 2000.

P. ASTM A 500 - Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes; 2001a.

Q. ASTM A 501 - Standard Specification for Hot-Formed Welded and Seamless Carbon Steel Structural Tubing; 2001.

R. ASTM A 514/A 514M - Standard Specification for High-Yield Strength, Quenched and Tempered Alloy Steel Plate, Suitable for Welding; 2000a.

S. ASTM A 529/A 529M - Standard Specification for High-Strength Carbon-Manganese Steel of Structural Quality; 2001.

T. ASTM A 563 - Standard Specification for Carbon and Alloy Steel Nuts; 2000.

U. ASTM A 563M - Standard Specification for Carbon and Alloy Steel Nuts (Metric); 2001.

V. ASTM A 572/A 572M - Standard Specification for High-Strength Low-Alloy Columbium-Vanadium Structural Steel; 2001.

W. ASTM A 588/A 588M - Standard Specification for High-Strength Low-Alloy Structural Steel with 50 ksi (345 MPa) Minimum Yield Point to 4-in. (100-mm) Thick; 2001.

X. ASTM A 992/A 992M - Standard Specification for Structural Steel Shapes; 2002.

Y. ASTM A 1008/A 1008M - Standard Specification for Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy and High-Strength Low-Alloy with Improved Formability; 2002.

Z. ASTM A 1011/A 1011M - Standard Specification for Steel, Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low-Alloy and High-Strength Low-Alloy with Improved Formability; 2002.

AA. ASTM C 1107 - Standard Specification for Packaged Dry, Hydraulic-Cement Grout (Nonshrink); 2002.

AB. ASTM E 94 - Standard Guide for Radiographic Examination; 2000.

AC. ASTM E 164 - Standard Practice for Ultrasonic Contact Examination of Weldments; 1997.

AD. ASTM E 165 - Standard Test Method for Liquid Penetrant Examination; 2002.

AE. ASTM E 709 - Standard Guide for Magnetic Particle Examination; 2001.

AF. ASTM F 436 - Standard Specification for Hardened Steel Washers; 2002.

AG. ASTM F 959 - Standard Specification for Compressible-Washer-Type Direct Tension Indicators for Use with Structural Fasteners; 2002.

AH. AWS A2.4 - Standard Symbols for Welding, Brazing, and Nondestructive Examination; American Welding Society; 1998.

AI. AWS D1.1 - Structural Welding Code - Steel; American Welding Society; 2004.

AJ. ITS (DIR) - Directory of Listed Products; Intertek Testing Services NA, Inc.; current edition.

AK. SSPC-Paint 15 - Steel Joist Shop Primer; Society for Protective Coatings; 1999 (Ed. 2000).

AL. SSPC-Paint 20 - Zinc-Rich Primers (Type I, "Inorganic," and Type II, "Organic"); Society for Protective Coatings; 2002.

AM. UL (FRD) - Fire Resistance Directory; Underwriters Laboratories Inc.; current edition.

1.5 SUBMITTALS

A. See Section 01300 - Administrative Requirements, for submittal procedures.

B. Shop Drawings:

1. Indicate profiles, sizes, spacing, locations of structural members, openings, attachments, and fasteners.
2. Connections.
3. Indicate cambers and loads.
4. Indicate welded connections with AWS A2.4 welding symbols. Indicate net weld lengths.

C. Manufacturer's Mill Certificate: Certify that products meet or exceed specified requirements.

D. Mill Test Reports: Indicate structural strength, destructive test analysis and non-destructive test analysis.

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

1.6 QUALITY ASSURANCE

A. Fabricate structural steel members in accordance with AISC "ASD Manual of Steel Construction".

B. Comply with Section 10 of AISC "Code of Standard Practice for Steel Buildings and Bridges" for architecturally exposed structural steel.

C. Maintain one copy of each document on site.

D. Fabricator: Company specializing in performing the work of this section with minimum five (5) years of documented experience.

E. Erector: Company specializing in performing the work of this section with minimum five (5) years of documented experience.

F. 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 where the project is located.

PART 2 – PRODUCTS

2.1 MATERIALS

A. Steel Angles and Plates: ASTM A 36/A 36M.

B. Steel W Shapes and Tees: ASTM A 992/A 992M.

C. Rolled Steel Structural Shapes: ASTM A 992/A 992M.

D. Steel Shapes, Plates, and Bars: ASTM A 242/A 242M high-strength, corrosion-resistant structural steel.

E. Steel Shapes, Plates, and Bars: ASTM A 529/A 529M high-strength, carbon-manganese structural steel, Grade 50.

F. Steel Plates and Bars: ASTM A 572/A 572M, Grade 50 (345) high-strength, columbium-vanadium steel.

G. Cold-Formed Structural Tubing: ASTM A 500, Grade B.

H. Hot-Formed Structural Tubing: ASTM A 501, seamless or welded.

J. Steel Plate: ASTM A 36.

K. Steel Sheet: ASTM A 1011/A 1011M, Designation SS, Grade 30 hot-rolled, or ASTM A 1008/A 1008M, Designation SS, Grade 30 cold-rolled.

L. Pipe: ASTM A 53/A 53M, Grade B, Finish black.

M. Shear Stud Connectors: Made from ASTM A 108 Grade 1015 bars.

O. Sag Rods: ASTM A 36/A 36M.

P. Carbon Steel Bolts and Nuts: ASTM A 307, Grade A galvanized to ASTM A 153/A 153M, Class C.

Q. High-Strength Bolts, Nuts, and Washers: ASTM A 325 (ASTM A 325M), Type 1, medium carbon, plain.

R. High-Strength Structural Bolts: ASTM A 490 (ASTM A 490M), with matching ASTM A 563 (ASTM A 563M) nuts and ASTM F 436 washers; Type 1 alloy steel.

S. Anchor Bolts: ASTM A 307, Grade C.

T. High-Strength Anchor Bolts: ASTM A 325, Type 1 medium carbon, plain.

U. Load Indicator Washers: Provide washers complying with ASTM F 959 at all connections requiring high-strength bolts.

V. Welding Materials: AWS D1.1; type required for materials being welded.

W. Sliding Bearing Plates: Teflon coated.

X. Grout: Non-shrink, non-metallic aggregate type, complying with ASTM C 1107 and capable of developing a minimum compressive strength of 7,000 psi at 28 days.

Y. Shop and Touch-Up Primer: Fabricator's standard, complying with VOC limitations of authorities having jurisdiction.

Z. Touch-Up Primer for Galvanized Surfaces: Fabricator's standard, complying with VOC limitations of authorities having jurisdiction.

2.2 FABRICATION

A. Shop fabricate to greatest extent possible.

B. Continuously seal joined members by intermittent welds and plastic filler. Grind exposed welds smooth.

C. Fabricate connections for bolt, nut, and washer connectors.

D. Develop required camber for members.

2.3 FINISH

A. Prepare structural component surfaces in accordance with SSPC SP.

B. Shop prime structural steel members. Do not prime surfaces that will be field welded, in contact with concrete, or high strength bolted.

C. Leave structural steel members un-primed.

D. Galvanize structural steel members to comply with ASTM A 123/A 123M. All exterior/ exposed to weather steel components to be galvanized.

2.4 SOURCE QUALITY CONTROL AND TESTS

A. Provide shop testing and analysis of structural steel per Contract Documents

B. High-Strength Bolts: Provide testing and verification of shop-bolted connections in accordance with AISC "Specification for Structural Joints Using ASTM A325 or A490 Bolts".

C. Welded Connections: Visually inspect all shop-welded connections per Contract Documents

1. Radiographic testing performed in accordance with ASTM E 94.

2. Ultrasonic testing performed in accordance with ASTM E 164.
3. Liquid penetrant inspection performed in accordance with ASTM E 165.
4. Magnetic particle inspection performed in accordance with ASTM E 709.

PART 3 – EXECUTION

3.1 EXAMINATION

A. Verify that conditions are appropriate for erection of structural steel and that the work may properly proceed.

3.2 ERECTION

A. Erect structural steel in compliance with AISC "Code of Standard Practice for Steel Buildings and Bridges".
B. Allow for erection loads and provide sufficient temporary bracing to maintain structure in safe condition, plumb, and in true alignment until completion of erection and installation of permanent bracing.
C. Field weld components and shear studs indicated on drawings or shop drawings.
D. Use carbon steel bolts only for temporary bracing during construction, unless otherwise specifically permitted on drawings. Install high-strength bolts in accordance with AISC "Specification for Structural Joints Using ASTM A325 or A490 Bolts".
E. Do not field cut or alter structural members without approval of Architect.
F. After erection, prime welds, abrasions, and surfaces not shop primed, except surfaces to be in contact with concrete.
G. Grout solidly between column plates and bearing surfaces, complying with manufacturer's instructions for nonshrink grout. Trowel grouted surfaces smooth, splaying neatly to 45 degrees.

3.3 ERECTION TOLERANCES

A. Maximum Variation from Plumb: 1/4 inch per story, non-cumulative.
B. Maximum Offset from True Alignment: 1/4 inch.

3.4 FIELD QUALITY CONTROL

A. An independent testing agency will perform field quality control tests, as specified in Section 01400.
B. High-Strength Bolts: Provide testing and verification of field-bolted connections in accordance with AISC "Specification for Structural Joints Using ASTM A325 or A490 Bolts", per Contract Documents
C. Welded Connections: Visually inspect all field-welded connections per Contract Documents
    1. Radiographic testing performed in accordance with ASTM E 94.
    2. Ultrasonic testing performed in accordance with ASTM E 164.
    3. Liquid penetrant inspection performed in accordance with ASTM E 165.
    4. Magnetic particle inspection performed in accordance with ASTM E 709.

END OF SECTION 051200

SECTION 053100

METAL DECKING

PART 1 – GENERAL

1.1 SECTION INCLUDES
- A. Roof deck
- B. Composite floor deck
- C. Bearing plates and angles
- D. Stud shear connectors

1.2 RELATED REQUIREMENTS
- A. Section 03 3000 - Cast in place concrete
- B. Section 05 1200 - Structural Steel Framing: Support framing for openings up to 6'-0" and shear stud connectors
- C. Section 05 5000 - Metal Fabrications: Steel angle concrete stops at deck edges.
- D. Section 07 8100 - Applied Fireproofing: Spray applied fireproofing.
- E. Section 26 0544 Sleeves and Sleeve Seals for Electrical Raceways and Cabling.
- F. Section 01 8113 Sustainable Design Requirements. (Addendum #2)

1.3 REFERENCE STANDARDS
- A. ASTM A 36/A 36M - Standard Specification for Carbon Structural Steel
- B. ASTM A 108 - Standard Specification for Steel Bar, Carbon and Alloy, Cold-Finished
- C. ASTM A 123/A 123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products
- D. ASTM A 653/A 653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process
- E. ASTM A 1008/A 1008M - Standard Specification for Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength, Low Alloy, and High-Strength Low-Alloy with Improved Formability, Solution Hardened, and Bake Hardened
- F. AWS D1.1/D1.1M - Structural Welding Code - Steel; American Welding Society
- G. AWS D1.3 - Structural Welding Code - Sheet Steel; American Welding Society.
- H. FM P7825 - Approval Guide; Factory Mutual Research Corporation.
- I. ITS (DIR) - Directory of Listed Products; Intertek Testing Services NA, Inc.
- J. SDI (DM) - Publication No.31, Design Manual for Composite Decks, Form Decks, Roof Decks; Steel Deck Institute.
- K. SSPC-Paint 15 - Steel Joist Shop Primer; The Society for Protective Coatings.
- L. SSPC-Paint 20 - Zinc-Rich Primers (Type I, "Inorganic," and Type II, "Organic"); The Society for Protective Coatings
- M. SSPC-Paint 25 - Zinc Oxide, Alkyd, Linseed Oil Primer for Use Over Hand Cleaned Steel, Type I and Type II; Society for Protective Coatings
- N. UL (FRD) - Fire Resistance Directory; Underwriters Laboratories Inc.

1.4 SUBMITTALS
- A. See Section 01 3000 - Administrative Requirements, for submittals procedures.
- B. Shop Drawings: Indicate deck plan, support locations; projections; openings; cellular

raceways and outlet box locations; pertinent details; accessories.

C. Product Data: Provide deck profile characteristics; dimensions; structural properties; Finishes.
D. Certificates: Certify that products furnished meet or exceed specified requirements.
E. Submit manufacturer's installation instructions.
F. Welders Certificates: Certify welders employed on the Work, verifying AWS qualification within the previous 12 months.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: Company specializing in performing the work of this Section with minimum 5 years of experience.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Cut plastic wrap to encourage ventilation.
B. Store deck on dry wood sleepers; slope for positive drainage

PART 2 – PRODUCTS

2.01 MANUFACTURERS

A. Steel Deck:
1. New Millennium Building Systems: www.metaldek.com
2. Nucor-Vulcraft Group: www.vulcraft.com
3. Substitutions: See Section 01 6000 - Product Requirements

2.02 STEEL DECK

A. Roof Deck: Non-composite type, fluted steel sheet:
1. Galvanized Steel Sheet: ASTM A 653/A 653M, Structural Steel (SS) Grade 33 with G60 galvanized coating.
a. Grade as required to meet performance criteria.
2. Structural Properties: as given on Structural Drawings

B. Composite Floor Deck: Fluted steel sheet embossed to interlock with concrete:
1. Galvanized Steel Sheet: ASTM A 653/A 653M, Structural Steel (SS) Grade 50 with G60 galvanized coating.
a. Grade as required to meet performance criteria.
2. Structural Properties: as given on Structural Drawings

2.03 ACESSORY MATERIALS

A. Bearing Angles: ASTM A 36/A 36M steel.
B. Stud Shear Connectors: ASTM A108, Type B Nelson headed shear stud connectors or approved equivalent.
C. Welding Materials: AWS D1.1.
D. Fasteners: Stainless steel, self tapping.
E. Weld Washers: Mild steel, uncoated, 3/4 outside diameter, 1/8 inch thick.
F. Shop and Touch-Up Primer: Complying with VOC limitations of authorities having jurisdiction.
G. Flute Closures: Closed cell; profiled to fit tight to the deck.

2.04 FABRICATED DECK ACCESSORIES

A. Sheet Metal Deck Accessories: Metal closure strips; 33mil thick sheet steel; of profile and size as required; finished same as deck.

B. Cant Strips: Formed sheet steel, 33mil thick, 45 degree slope, 3 1/2 inch nominal width and height, flange for attachment.

C. Roof Drain Pans: 68mil sheet steel, flat bottom, sloped sides, recessed 1-1/2 inches below roof deck surface, bearing flange 3 inches wide, sealed watertight.

D. Floor Drain Pans: 68mil sheet steel, flat bottom, sloped sides, recessed 1-1/2 inches below floor deck surface, bearing flange 3 inches wide, sealed watertight.

PART 3 – EXECUTION

3.01 EXAMINATION

A. Verify existing conditions prior to beginning work.

3.02 INSTALLATION

A. Erect metal deck in accordance with SDI Design Manual and manufacturer's instructions. Align and level.

B. On all bearing surfaces provide greater of 2½" inch bearing or as indicated on Structural Drawings.

C. Fasten deck to steel support members at ends and intermediate supports at spacing indicated on Structural Drawings.

1. Welding: Use fusion welds through weld washers.

D. Weld deck in accordance with AWS D1.3.

E. At deck openings reinforce as indicated on Structural Drawings.

F. Where deck changes direction, install 6 inch minimum wide sheet steel cover plates, of same thickness as deck. Fusion weld 12 inches on center maximum.

G. At floor edges, install concrete stops upturned to top surface of slab, to contain wet concrete. Provide stops of sufficient strength to remain stationary without distortion.

H. At openings between deck and walls, columns, and openings, provide sheet steel closures and angle flashings to close openings.

I. Close openings above walls and partitions perpendicular to deck flutes with double row of foam cell closures.

J. Place metal cant strips in position and mechanically attach.

K. Position roof drain pans with flange bearing on top surface of deck. Fusion weld at each deck flute.

L. Position floor drain pans with flange bearing on top surface of deck. Fusion weld at each deck flute.

M. Weld stud shear connectors through steel deck to structural members below.

N. Immediately after welding deck and other metal components in position, coat welds, burned areas, and damaged surface coating, with touch-up primer.

END OF SECTION - 053100

SECTION 055213
PIPE AND TUBE RAILINGS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Wall mounted handrails.

B. Stair railings and guardrails.

C. Free-standing railings at steps.

D. Balcony railings and guardrails.

1.02 RELATED REQUIREMENTS

A. Section 033000 - Cast-in-Place Concrete: Placement of anchors in concrete.

B. Section 099113 - Exterior Painting: Paint finish.

1.03 REFERENCE STANDARDS

A. ADA Standards - Americans with Disabilities Act (ADA) Standards for Accessible Design; 2010.

B. ASTM A53/A53M - Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless; 2018.

C. ASTM A500/A500M - Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes; 2013.

D. ASTM E935 - Standard Test Methods for Performance of Permanent Metal Railing Systems and Rails for Buildings; 2013, with Editorial Revision.

E. SSPC-Paint 15 - Steel Joist Shop Primer/Metal Building Primer; 1999 (Ed. 2004).

F. SSPC-Paint 20 - Zinc-Rich Primers (Type I, "Inorganic," and Type II, "Organic"); 2002 (Ed. 2004).

1.04 SUBMITTALS

A. See Section 013000 - Administrative Requirements, for submittal procedures.

B. Shop Drawings: Indicate profiles, sizes, connection attachments, anchorage, size and type of fasteners, and accessories.
   1. Include the design engineer's seal and signature on each sheet of shop drawings.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Handrails and Railings:
   1. See basis of design.
   2. Substitutions: See Section 016000 - Product Requirements.

2.02 RAILINGS - GENERAL REQUIREMENTS

A. Design, fabricate, and test railing assemblies in accordance with the most stringent requirements of applicable local code.

B. Distributed Loads: Design railing assembly, wall rails, and attachments to resist distributed force of 75 pounds per linear foot applied to the top of the assembly and in any direction, without damage or permanent set. Test in accordance with ASTM E935

C. Concentrated Loads: Design railing assembly, wall rails, and attachments to resist a concentrated force of 200 pounds applied at any point on the top of the assembly and in any direction, without damage or permanent set. Test in accordance with ASTM E935

D. Allow for expansion and contraction of members and building movement without damage to connections or members.

E. Dimensions: See drawings for configurations and heights.

F. Provide anchors and other components as required to attach to structure, made of same materials as railing components unless otherwise indicated; where exposed fasteners are unavoidable provide flush countersunk fasteners.

2.03 STEEL RAILING SYSTEM

A. Steel Tube: ASTM A500/A500M Grade B cold-formed structural tubing.

B. Steel Pipe: ASTM A53/A53M Grade B Schedule 80, black finish.

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

D. Exposed Fasteners: No exposed bolts or screws.

E. Shop and Touch-Up Primer: SSPC-Paint 15, complying with VOC limitations of authorities having jurisdiction.

2.04 FABRICATION

A. Accurately form components to suit specific project conditions and for proper connection to building structure.

B. Fit and shop assemble components in largest practical sizes for delivery to site.

C. Fabricate components with joints tightly fitted and secured. Provide spigots and sleeves to accommodate site assembly and installation.

D. Welded Joints:
1. Exterior Components: Continuously seal joined pieces by intermittent welds and plastic filler. Drill condensate drainage holes at bottom of members at locations that will not encourage water intrusion.
2. Interior Components: Continuously seal joined pieces by intermittent welds and plastic filler.
3. Grind exposed joints flush and smooth with adjacent finish surface. Make exposed joints butt tight, flush, and hairline. Ease exposed edges to small uniform radius.

PART 3 EXECUTION

3.01 EXAMINATION

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

3.02 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Install components plumb and level, accurately fitted, free from distortion or defects, with tight joints.

C. Install railings in compliance with ADA Standards for accessible design at applicable locations.

D. Anchor railings securely to structure.

E. Conceal anchor bolts and screws whenever possible. Where not concealed, use flush countersunk fastenings.

3.03 TOLERANCES

A. Maximum Variation From Plumb: 1/4 inch per floor level, non-cumulative.

B. Maximum Offset From True Alignment: 1/4 inch.

C. Maximum Out-of-Position: 1/4 inch.

END OF SECTION

SECTION 072100.01
THERMAL INSULATION

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. This Section includes the following:
   1. Perimeter insulation at slabs-on-grade.
   2. Concealed building insulation.

B. Related Sections include the following:
   1. Division 09 Section Acoustic Insulation for sound attenuation insulation.

1.03 SUBMITTALS

A. Product Data: For each type of product indicated.

1.04 QUALITY ASSURANCE

A. Source Limitations: Obtain each type of building insulation through one source from a single manufacturer.

B. Fire-Test-Response Characteristics: Provide insulation and related materials with the fire-test-response characteristics indicated, as determined by testing identical products per test method indicated below by UL or another testing and inspecting agency acceptable to authorities having jurisdiction. Identify materials with appropriate markings of applicable testing and inspecting agency.
   1. Surface-Burning Characteristics: ASTM E 84.
   2. Fire-Resistance Ratings: ASTM E 119.
   3. Combustion Characteristics: ASTM E 136.

1.05 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 written instructions for handling, storing, and protecting during installation.

B. Protect plastic 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 before installation time.
   3. Complete installation and concealment of plastic materials as rapidly as possible in each area of construction.

PART 2 PRODUCTS

2.01 CELLULAR-GLASS INSULATION

A. Manufacturer: Johns Manville.

B. Cellular-Glass Insulation:
   1. R-21 kraft faced at exterior walls - install with kraft face to interior of building.

2.02 FOAM-PLASTIC BOARD INSULATION

A. Extruded-Polystyrene Board Insulation: ASTM C 578, of type and density indicated below, with maximum flame-spread and smoke-developed indexes of 75 and 450, respectively:
   1. Type VI, 1.80 lb/cu. ft., R-5 per inch.

2.03 AUXILIARY INSULATING MATERIALS

A. Vapor-Retarder Tape: Pressure-sensitive tape of type recommended by insulation manufacturers for sealing joints and penetrations in vapor-retarder facings.

B. Eave Ventilation Troughs: Preformed, rigid fiberboard or plastic sheets designed and sized to fit between roof framing members and to provide cross ventilation between insulated attic spaces and vented eaves.

PART 3 EXECUTION

3.01 EXAMINATION

A. Examine substrates and conditions, with Installer present, for compliance with requirements of Sections in which substrates and related work are specified and for other conditions affecting performance.
   1. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 PREPARATION

A. Clean substrates of substances harmful to insulation or vapor retarders, including removing projections capable of puncturing vapor retarders or of interfering with insulation attachment.

3.03 INSTALLATION, GENERAL

A. Comply with insulation manufacturer's written instructions applicable to products and application indicated.

B. Install insulation that is undamaged, dry, and unsoiled and that has not been left exposed at any time to ice, rain, and snow.

C. Extend insulation in thickness indicated to envelop entire area to be insulated. Cut and fit tightly around obstructions and fill voids with insulation. Remove projections that interfere with placement.

D. Water-Piping Coordination: If water piping is located within insulated exterior walls, coordinate location of piping to ensure that it is placed on warm side of insulation and insulation encapsulates piping.

E. For preformed insulating units, provide sizes to fit applications indicated and selected from manufacturer's standard thicknesses, widths, and lengths. Apply single layer of insulation units to produce thickness indicated unless multiple layers are otherwise shown or required to make up total thickness.

3.04 INSTALLATION OF SLAB EDGE INSULATION

A. Install vertically inside formwork as indicated in the drawings. Stagger end joints and tightly abut insulation units.

B. Protect insulation from damage during concrete work.

3.05 INSTALLATION OF CAVITY-WALL INSULATION

A. Install units of cellular-glass insulation with closely fitting joints using method indicated by manufacturer.

3.06 PROTECTION

A. Protect installed insulation from damage due to harmful weather exposures, physical abuse, and other causes. Provide temporary coverings or enclosures where insulation is subject to abuse and cannot be concealed and protected by permanent construction immediately after installation.

END OF SECTION 072100

SECTION 072100
THERMAL INSULATION

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Board insulation for continuous insulation if shown.

B. Batt insulation and vapor retarder in exterior wall, ceiling, roof, and floor construction.

C. Batt insulation for filling perimeter window and door shim spaces and crevices in exterior wall and roof.

1.02 REFERENCE STANDARDS

A. ASTM C240 - Standard Test Methods of Testing Cellular Glass Insulation Block; 2016.

B. ASTM C552 - Standard Specification for Cellular Glass Thermal Insulation; 2016a.

C. ASTM C553 - Standard Specification for Mineral Fiber Blanket Thermal Insulation for Commercial and Industrial Applications; 2013.

D. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2018.

1.03 SUBMITTALS

A. Product Data: Provide data on product characteristics, performance criteria, and product limitations.

B. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.

C. Manufacturer's Installation Instructions: Include information on special environmental conditions required for installation and installation techniques.

1.04 FIELD CONDITIONS

A. Do not install insulation adhesives when temperature or weather conditions are detrimental to successful installation.

PART 2 PRODUCTS

2.01 APPLICATIONS

A. Insulation in Metal Framed Walls: Batt insulation with integral vapor retarder.

B. Insulation in Wood Framed Walls: Batt insulation with integral vapor retarder.

C. Insulation in Wood Framed Ceiling Structure: Batt insulation with no vapor retarder.

2.02 BATT INSULATION MATERIALS

A. Where batt insulation is indicated, either glass fiber or mineral fiber batt insulation may be used, as indicated on drawings.

B. Glass Fiber Batt Insulation: Flexible preformed batt or blanket, complying with ASTM C665; friction fit.
   1. Formaldehyde Content: Zero.

C. Mineral Fiber Batt Insulation: Flexible or semi-rigid preformed batt or blanket, complying with ASTM C665; friction fit; unfaced flame spread index of 0 (zero) when tested in accordance with ASTM E84.
   1. Flame Spread Index: 25 or less, when tested in accordance with ASTM E84.
   2. Provide Kraft facing toward inside of the building.

2.03 ACCESSORIES

A. As required by manufacturers for product provided.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that substrate, adjacent materials, and insulation materials are dry and that substrates are ready to receive insulation.

B. Verify substrate surfaces are flat, free of honeycomb, fins, irregularities, or materials or substances that may impede adhesive bond.

3.02 BATT INSTALLATION

A. Install insulation and vapor retarder in accordance with manufacturer's instructions.

B. Install in exterior wall and roof spaces without gaps or voids. Do not compress insulation.

C. Trim insulation neatly to fit spaces. Insulate miscellaneous gaps and voids.

D. Fit insulation tightly in cavities and tightly to exterior side of mechanical and electrical services within the plane of the insulation.

E. Install with factory applied vapor retarder membrane facing warm side of building spaces. Lap ends and side flanges of membrane over framing members.

F. Staple or nail facing flanges in place at maximum 6 inches on center.

3.03 FIELD QUALITY CONTROL

3.04 PROTECTION

A. Do not permit installed insulation to be damaged prior to its concealment.

SECTION 072110
ACOUSTIC INSULATION

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes:
   1. Glass fiber acoustical insulation for interior partitions.

1.02 ACTION SUBMITTALS

A. Product Data: For each type of product indicated.

1.03 QUALITY ASSURANCE

A. Surface-Burning Characteristics: As determined by testing identical products according to ASTM E 84 by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

1.04 DELIVERY, STORAGE, AND HANDLING

A. Protect insulation materials from physical damage and from deterioration due to moisture, soiling, and other sources. Store inside and in a dry location. Comply with manufacturer's written instructions for handling, storing, and protecting during installation.

PART 2 PRODUCTS

2.01 SOUND ATTENUATION BATTS

A. Type: Unfaced glass fiber acoustical insulation complying with ASTM C 665, Type I.

B. Size: as indicated on the drawings or largest practical size x width of partition stud.

C. Surface Burning Characteristics, when tested in accordance with ASTM E 84:
   1. Maximum flame spread: 10
   2. Maximum smoke developed: 10

D. Combustion Characteristics - passes ASTM E 136.

E. Fire Resistance Ratings: passes ASTM E 119 as part of a complete fire tested wall assembly.

F. Sound Transmission Class: STC 45

G. Dimensional Stability: Linear Shrinkage less than 0.1%

2.02 EXECUTION

2.03 PREPARATION

A. Clean substrates of substances that are harmful to insulation or vapor retarders, including removing projections capable of puncturing vapor retarders, or that interfere with insulation attachment.

2.04 INSTALLATION, GENERAL

A. Comply with insulation manufacturer's written instructions applicable to products and applications indicated.

B. Install insulation that is undamaged, dry, and unsoiled and that has not been left exposed to ice, rain, or snow at any time.

C. Extend insulation to envelop entire area to be insulated. Cut and fit tightly around obstructions and fill voids with insulation. Remove projections that interfere with placement.

D. Provide sizes to fit applications indicated and selected from manufacturer's standard thicknesses, widths, and lengths. Apply single layer of insulation units to produce thickness indicated unless multiple layers are otherwise shown or required to make up total thickness.

2.05 INSTALLATION OF INSULATION FOR FRAMED CONSTRUCTION

A. Apply insulation units to substrates by method indicated, complying with manufacturer's written instructions. If no specific method is indicated, bond units to substrate with adhesive or use

mechanical anchorage to provide permanent placement and support of units.

B. Glass-Fiber Blanket Acoustical Insulation: Install in cavities formed by framing members according to the following requirements:
   1. Use insulation widths and lengths that fill the cavities formed by framing members. If more than one length is required to fill the cavities, provide lengths that will produce a snug fit between ends.
   2. Place insulation in cavities formed by framing members to produce a friction fit between edges of insulation and adjoining framing members.
   3. Maintain 3-inch clearance of insulation around recessed lighting fixtures not rated for or protected from contact with insulation.

C. Miscellaneous Voids: Install insulation in miscellaneous voids and cavity spaces where required to prevent gaps in insulation using the following materials:
   1. Loose-Fill Insulation: Compact to approximately 40 percent of normal maximum volume equaling a density of approximately 2.5 lb/cu. ft..
   2. Spray Polyurethane Insulation: Apply according to manufacturer's written instructions.

2.06 PROTECTION

A. Protect installed insulation from damage due to harmful weather exposures, physical abuse, and other causes. Provide temporary coverings or enclosures where insulation is subject to abuse and cannot be concealed and protected by permanent construction immediately after installation.

END OF SECTION 072100

SECTION 072126
BLOWN INSULATION

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Ceiling and Attic: Blown insulation pneumatically placed into joist spaces through access holes.

1.02 REFERENCE STANDARDS

A. ASHRAE Std 90.1 I-P - Energy Standard for Buildings Except Low-Rise Residential Buildings; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

B. ASTM C739 - Standard Specification for Cellulosic Fiber Loose-Fill Thermal Insulation; 2017.

C. ASTM C764 - Standard Specification for Mineral Fiber Loose-Fill Thermal Insulation; 2017.

D. ASTM C1015 - Standard Practice for Installation of Cellulosic and Mineral Fiber Loose-Fill Thermal Insulation; 2017.

1.03 SUBMITTALS

A. See Section 013000 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide data on product characteristics, performance criteria, and limitations.

C. Certificates: Certify that products of this section meet or exceed specified requirements.

PART 2 PRODUCTS

2.01 MATERIALS

A. Applications: Provide blown insulation in attic and ceiling as indicated on drawings.

2.02 ACCESSORIES

A. Roof Ventilation Baffles: Prefabricated ventilation channels for placement under roof sheathing with baffles to prevent wind-washing.
   1. Material: Polyvinyl chloride (PVC).
   2. Roof Joist/Truss Spacing: 16 inch on center, nominal.

PART 3 EXECUTION

3.01 EXAMINATION

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

B. Verify that light fixtures have thermal cut-out device to restrict over-heating in soffit or ceiling spaces.

C. Verify spaces are unobstructed to allow for proper placement of insulation.

3.02 INSTALLATION

A. Install insulation and ventilation baffle in accordance with ASTM C1015 and manufacturer's instructions.

B. Completely fill intended spaces leaving no gaps or voids.

3.03 CLEANING

A. Remove loose insulation residue.

END OF SECTION

SECTION 072129
SPRAYED INSULATION

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Cellulosic insulation applied to underside of structure and placed in walls.

1.02 REFERENCE STANDARDS

A. ASHRAE Std 90.1 I-P - Energy Standard for Buildings Except Low-Rise Residential Buildings; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

B. ASTM C177 - Standard Test Method for Steady-State Heat Flux Measurements and Thermal Transmission Properties by Means of the Guarded-Hot-Plate Apparatus; 2013.

C. ASTM C739 - Standard Specification for Cellulosic Fiber Loose-Fill Thermal Insulation; 2017.

D. ITS (DIR) - Directory of Listed Products; current edition.

E. UL (DIR) - Online Certifications Directory; Current Edition.

1.03 SUBMITTALS

A. See Section 013000 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide data on materials, describing insulation properties.

C. Certificates: Certify that products of this section meet or exceed specified requirements.

D. Manufacturer's Installation Instructions: Indicate special procedures and perimeter conditions requiring special attention.

E. Manufacturer's Qualification Statement.

1.04 QUALITY ASSURANCE

A. Products Specified by Flammability Criteria: Listed and classified by ITS (DIR), UL (DIR), or authorities having jurisdiction (AHJ).

1.05 FIELD CONDITIONS

A. Maintain acceptable ambient and substrate surface temperatures prior to, during, and after installation of primer and insulation materials and overcoat.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Cellulosic Fiber Sprayed Insulation:
   1. GreenFiber: www.greenfiber.com/#sle.
   2. International Cellulose Corp: www.spray-on.com/#sle.
   3. ThermoCon, Inc: www.thermocon.com/#sle.
   4. Substitutions: See Section 016000 - Product Requirements.

2.02 MATERIALS

A. Cellulosic Fiber Insulation: ASTM C739; treated cellulosic fiber, Color as selected by Architect.
   1. Thermal Resistance (R-value): 5.3, at 1 inch thick when tested in accordance with ASTM C177 at 75 degrees F temperature

B. Provide blown insulation in accordance with requirements of Section 016116 - Volatile Organic Compound (VOC) Content Restrictions.

C. Thermal Resistance [R-value]: Provided minimum values in accordance with applicable edition of ASHRAE Std 90.1 I-P for envelope requirements of building location and climate zone.

2.03 ACCESSORIES

A. Primer: As required by insulation manufacturer.

B. Surface Sealer: Clear, latex based for placement over insulation.

C. Insulation Stop: Plastic, profiled and sized to suit rafter spacing and wall/sloped roof configuration.

D. Roof Ventilation Baffles: Prefabricated ventilation channels for placement under roof sheathing with baffles to prevent wind-washing.
   1. Material: Polyvinyl chloride (PVC).
   2. Roof Joist/Truss Spacing: 16 inch on center, nominal.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that surfaces are clean, dry, and free of matter that may inhibit adhesion.

B. Verify that ceiling hangers and supporting clips have been are installed correctly.

C. Verify other work on and within spaces to be insulated is complete prior to application.

3.02 PREPARATION

A. Mask and protect adjacent surfaces from overspray or damage.

B. Apply primer in accordance with manufacturer's instructions.

3.03 INSTALLATION

A. Install sprayed insulation in accordance with manufacturer's instructions.

B. Install sprayed insulation to a uniform monolithic density without voids.

C. Tamp wet sprayed insulation surface to improve adhesion and to achieve a smooth surface.

3.04 FIELD QUALITY CONTROL

A. Independent agency field inspection will be provided under provisions of Section 014000 - Quality Requirements.

B. Inspection will include verification of sprayed insulation and surface sealer thickness and density.

3.05 PROTECTION

A. Do not permit subsequent construction work to disturb applied sprayed insulation.

END OF SECTION

SECTION 072419
EXTERIOR INSULATION AND FINISH SYSTEM WITH MOISTURE DRAINAGE

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes:
   1. Exterior Insulation and Finish System (EIFS) with Moisture Drainage adhered over a fluid applied air and water-resistive barrier coating.

B. Related Requirements:
   1. 03 30 00 Cast-in-place Concrete
   2. 03 40 00 Precast Concrete
   3. 04 20 00 Unit Masonry
   4. 05 40 00 Cold-formed Metal Framing
   5. 06 11 00 Wood Framing
   6. 06 16 00 Sheathing
   7. 07 25 00 Weather-Resistive Barriers
   8. 07 26 13 Above-grade Vapor Retarders
   9. 07 27 26 Fluid-applied Air Barriers
   10. 07 62 00 Sheet Metal Flashing and Trim
   11. 07 90 00 Joint Protection
   12. 08 40 00 Entrances, Store Fronts, and Curtain Walls
   13. 08 50 00 Windows

1.02 REFERENCES

A. Reference Standards:
   1. ASTM Standards:
      a. ASTM B 117 Standard Practice for Operating Salt Spray (Fog) Apparatus
      b. ASTM C 67 Standard Test Methods for Sampling and Testing Brick and Structural Clay Tile
      c. ASTM C 150 Standard Specification for Portland Cement
      d. ASTM C 297 Standard Test Method for Flatwise Tensile Strength of Sandwich Constructions
      e. ASTM C 1063 Standard Specification for Installation of Lathing and Furring to Receive Interior and Exterior Portland Cement Plaster.
      f. ASTM C 1177 Standard Specification for Glass Mat Gypsum Substrate for Use as Sheathing
      g. ASTM C 1396 Standard Specification for Gypsum Board
      h. ASTM C 1397 Standard Practice for Application of Class PB Exterior Insulation and Finish System (EIFS) and EIFS with Drainage
      i. ASTM D 968 Standard Test Methods for Abrasion Resistance of Organic Coatings by Falling Abrasive
      j. ASTM D 1784 Standard Specification for Rigid PVC and CPVC Compounds
      k. ASTM D 1970 Standard Specification for Self-Adhering Polymer Modified Bituminous Sheet Materials Used as Steep Roofing Underlayment for Ice Dam Protection
      l. ASTM D 2247 Standard Practice for Testing Water Resistance of Coatings in 100% Relative Humidity
      m. ASTM D 2898 Standard Test Method for Accelerated Weathering of Fire-Retardant-Treated Wood for Fire Testing
      n. ASTM D 3273 Standard Test Method for Resistance to Growth of Mold on the Surface of Interior Coatings in an Environmental Chamber
      o. ASTM D 4060 Standard Test Method for Abrasion Resistance of Organic Coatings by the Taber Abraser

p. ASTM E72 Standard Methods of Conducting Strength Tests Of Panels For Building Construction
q. ASTM E 84 Standard Test Method for Surface Burning Characteristics of Building Materials
r. ASTM E 96 Standard Test Methods for Water Vapor Transmission of Materials
s. ASTM E 119 Standard Method for Fire Tests of Building Construction and Materials
t. 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
u. ASTM E 330 Test Method for Structural Performance of Exterior Windows, Doors and Curtain Walls by Uniform Static Air Pressure Difference
v. ASTM E 331 Test Method for Water Penetration of Exterior Windows, Skylights, Doors and Curtain Walls by Uniform Static Air Pressure Difference
w. ASTM E1233 Standard Test Method for Structural Performance of Exterior Windows, Doors, Skylights, and Curtain Walls by Cyclic Air Pressure Differential
x. ASTM E 2098 Test Method for Determining the Tensile Breaking Strength of Glass Fiber Reinforcing Mesh for use in Class PB Exterior Insulation and Finish Systems (EIFS), after Exposure to Sodium Hydroxide Solution
y. ASTM E 2134 Test Method for Evaluating the Tensile-Adhesion Performance of Exterior Insulation and Finish Systems (EIFS)
z. ASTM E 2178 Standard Test Method for Air Permeance of Building Materials
aa. ASTM E 2273 Test Method for Determining the Drainage Efficiency of Exterior Insulation and Finish Systems (EIFS) Clad Wall Assemblies
bb. ASTM E 2357 Standard Test Method for Determining Air Leakage of Air Barrier Assemblies
cc. ASTM E 2430 Standard Specification for Expanded Polystyrene (EPS) Thermal Insulation Boards for use in Exterior Insulation and Finish Systems (EIFS)
dd. ASTM E 2485 Standard Test Method for Freeze-Thaw Resistance of Exterior Insulation and Finish Systems (EIFS) and Water-Resistive Barrier Coatings
ee. ASTM E 2486 Standard Test Method for Impact Resistance of Class PB and PI Exterior Insulation and Finish Systems (EIFS)
ff. ASTM E 2568 Standard Specification for PB Exterior Insulation and Finish Systems
gg. ASTM E 2570 Standard Test Method for Evaluating Water-Resistive Barrier (WRB) Coatings Used Under Exterior Insulation and Finish Systems (EIFS) or EIFS with Drainage
hh. ASTM G 154 Standard Practice for Operating Fluorescent Light Apparatus for UV Exposure of Nonmetallic Materials
ii. ASTM G 155Standard Practice for Operating-Xenon Arc Light Apparatus for Exposure of Nonmetallic Materials

2. National Fire Protection Association (NFPA) Standards:
   a. NFPA 268 Standard Test Method for Determining Ignitability of Exterior Wall Assemblies Using a Radiant Heat Source
   b. NFPA 285 Standard Fire Test Method for Evaluation of Fire Propagation Characteristics of Exterior Non-Load Bearing Wall Assemblies Containing Combustible Components

1.03 ADMINISTRATIVE REQUIREMENTS

A. Pre-Installation Meetings
   1. Pre-Installation Meeting: Coordinate with the General Contractor for a pre-installation meeting regarding EIFS cladding installation and integration with all related envelope components. Representatives of the EIFS installer, EIFS manufacturer, General Contractor and related envelope components contractors shall participate, and review intended detailing integrations, installation sequencing and responsibilities to assure for complete air and water tight high performance insulated building envelope walls.

B. Sequencing: Coordinate Sequencing items with Pre-Installation Meeting.
   1. Coordinate for jobsite grading (by others) prior to installation of Exterior Insulation and Finish System with Moisture Drainage so that the system may be terminated at 8 in above grade, as required by code or as determined necessary to properly address termination conditions.
   2. Coordinate installation of wall to foundation waterproofing, wall to roofing membrane, windows, doors, and other penetrations of the exterior walls to provide a continuous air and water-resistive barrier.
   3. Provide protection of rough openings before installing windows, doors, and other penetrations of the exterior walls.
   4. Provide transition flashing for nail flange type window frames and tie-in to air / water-resistive barrier to provide a continuous barrier. Do not apply flashings at sill flange.
   5. Coordinate installation of non-nail flange type window and door frames for transition detailing and flashings (by others) and their integration and tie-in to air / water-resistive barrier to provide a continuous barrier.

C. Coordinate installation of sill pan flashings with end and side dams (by others) and provide for their integration tie-in to air / water-resistive barrier to provide a continuous barrier in advance of window installation.
   1. Coordinate installation of window and door head flashings (by others) and provide for their integration tie-in to air / water-resistive barrier to provide a continuous barrier immediately after windows and doors are installed.
   2. Coordinate installation of diverter flashings (by others) and provide for their integration tie-in to air / water-resistive barrier to provide a continuous barrier immediately after flashings are installed.
   3. Coordinate installation of copings and sealants (by others) immediately after installation of the Exterior Insulation and Finish System with Moisture Drainage and when EIFS materials are dry.
   4. Coordinate attachment penetrations for all wall mounted components (by others) through Exterior Insulation and Finish System with Moisture Drainage to structural support and provide water-tight seals at penetrations in accordance with EIFS manufacturer's recommended detailing.

1.04 ACTION SUBMITTALS / INFORMATIONAL SUBMITTALS

A. Submit product data as required by Section 01 33 00, Administrative Requirements.

B. Submit two (2) samples of the Exterior Insulation and Finish System with Moisture Drainage for each finish, texture, and color to be used on the project. Use the same tools and techniques proposed for the actual installation. Make the samples of sufficient size to accurately represent each color and texture being utilized on the project.

C. Submit a current copy of the manufacturer's Trained Contractor Certificate for the system and finish specified.

D. Submit Owner/Architect-requested test results verifying the performance of the Exterior Insulation and Finish System with Moisture Drainage.

E. Submit a copy of the manufacturer's specifications, installation details and application instructions.

1.05 CLOSEOUT SUBMITTALS

A. Submit a copy of the manufacturer's recommended maintenance and repair manual.

B. Submit a copy of the Exterior Insulation and Finish System with Moisture Drainage manufacturer's specified warranty.

1.06 QUALITY ASSURANCE

A. Manufacturer's Qualifications:

1. A member in good standing of the EIFS Industry Members Association (EIMA) for a minimum of five (5) years.
2. Manufacture Exterior Insulation and Finish System with Moisture Drainage materials at a facility covered by a current ISO 9001:2008 and ISO 14001:2004 certification. Certification of the facility is done by a registrar accredited by the American National Standards Institute, Registrar Accreditation Board (ANSI-RAB).

B. Contractor Qualifications:
1. Knowledgeable in the proper installation of the Exterior Insulation and Finish System with Moisture Drainage.
2. Possess a current Training and Listing Certificate issued by the EIFS Manufacturer and for the specific EIFS system and/or specialty finish as specified herein.
3. Successfully complete a minimum of three (3) projects of similar scope and scale to the specified project.

C. Insulation Board Manufacturer Qualifications:
1. Listed by and capable of producing the Expanded Polystyrene (EPS) in accordance with the current EIFS Manufacturer's Specification for Insulation Board.
2. Subscribe to the EIFS Manufacturer's Third-Party Certification and Quality Assurance Program.
3. Supplied through the EIFS Manufacturer's authorized distribution network.

D. Mock-Up:
1. Provide the owner/architect with a mock-up for approval.
a. Of suitable size as required to accurately represent the products being installed, as well as each color and texture to be utilized on the project. Coordinate for size and location during Pre-Installation Meeting.
b. Prepared with the same products, tools, equipment and techniques required for the actual applications. Use finish from the same batch that is being used on the project.
2. Available and maintained at the jobsite.

E. Regulatory Requirements:
1. Separate the EPS insulation board from the interior of the building by a minimum 15-minute thermal barrier.
2. Comply with local building and energy codes for the use and maximum thickness of EPS insulation board.

F. Inspections:
1. Cooperate with independent, third-party inspectors when required by code or by contract documents.

1.07 DELIVERY, STORAGE AND HANDLING

A. Deliver all Exterior Insulation and Finish System with Moisture Drainage components and materials to the job site in the original, unopened packages with labels intact.

1.08 INSPECT ALL EXTERIOR INSULATION AND FINISH SYSTEM WITH MOISTURE DRAINAGE COMPONENTS AND MATERIALS UPON ARRIVAL FOR PHYSICAL DAMAGE, FREEZING OR OVERHEATING. DO NOT USE QUESTIONABLE MATERIALS.

A. Store all Exterior Insulation and Finish System with Moisture Drainage components and materials at the jobsite in a cool, dry location, out of direct sunlight, protected from weather and other sources of damage. Maintain minimum and maximum storage temperature as stated in the product data sheets or specifications for the materials selected.

B. Protect all products from inclement weather and direct sunlight.

1.09 SITE CONDITIONS

A. Ambient Conditions
1. Do not apply wet materials during inclement weather unless appropriate protection is provided. Protect materials from inclement weather until they are completely dry.

2. Verify the minimum air and application surface temperatures at the time of application as stated in the product data sheets or specifications for the materials selected.
3. Maintain these temperatures with adequate air ventilation and circulation for a minimum of 24 hours
(or as additionally required for specialty products) thereafter, or until the products are completely dry.

1.10 WARRANTY

A. Manufacturers' Limited EIF System Warranty
1. Manufacturer shall offer a limited material defect and labor to repair or replace defective material warranty stating the Products will be free from manufacturing defect and will perform as warranted in the manner specified for the stated term measured from the Date of Project Substantial Completion.
a. A pre-construction meeting, including representatives of the Manufacturer, the Applicator, the Owner, and the Consultant (if applicable), shall be required prior to installation of the Products.
b. The term of this warranty may be extended for an additional 2 years with involvement on the project of a Manufacturer-approved, third-party consultant ("Consultant") engaged by the Owner or its authorized representative, at the Owner's sole expense. Inspection reports generated by the Consultant shall be made available to the Manufacturer and the Owner.
c. The warranty is available upon written request.
2. The EIF system warranty shall additionally include the following for the term of the warranty or as specifically noted hereunder.
a. The EIF system warranty term shall be 10 years.
b. The EIF system will remain in a watertight condition when the EIFS is used in conjunction with approved Company Joinery and Sealants.
c. The EIF system will drain incidental moisture between the air/water-resistive barrier and the insulation board.
1) Remedy includes repair or replacement of any sheathing or framing member that is damaged as a result of the EIF system failing to drain incidental moisture between the secondary weather barrier and the insulation board.
d. Finish will be UV fade resistant for 10 years, except for specially produced colors.
1) Specially produced colors will be UV fade resistant for 5 years when high-performance colorants are used to formulate.
e. The EIFS shall be eligible to receive a renewal of the original warranty if the Owner satisfactorily completes the specific renovation requirements published by the Manufacturer.

B. Installer Warranty
1. EIF system Installer shall provide a separate minimum 1-year warranty for all workmanship related to the proper installation and drainage performance of the EIFS application. Manufacturer shall not be responsible for workmanship associated with the installation of Exterior Insulation and Finish System with Moisture Drainage.

PART 2 - PRODUCTS

2.01 EIFS SYSTEM / MANUFACTURER

A. EIFS System Basis of Design: Outsulation® Plus MD Exterior Insulation and Finish System (EIFS) with Moisture Drainage as manufactured by Dryvit Systems, Inc., One Energy Way, West Warwick, RI 02893, 800-556-7752, www.dryvit.com.

B. Substitution Limitations:
1. All components of the Outsulation® Plus MD System® including EPS Insulation Board shall be supplied or obtained from Dryvit Systems, Inc. or its authorized distributors. Substitutions or additions of materials manufactured or supplied by others will void the system warranty.

2. Alternate EIFS manufacturers must demonstrate equivalency for all elements of EIFS system such as but not limited to:
   a. Material components;
   b. Standard and specialty finishes;
   c. Color and texture matching; and,
   d. Warranty criteria as specified herein.
3. Submit alternate EIFS manufacturer's complete data highlighting equivalency for review through Substitution Requirements as defined in Division 1.

2.02 DESCRIPTION

A. System Description:
   1. Dryvit Outsulation Plus MD System is an Exterior Insulation and Finish System (EIFS) with Moisture Drainage; consisting of:
      a. A fluid-applied air/water-resistive barrier coating
      b. Adhesive – installed in vertical notched trowel ribbons to facilitate egress of incidental moisture
      c. Expanded Polystyrene (EPS) insulation board
      d. Base Coat
      e. Reinforcing Mesh
      f. Finish Coat

B. Materials:
   1. Fluid-Applied Air and Water-Resistive Barrier:
      a. Permeable:
         1) Dryvit Backstop® NT: A standard thin film vapor permeable, flexible, polymer-based non-cementitious water-resistive and air barrier coating available in Texture, Smooth, and spray versions. Backstop NT can be exposed for up to 6 months during the construction process. Backstop NT Texture is additionally used for treatment of sheathing board joints, inside / outside corners and spotting of fastener heads.
         2) Tremco ExoAir 230: A thick film synthetic, permeable, elastomeric air/water-resistive membrane barrier designed to be roller or spray applied. ExoAir 230 can be exposed for up to 12 months during the construction process. ExoAir is specialty formulated for design options requiring assembles that have been evaluated for NFPA 285. Consult with membrane barrier manufacturer for more information.
      b. Non-Permeable – Vapor Retarder / Barrier:
         1) Dryvit Backstop® NT-VB (Vapor Barrier): A Class 1 vapor retarder, available in trowel and spray versions.
   2. Accessory Materials for Fluid Applied Air and Water-Resistive Barrier:
      a. Provide compatible accessory materials as required by project conditions for substrate, rough opening and penetration preparation, bridge expansion joints in substrate, material transitions and flashing integration to produce a complete air and water-resistant assembly.
         1) Dryvit Grid Tape™: An open weave fiberglass mesh tape with pressure sensitive adhesive. Used in combination with Backstop NT Texture for treating sheathing board joints and inside / outside corners and preparing rough openings and penetrations. Backstop NT Texture is used alone for spotting fastener heads.
         2) Dryvit AquaFlash®: Fluid-applied, water-based polymer transition membrane. Used in preparing rough openings and penetrations, bridging expansion joints in substrate, material transitions and flashing integration.
            (a) Dryvit AquaFlash Mesh and Corners: Polyester reinforcing mesh for use with AquaFlash.
         3) Dryvit Backstop Flash and Fill: A flexible, waterproof, low temperature gun applied material. Used in substrate preparation, treating sheathing board joints,

inside/outside corners and fastener heads, preparing rough openings and penetrations, bridging expansion joints in substrate material transitions and flashing integration. Surface and ambient temperatures for application of Backstop Flash & Fill shall be between 32 °F (0 °C) and 110 °F (43 °C) for proper curing and drying of the material. Note: Dryvit Backstop Flash and Fill may only be used with Dryvit Backstop NT air/water-resistive barrier.

4) Tremco Dymonic 100: A high-performance, high-movement, single-component, medium-modulus, low-VOC, UV-stable, non-sag, gun applied polyurethane sealant. Used in substrate preparation, treating sheathing board joints and inside/outside corners and fastener heads, preparing rough openings and penetrations, bridging expansion joints in substrate, material transitions and flashing integration.
5) Tremco ExoAir 110AT: A 22-mil composite impermeable membrane that is comprised of 16 mils of butyl and 6 mills of HDPP facer. Used in limited applications as a membrane flashing that will not interfere with the adhesive application of EIFS.

3. Flashing:
   a. AquaFlash®: Fluid-applied, water-based polymer transition membrane.
   b. AquaFlash Mesh: Polyester reinforcing mesh for use with AquaFlash.
   c. Dryvit Flashing Tape™: Rubberized asphalt adhesive membrane.
   d. Dryvit Flashing Tape Surface Conditioner™: Water-based surface conditioner and adhesion promoter for use with Flashing Tape.
4. Drainage Components:
   a. Dryvit Drainage Strip™: A corrugated plastic strip for use at horizontal weep termination Drainage Strip is not required where pre-base coated starter boards are integrated.
   b. Dryvit AP Adhesive™: Urethane-based adhesive used to attach Dryvit Drainage Strip to substrate surface.
5. Adhesives:
   a. Liquid polymer-based adhesive field mixed with Portland cement.
      1) Dryvit Primus® or Dryvit Genesis®
   b. Ready mixed dry blend cementitious, copolymer-based adhesive field mixed with water.
      1) Dryvit Primus® DM or Dryvit Genesis® DM
6. Insulation Board:
   a. Expanded Polystyrene (EPS): Minimum thickness shall be 25 mm (1.5 in); or, as required to comply with local energy codes and wall assembly design; or, as shown on contract drawings and meeting Dryvit Specification DS131 and ASTM E 2430.
   b. The insulation board shall be manufactured by a board supplier listed by Dryvit Systems, Inc.
   c. The insulation board shall be supplied through the EIFS Manufacturer’s authorized distributor.
7. Pre-Coated Insulation Starter Boards and Shapes:
   a. Machine Coated Starter Boards and Shapes: Shall be produced with materials approved by Dryvit Systems, Inc. and be supplied by a fabricator approved by Dryvit Systems, Inc.
   b. Non-Machine Coated Starter Boards and Shapes: Shall be produced with materials approved by Dryvit Systems, Inc.
8. Base Coat:
   a. Liquid polymer-based adhesive field mixed with Portland cement.
      1) Dryvit Primus® or Dryvit Genesis®
   b. Ready mixed dry blend cementitious, copolymer-based adhesive field mixed with water.
      1) Dryvit Primus® DM or Dryvit Genesis® DM

9. Reinforcing Mesh:
    a. A balanced open-weave, glass fiber fabric treated for compatibility with other system materials.
        1) Dryvit Standard, Standard Plus, Intermediate, Panzer 15, Panzer 20, Detail and Corner Mesh or combinations thereof as specified herein to achieve required impact resistance and proper installation.
    b. Provide for Ultra-High Impact Mesh Assembly with 4.3 oz. mesh installed over Panzer 20.0 oz. mesh for all EIFS areas within 8’-0” of grade or where high impact or abuse is anticipated.
    c. Mesh shall be colored blue for product identification bearing the Dryvit logo.
10. Finish Coat:
    a. Hydrophobic (HDP™) Finishes: 100% water-based acrylic polymer finish with integral color and texture; formulated with Hydrophobic Water-Repellant (HDP) performance chemistry.
        1) Standard Texture: Select from EIFS Manufacturer’s Standard textures.
            (a) Dryvit Quarzputz® HDP, Sandpebble® HDP, Sandpebble Fine® HDP, Sandblast® HDP.
        2) Color: Select from EIFS Manufacturer’s standard full range color offering. Special colors available upon request.
        3) Colorant: Provide High Performance Colorant.
            (a) Dryvit StratoTone™.
    b. Jobsite-Mixed Materials:
    c. Portland cement: Verify is Type I or II, meeting ASTM C 150, white or gray in color, fresh and free of lumps.
    d. Water: Verify is clean and free of foreign matter.

C. Joint Sealants:
1. Silicone Sealant:
    a. Tremco Spectrem 1: An ultra low modulus, high-performance, one-part, moisture-curing silicone joint sealant with physical properties making it an ideal sealant for sealing dynamic joints.
    b. Tremco Spectrem 3: A general-purpose, low-modulus, high performance, one-part, neutral-cure, non-staining, low dirt pickup, construction-grade silicone sealant.
    c. Tremco Spectrem 4-TS: A multi-component, neutral-curing, non-staining, low dirt pick up, low-modulus silicone sealant specially formulated for use in dynamically moving building joints. Spectrem 4-TS offers color flexibility with the opportunity to tint the material on site.
        1) Coordination for custom sealant colors is required.
    d. Where deemed necessary, use TREMprime Silicone Porous Primer.
    e. See related specification section or consult with Tremco, Inc. for more information.
2. Polyurethane Sealant:
    a. Tremco Dymonic FC: A one component hybrid polyurethane sealant. Where deemed necessary, use TREMprime Silicone Porous Primer for porous surfaces and TREMprime Silicone Metal Primer for metals or plastics. Coordinate for primer use as indicated.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verification of Conditions:
1. Verify access to electric power, clean water and a clean work area at the location where the Dryvit materials are to be applied.
2. Verify that wall surface on which Exterior Insulation and Finish System with Moisture Drainage is to be installed on a EIFS Manufacturer-approved substrate:
    a. Verify the deflection of the substrate does not exceed 1/240 times the span.

b. VERIFY SUBSTRATE IS FLAT WITHIN 6.4 MM (1/4 IN) IN A 1.2 M (4 FT) RADIUS.
c. VERIFY SUBSTRATE IS SOUND, DRY, CONNECTIONS ARE TIGHT; HAS NO SURFACE VOIDS, PROJECTIONS, OR OTHER CONDITIONS THAT MAY INTERFERE WITH THE EXTERIOR INSULATION AND FINISH SYSTEM WITH MOISTURE DRAINAGE INSTALLATION OR PERFORMANCE.
d. VERIFY THE SLOPE OF INCLINED SURFACES ARE NOT LESS THAN 6:12 (27 O), AND THE LENGTH OF THE SLOPE DOES NOT EXCEED 305 MM (12 IN).
e. VERIFY METAL ROOF FLASHINGS HAVE BEEN INSTALLED IN ACCORDANCE WITH SHEET METAL AND AIR CONDITIONING CONTRACTOR'S NATIONAL ASSOCIATION (SMACNA) STANDARDS.
f. VERIFY ALL ROUGH OPENINGS ARE FLASHED IN ACCORDANCE WITH THE EXTERIOR INSULATION AND FINISH SYSTEM WITH MOISTURE DRAINAGE MANUFACTURER'S INSTALLATION DETAILS, OR AS OTHERWISE NECESSARY TO PREVENT WATER PENETRATION. VERIFY CHIMNEYS, BALCONIES AND DECKS HAVE BEEN PROPERLY FLASHED AS NECESSARY TO PREVENT WATER PENETRATION.
g. VERIFY WINDOWS AND DOORS ARE INSTALLED AND FLASHED PER MANUFACTURER'S REQUIREMENTS AND INSTALLATION DETAILS.
h. NOTIFY GENERAL CONTRACTOR OF ALL DISCREPANCIES PRIOR TO THE INSTALLATION OF THE EXTERIOR INSULATION AND FINISH SYSTEM WITH MOISTURE DRAINAGE.

B. Verify that expansion joints are installed:
1. Where expansion joints occur in the substrate system.
2. Where building expansion joints occur.
3. At floor lines in wood frame construction.
4. At floor lines of non-wood framed buildings where significant movement is expected.
5. Where the Exterior Insulation and Finish System with Moisture Drainage abuts dissimilar materials.
6. Where the substrate type changes.
7. In continuous elevations at intervals not exceeding 23 m (75 ft).
8. Where significant structural movement occurs, such as changes in roof line, building shape or structural system.

3.02 PREPARATION

A. Protect the Exterior Insulation and Finish System with Moisture Drainage materials by permanent or temporary means from inclement weather and other sources of damage prior to, during, and following application until completely dry.

B. Protect adjoining work and property during installation of the Exterior Insulation and Finish System with Moisture Drainage.

C. Prepare the substrate to be free of foreign materials, such as oil, dust, dirt, form-release agents, efflorescence, paint, wax, water repellants, moisture, frost, and any other condition that may inhibit adhesion.

3.03 INSTALLATION

A. Install the system in accordance with ASTM C1397 and the Dryvit Outsulation Plus MD System Application Instructions DS 218.

B. Apply base coat sufficient to fully embed the reinforcing mesh so that no mesh color can be seen. The recommended method is to apply the base coat in two (2) passes.

C. Apply sealant only to base coat treated with Dryvit Demandit or Color Prime coatings.
1. Install high impact reinforcing mesh as specified at ground level, high traffic areas and other areas exposed to or susceptible to impact damage as designated on contract drawings.

3.04 SITE QUALITY CONTROL

A. Exterior Insulation and Finish System with Moisture Drainage manufacturer assumes no responsibility for on-site inspections or application of its products.

B. EIFS sub-contractor to certify in writing the quality of work performed relative to the substrate system, details, installation procedures, and as to the specific products used.

C. EPS supplier, if requested, to certify in writing that the EPS meets the Exterior Insulation and Finish System manufacturer’s specifications.

D. The sealant contractor, if requested, to certify in writing that the sealant application is in accordance with the sealant manufacturer's and the Exterior Insulation and Finish System manufacturer’s recommendations.

3.05 CLEANING

A. Remove all excess Exterior Insulation and Finish System materials from the job site by the contractor in accordance with contract provisions and as required by applicable law.

B. Leave all surrounding areas, where the Exterior Insulation and Finish System with Moisture Drainage has been applied, free of debris and foreign substances resulting from the EIFS sub-contractor’s work.

END OF SECTION

SECTION 072500
WEATHER BARRIERS

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. Drainable building wrap as water-resistive barrier, and air barrier over OSB sheathing.
   2. Rainscreen system under fiber cement panels,
   3. Flexible flashing.

B. Related Requirements:
   1. Section 061000 "Rough Carpentry" for wall sheathing.

1.03 ACTION SUBMITTALS

A. Product Data: For each type of product.
   1. For building wrap, include data on air and water-vapor permeance based on testing according to referenced standards.

1.04 INFORMATIONAL SUBMITTALS

A. Evaluation Reports: For water-resistive barrier, from ICC-ES.

PART 2 PRODUCTS

2.01 MISCELLANEOUS MATERIALS WATER-RESISTIVE BARRIER

A. Drainable building Wrap: ASTM E 1677, Type I air barrier; with flame-spread and smoke-developed indexes of less than 25 and 450, respectively, when tested according to ASTM E 84; UV stabilized; and acceptable to authorities having jurisdiction.
   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. DuPont (E. I. du Pont de Nemours and Company); Tyvek DrainVent Rainscreen.
   2. Water-Vapor Permeance: Not less than 20 perms (1150 ng/Pa x s x sq. m) per ASTM E 96/E 96M, Desiccant Method (Procedure A).
   3. Air Permeance: Not more than 0.0072 cfm/sq. ft. infiltration and 0.0023 cfm/ sq. ft. exfiltration at a pressure differential of 1.57 psf when tested according to ASTM E 2178.
   4. Allowable UV Exposure Time: Not less than three months.

B. Rainscreen System - Dupont Rainscreen Batten System, polypropylene corrugated batten product with flow through ventilation channels installed between the control layer and the siding/stucco system. The battens are 3/8" thick, 1-5/8" wide and 8' long.

C. Building-Wrap Tape: Pressure-sensitive plastic tape recommended by building-wrap manufacturer for sealing joints and penetrations in building wrap.

2.02 ACCESSORIES

A. Per manufacturer's recommendation for substrate.

B. Flexible Flashing: Composite, self-adhesive, flashing product consisting of a pliable, butyl rubber or rubberized-asphalt compound, bonded to a high-density polyethylene film, aluminum foil, or spunbonded polyolefin to produce an overall thickness of not less than 0.025 inch (0.6 mm).
   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. DuPont (E. I. du Pont de Nemours and Company); DuPont Flashing Tape.
      b. Grace Construction Products, a unit of W. R. Grace & Co. - Conn.; Vycor Butyl Self Adhered Flashing.

c. Protecto Wrap Company; BT-25 XL.
d. Raven Industries Inc.; Fortress Flashshield.
e. Advanced Building Products Inc.; Wind-o-wrap.
f. Carlisle Coatings & Waterproofing; CCW-705-TWF Thru-Wall Flashing.
g. Fiberweb, Clark Hammerbeam Corp.; Aquaflash 500.
h. MFM Building Products Corp.; Window Wrap.
i. Polyguard Products, Inc.;.
j. Sandell Manufacturing Co., Inc.; Presto-Seal.

C. Primer for Flexible Flashing: Product recommended by manufacturer of flexible flashing for substrate.

D. Nails and Staples: ASTM F 1667.

PART 3 EXECUTION

3.01 WATER-RESISTIVE BARRIER INSTALLATION

A. Cover exposed exterior surface of sheathing with water-resistive barrier securely fastened to framing immediately after sheathing is installed.

B. Cover sheathing with water-resistive barrier as follows:
1. Cut back barrier 1/2 inch (13 mm) on each side of the break in supporting members at expansion- or control-joint locations.
2. Apply barrier to cover vertical flashing with a minimum 4-inch (100-mm) overlap unless otherwise indicated.

C. Building Wrap: Comply with manufacturer's written instructions.
1. Seal seams, edges, fasteners, and penetrations with tape.
2. Extend into jambs of openings and seal corners with tape.

D. Rainscreen system - install per manufacturer's instructions.

3.02 FLEXIBLE FLASHING INSTALLATION

A. Apply flexible flashing where indicated to comply with manufacturer's written instructions.
1. Prime substrates as recommended by flashing manufacturer.
2. Lap seams and junctures with other materials at least 4 inches (100 mm) except that at flashing flanges of other construction, laps need not exceed flange width.
3. Lap flashing over water-resistive barrier at bottom and sides of openings.
4. Lap water-resistive barrier over flashing at heads of openings.
5. After flashing has been applied, roll surfaces with a hard rubber or metal roller to ensure that flashing is completely adhered to substrates.

END OF SECTION 072500

SECTION 072600
SLAB ON-GRADE VAPOR RETARDER

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes: At storage rooms and at rooms to receive moisture sensitive flooring, provide vapor retarder system for slab-on-grade concrete, including sealing joints and protrusions through vapor retarder.

1.02 SUBMITTALS

A. Project data: Submit manufacturer's literature.

B. Summary of Test Results per paragraph 9.3 of ASTM E1745.

C. Manufacturer's samples.

D. Manufacturer's installation instructions for placement, seaming, penetration repair, and perimeter seal per ASTM E1643.

E. All mandatory ASTM E1745 testing must be performed on a single production roll per SATM E1745 Section 8.1.

1.03 PROJECT CONDITIONS

A. Does not apply vapor retarder during inclement weather or when air temperature is below 40 degrees F.

1.04 REFERENCES

A. American Society for Testing and Materials)ASTM):
   1. ASTM E1745-11 Standard Specification for Plastic Water Vapor Retarders Unsed in Contact with Soil or Granular Fill Under Concrete Slabs.
   2. ESTM E1643-11 Selection Design, Installation and Inspection of Water Vapor Retarders Used in Contact with Earth or Granular Fill Under Concrete Slabs.

B. Technical Reference – American Concrete Institute (ACI):
   1. ACI 302.2R-06 Guide for Concrete Slabs that Receive Moisture-Sensitive Flooring Materials

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Forifiber Corp./Ultra 15.

B. Stego Industries, Inc./Stego Wrap (15 mil).

C. Raven Industries, Inc./Vapor Block # VB15(15 mil Blue).

D. Substitutions: Refer to Section 01250.

2.02 MATERIALS

A. Vapor Retarder: ASTM/E1745, Class A vapor retarder consisting of 15 mil polyolefin film.
   1. Permeance: Maximum 0.01 perms, ASTM F1249 and E154 tests.
   2. Resistance to Puncture: Minimum 2200 grams, ASTM D1709, Method B.
   3. Tear Resistance: Minimum 8.74 lbs., ASTM D1004
   4. Tensile Strength: Minimum 35 lbs/in., ASTM E154, Section 9, Method D-882, in both directions.

B. Joint Sealer: Pressure sensitive adhesive tape providing permanent bond strength and quick-stick properties as recommended by vapor retarder manufacturer and providing comparable permeance to vapor retarder.

C. Mastic: Medium viscosity, water based, polymer-modified anionic bituminous/asphalt emulsion exhibiting bonding, elongation, and waterproofing characteristics as recommended by vapor retarder manufacturer.

PART 3 - EXECUTION

3.01 PREPARATION

A. Ensure sleeves, curbs and projections that pass through vapor retarder are properly and rigidly installed.

B. Ensure substrate is free of projections and irregularities that may be detrimental to proper installation of vapor retarder.

C. Ensure subsoil is approved by Architect or Geotechnical Engineer.

3.02 INSTALLATION

A. Spread and roll gravel to provide smooth, even bed for vapor retarder.

B. Apply vapor retarder in accordance with manufacturer's recommendations and installation instructions and in accordance with ASTM E1643; comply with most restrictive where conflicts occur.

1. Seal items projecting through vapor retarder with manufacturer's approved pressure sensitive tape.

C. Seams: Minimum 6" overlap, sealed with pressure sensitive tape for vapor tight seal. Vapor retarder must be clean and dry.

D. Penetrations: All penetrations are to be sealed per manufacturer installation instructions.

E. Lay vapor retarder membrane smooth with no fishmouths or bunches of material.

F. Inspect and repair vapor retarder prior to application of concrete slab; tape tears and repair damage.

1. Damaged areas must be repaired with material with permeance no less than the material that was damaged with minimum overlaps of 6 inches.

END OF SECTION

SECTION 072726
FLUID APPLIED MEMBRANE AIR BARRIERS – VAPOR PERMEABLE

PART 2GENERAL

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 materials and installation of fluid applied air and moisture barrier membrane over vertical above grade concrete walls, concrete masonry walls, and wall sheathing.

1.03 DEFINITIONS

A. Air Barrier Material: A primary element that provides a continuous barrier to the movement of air.

B. Air Barrier Accessory: A transitional component of the air barrier that provides continuity.

C. Air Barrier Auxiliary Material: A transitional component that provides air barrier continuity furnished by a source other than the primary air barrier manufacturer.

D. Air Barrier Assembly: The collection of air barrier materials, accessory and auxiliary materials applied to an opaque wall, including joints and junctions to abutting construction, to control air movement through the wall

1.04 PRE-INSTALLATION MEETINGS

A. Pre-installation Conference
   1. Review air barrier installation requirements and installation details, mock-ups, testing requirements, protection, and sequencing of work.

1.05 REFERENCES

A. Building Code and Material Evaluation Service Standards
   1. ICC ES AC 212 March, 2015, ICC Acceptance Criteria for Water-Resistive Coatings Used as Water-Resistive Barriers over Exterior Sheathing
   2. 2012, 2015 IBC International Building Code
   3. 2012, 2015 IRC International Residential Code
   4. 2012, 2015 IECC International Energy Conservation Code

B. ASTM Standards
   1. C 297-94 Test Method for Tensile Strength of Flat Sandwich Constructions in Flatwise Plane
   2. C 1177-08 Specification for Glass Mat Gypsum Substrate for Use as Sheathing
   3. D 522-93a Test Methods for Mandrel Bend Test of Attached Organic Coatings
   4. D 1970-00 Standard Specification for Self-Adhering Polymer Modified Bituminous Sheet Materials Used as Steep Roofing Underlayment for Ice Dam Protection
   5. D 3273-00 Test Method for Resistance to Growth of Mold on the Surface of Interior Coatings in an Environmental Chamber
   6. D 4541-09 Test Method for Pull-Off Strength of Coatings Using Portable Adhesion Testers
   7. E 84-98 Test Method for Surface Burning Characteristics of Building Materials
   8. E 96-00 Test Method for Water Vapor Transmission of Materials
   9. E 119-98, Standard Test Methods for Fire Tests of Building Construction and Materials
   10. E 779-10 Standard Test Method for Determining Air Leakage Rate by Fan Pressurization
   11. E 783-02 Standard Test Method for Field Measurement of Air Leakage Through Installed Exterior Windows and Doors

12. E 1186-03 (2009) Standard Practices for Air Leakage Site Detection in Building Envelopes and Air Barrier Systems
13. 1E 1827-96 (2007) Standard Test Methods for Determining Airtightness of Buildings Using an Orifice Blower Door
14. 1E 2178-03 Test Method for Air Permeance of Building Materials
15. 15. E 2357-05 Standard Test Method for Determining Air Leakage of Air Barrier Assemblies

C. APA – The Engineered Wood Association
   1. E30U-2007 Engineered Wood Construction Guide

D. American Society of Heating, Refrigerating and Air-Conditioning Engineers, Inc. (ASHRAE)
   1. 2005 ASHRAE Handbook Fundamentals
   2. ASHRAE 90.1 2016 Energy Standard for Buildings Except Low-Rise Residential Buildings
   3. ASHRAE 189.1 2009 Standard for the Design of High Performance Green Buildings Except Low-Rise Residential Buildings

E. National Fire Protection Association (NFPA)
   1. NFPA 285 Standard Fire Test Method for Evaluation of Fire Propagation Characteristics of Exterior Non-Load-Bearing Wall Assemblies Containing Combustible Components

F. South Coast Air Quality Management District (SCAQMD)
   1. Rule 1113 (2007) Architectural Coatings

1.06 COORDINATION/SCHEDULING

A. Coordinate installation of foundation waterproofing, roofing membrane, windows, doors and other wall penetrations to provide a continuous air barrier.

B. Provide protection of rough openings before installing windows, doors, and other penetrations through the wall.

C. Provide sill flashing to direct water to the exterior before windows and doors are installed.

D. Install window and door head flashing immediately after windows and doors are installed.

E. Install diverter flashings wherever water can enter the assembly to direct water to the exterior.

F. Install parapet cap flashing and similar flashing at copings and sills to prevent water entry into the wall assembly.

G. Install cladding within 180 days of air and moisture barrier installation (except in the case of StoTherm ci, install insulation board with adhesive within 30 days of Sto Gold Coat installation).

1.07 SUBMITTALS

A. Manufacturer’s specifications, details and product data.

B. Manufacturer’s standard warranty.

C. Manufacturer’s ICC evaluation report confirming compliance with the IBC, IRC, and IECC as an air barrier and water-resistive barrier.

D. Samples for approval as directed by architect or owner.

E. Shop drawings: substrate joints, cracks, flashing transitions, penetrations, corners, terminations, and tie-ins with adjoining construction, and interfaces with separate materials that form part of the air barrier assembly.

1.08 QUALITY ASSURANCE

A. Manufacturer requirements
   1. Manufacturer of exterior wall air and moisture barrier materials for a minimum of 30 years in North America.
   2. ISO 9001:2008 Certified Quality System and ISO 14001:2004 Certified Environmental Management System

B. Contractor requirements
   1. Knowledgeable in the proper use and handling of Sto materials.
   2. Employ skilled mechanics who are experienced and knowledgeable in waterproofing and air barrier application, and familiar with the requirements of the specified work.
   3. Provide the proper equipment, manpower and supervision on the job-site to install the air barrier assembly in compliance with the project plans & specifications, shop drawings, and Sto's published specifications and details.

C. Regulatory Compliance
   1. Primary air barrier and joint treatment reinforcement materials:
      a. Listed by IBC and recognized for use on all types of construction. Refer to ICC ESR 1233 for limitations.
      b. Comply with VOC requirements of SCAQMD Rule 1113.
      c. Comply with air barrier material requirements of ASHRAE 90.1 – 2010, 2013
      d. Comply with air barrier material requirements of ASHRAE 189.1 – 2009
      e. Comply with 2012 and 2015 IRC requirements for a continuous air barrier
      f. Comply with air barrier material requirements of 2012 and 2015 IBC and IECC.
      g. Evaluated and Listed by ABAA as an air barrier material.

D. Mock-ups
   1. Build stand-alone site mock up or sample wall area on as-built construction to incorporate back-up wall construction, typical details covering substrate joints, cracks, flashing transitions, penetrations, corners, terminations, tie-ins with adjoining construction, and interfaces with separate materials that form part of the air barrier assembly.

1.09 PRE-CONSTRUCTION TESTING

A. Conduct testing by qualified test agency or building envelope consultant
   1. Conduct assembly air leakage testing in accordance with ASTM E 783.
   2. Conduct adhesion testing to substrates in accordance with ASTM D 4541.
   3. Conduct wet sealant compatibility testing in accordance with sealant manufacturer's field quality control test procedure.
   4. Notify design professional minimum 7 days prior to testing.

1.10 DELIVERY, STORAGE AND HANDLING

A. Deliver all materials in their original sealed containers bearing manufacturer's name and identification of product.

B. Protect coatings (pail products) from freezing temperatures and temperatures in excess of 90 degrees F (32 degrees C). Store away from direct sunlight.

C. Protect Portland cement-based materials (bag products) from moisture and humidity. Store under cover off the ground in a dry location.

D. Protect and store accessory and auxiliary products in accordance with manufacturer's written instructions.

1.11 PROJECT/SITE CONDITIONS

A. Maintain ambient and surface temperatures above 40 degrees F (4 degrees C) during application and drying period, minimum 24 hours after application of air and moisture barrier materials.

B. Provide supplementary heat for installation in temperatures less than 40 degrees F (4 degrees C) or if surface temperature is likely to fall below 40 degrees F (4 degrees C).

C. Provide protection of surrounding areas and adjacent surfaces from application of materials.

1.12 WARRANTY

A. Provide manufacturer's standard warranty.

PART 3PRODUCTS

2.01 MANUFACTURERS

A. Sto Corp.

B. Substitutions: See Section 01 6000-Product Requirements.

C. Obtain primary air barrier and accessory air barrier and Exterior Insulation and Finishing System materials and from single source.

2.02 MATERIALS

A. Primary Air Barrier Material: StoGuard with Sto Gold Coat – ready-mixed flexible spray or roller applied air and moisture barrier material.

B. Accessory Materials

C. (Select one of the following joint treatments)
   1. Sheathing Joint Treatments
      a. Sto Gold Coat® with StoGuard Fabric: flexible air and moisture barrier membrane material for embedding non-woven integrally reinforced cloth reinforcement.
      b. Rough Opening Treatments
         1) StoGuard Tape: self-adhered rubberized asphalt tape for frame walls with polyester fabric facing.
      c. Transition Detail Components
         1) StoGuard Transition Membrane: flexible air and moisture barrier membrane for continuity at static transitions: sheathing to foundation, dissimilar materials (CMU to frame wall), wall to balcony floor slab or ceiling, and shingle lap transitions to flashing. Also used for dynamic joints: floor line deflection joints, masonry control joints, and through wall joints in masonry or frame construction.
      d. Primers
         1) StoGuard Primer: rubber resin emulsion primer for use with StoGuard Tape to enhance adhesion.

D. Auxiliary Materials furnished by others.
   1. Wet sealant: Dow Corning 758, 790, 791, and 795 sealants
   2. Pre-cured sealant tape: Dow 123
   3. Spray adhesive: 3M Super 77 Spray Adhesive
   4. Spray foam: Dow Great Stuff for Gaps and Cracks

E. Patching and Leveling Material for Concrete and Masonry
   1. Sto Leveler: polymer modified cementitious patch and leveling material for prepared concrete and masonry surfaces up to 1/4 inch (6 mm).
   2. Sto BTS Xtra: polymer modified lightweight cementitious patch and leveling material for prepared concrete and masonry surfaces up to 1/8 inch (3 mm).

2.03 PERFORMANCE REQUIREMENTS

A. Durability, resistance to aging, water and water penetration resistance, structural loading: joint treatment and primary air barrier material, comply with ICC ES AC 212

B. Flexibility: ASTM D 522, primary air barrier material, no cracking or delamination before and after aging using 1/8 inch (3 mm) mandrel at 14º F (10º C)

C. Nail sealability: ASTM D 1970, 7.9.1, primary air barrier passes

D. Resistance to mold: ASTM D 3273, no mold growth after 28 day exposure

E. Adhesion: joint treatment and primary air barrier material, ASTM C 297 or D 4541, > 30 psi (207 kPa), or exceeds strength of glass mat facing on glass mat gypsum substrates

F. Surface burning: ASTM E 84, joint treatment and primary air barrier material flame spread < 25, smoke developed < 450, Class A building material

G. Water vapor permeance: ASTM E 96 Method B, > 10 perms (570 ng/Pa·s·m2)

H. Field adhesion testing: ASTM D 4541, > 30 psi (207 kPA) or exceeds strength of glass mat facing on glass mat gypsum substrates

I. Fire resistance: ASTM E 119, permitted for use in exterior walls of fire-resistance-rated construction assemblies. Refer to ICC-ESR 1233.

J. Building envelope air leakage: ASTM E 779 or 1827, < 0.4 cfm/ft2 (2 L/s·m2)

K. Material air leakage: ASTM E 2178, primary air barrier and joint treatment < 0.004 cfm/ft2 at 1.57 psf (0.02 L/s•m2 at 75 Pa)

L. Assembly air leakage: ASTM E 2357, < 0.04 cfm/ft2 (0.2 L/s·m2) air leakage after conditioning protocol

M. Fire propagation: NFPA 285, meets requirements for use on all Types of construction. Refer to ICC-ESR 1233.

N. Volatile Organic Compounds: SCAQMD Rule 1113, joint treatment and primary air barrier material < 100 g/L

O. Water-resistive barrier: ICC ES 212, joint treatment and primary air barrier material comply and are listed in a valid ICC ESR.

2.04 DESIGN CRITERIA

A. Structural (Wind and Axial Loads)
   1. Design for maximum allowable deflection normal to the plane of the wall: L/240. Where cladding dictates stiffer deflection criteria use cladding design criteria for maximum allowable deflection.
   2. Design for wind load in conformance with code requirements.

B. Moisture Control
   1. Prevent the accumulation of water in the wall assembly and behind the exterior wall cladding:
      a. Minimize condensation within the assembly.
      b. Drain water directly to the exterior where it is likely to penetrate components in the wall assembly (windows and doors, for example).
      c. Provide corrosion resistant flashing to direct water to the exterior in accordance with code requirements, including: above window and door heads, beneath window and door sills, at roof/wall intersections, floor lines, decks, intersections of lower walls with higher walls, and at the base of the wall.

C. Air Barrier Continuity: provide continuous air barrier assembly of compatible air barrier components.

D. Substrates
   1. Concrete Masonry Units: provide CMU surfaces in conformance with the applicable building code, and such that a void and pinhole free air barrier is achieved. Provide normal weight units with flush joints (struck flush with the surface) and allow for a minimum of 2 coats of the primary air barrier material, applied by spray or roller. Alternatively, for “rough” CMU wall surfaces allow for a cementitious parge coat to fill and level irregular surfaces, prior to 1 coat of the primary air barrier material.
   2. Concrete: provide concrete in conformance with the applicable building code.
   3. Sheathing: provide gypsum sheathing in compliance with ASTM C 1177, provide APA Exterior or Exposure 1 wood-based sheathing, and provide sheathing that meets required design wind pressures.
   4. Mechanical Ventilation: maintain pressurization and indoor humidity levels in accordance with recommendations of ASHRAE (see 2005 ASHRAE Handbook—Fundamentals).

PART 3 EXECUTION

3.01 EXAMINATION

A. Inspect concrete and concrete masonry surfaces for:

1. Contamination – algae, dirt, dust, efflorescence, form oil, fungus, grease, mildew or other foreign substances.
2. Surface deficiencies – weak, friable, chalkiness, laitance, bugholes, and spalls.
3. Cracks – measure crack width and record location of cracks.
4. Damage or deterioration.
5. Moisture content and moisture damage – use a moisture meter to determine if the surface is dry enough to receive the waterproof air barrier and record any areas of moisture damage or excess moisture.
6. Flush masonry mortar joints completely filled with mortar.

B. Inspect sheathing application for compliance with applicable requirement:
1. Exterior Grade and Exposure I wood based sheathing: E30U-2007, Engineered Wood Construction Guide, and the requirements of the applicable building code.
2. Glass mat faced gypsum sheathing in compliance with ASTM C 1177: consult manufacturer's published recommendations and ICC ES Report. Conform with project requirements for wind load resistance.
3. Cementitious sheathing – Consult manufacturer's published recommendations and ICC ES Report. Conform with project requirements for wind load resistance.

C. Report deviations from the requirements of project specifications or other conditions that might adversely affect the air and moisture barrier installation. Do not start work until deviations are corrected.

3.02 SURFACE PREPARATION

A. Concrete Masonry
1. Surface must be structurally sound and free of weak or damaged surface conditions such as laitance or spalls. Surface must be clean, dry, frost-free, and free of any bond-inhibiting materials such as dust, dirt, oil, algae, mildew, salts, efflorescence, or any other surface contamination. Mortar joints must be struck flush with the surface.
2. Remove excess mortar from masonry ties, lintels and shelf angles.
3. Remove loose or damaged material by water-blasting, sandblasting or mechanical wire brushing. Remove surface contamination such as dirt or efflorescence by chemical or mechanical means. Repair surface defects such as spalls, voids and holes with Sto BTS Xtra (up to 1/8 inch [3 mm] thick) or Sto Leveler (up to 1/4 inch [6 mm] thick).
4. Repair non-structural cracks up to 1/8 inch (3 mm) wide by raking with a sharp tool to remove loose, friable material and blow clean with oil-free compressed air. Apply joint treatment material over crack, embed reinforcement (where applicable), and smooth joint treatment material with a trowel, drywall or putty knife to cover the reinforcement.
5. Important: For "rough" CMU wall surfaces skim coat the entire wall surface with the leveling material to fill and level the surface prior to applying the air and moisture barrier membrane and transition materials. When a skim coat of the leveling material is installed only one coat of the air and moisture barrier coating is typically required. Use the mock-up and site tests as the basis for the work.

B. Concrete
1. Surface must be structurally sound and free of weak or damaged surface conditions such as laitance, bugholes, or spalls. Surface must be clean, dry, frost-free, and free of any bond-inhibiting materials such as dust, dirt, oil, form release, algae, mildew, salts, efflorescence, or any other surface contamination.
2. Remove projecting fins, ridges, form ties, and high spots by mechanical means.
3. Remove loose or damaged material by water-blasting, sandblasting or mechanical wire brushing. Remove form release by chemical or mechanical means. Repair surface defects such as honeycombs, pitting, spalls, voids or holes with Sto BTS Xtra (up to 1/8 inch [3 mm] thick) or Sto Leveler (up to 1/4 inch [6 mm] thick).
4. Repair non-structural cracks up to 1/8 inch (3 mm) wide by raking with a sharp tool to remove loose, friable material and blow clean with oil-free compressed air. Apply joint treatment material over crack, embed reinforcement (where applicable), and smooth joint

treatment material with a trowel, drywall or putty knife to cover the reinforcement.

C. Sheathing
   1. Remove and replace damaged sheathing.
   2. Spot surface defects such as over-driven fasteners, knot holes, or other voids in sheathing with knife grade joint treatment material.
   3. Spot fasteners with knife grade or coating joint treatment material.

3.03 INSTALLATION

A. Air/Moisture Barrier Installation over Exterior or Exposure I Wood-Based Sheathing (Plywood and OSB), Glass Mat Faced Gypsum Sheathing in compliance with ASTM C 1177, concrete, and concrete masonry (CMU) wall construction
   1. Coordinate work with other trades to ensure air barrier continuity with connections at foundation, floor lines, flashings, lintels and shelf angles, openings and penetrations such as pipes, vents, windows and doors, masonry anchors, rafters or beams, joints in construction, projections such as decks and balconies, and roof line.
   2. Transition Detailing: detail transition areas with Sto RapidGuard or StoGuard Transition Membrane to achieve air barrier continuity. For illustrations of installation, refer to Sto Guide Details and Sto RapidGuard Installation Guide or StoGuard Transition Membrane Installation Guide (www.stocorp.com).

B. Rough opening protection
   1. Install rough opening protection. Refer to Sto details and applicable Sto product bulletins.

C. Sheathing joints
   1. Install joint treatment material over sheathing joints. Refer to Sto details and applicable Sto product bulletins.

D. Air and moisture barrier coating
   1. Concrete – install one coat of Sto Gold Coat by spray or roller in a uniform, continuous film of 10 wet mils to the prepared concrete substrate. Do not install over working or moving joint sealants.
   2. Concrete Masonry – install one liberal coat of Sto Gold Coat by spray or roller in a uniform, continuous film to the prepared concrete masonry substrate. Backroll spray applications. Allow to dry. Install a second liberal coat in a uniform, continuous film, and backroll spray applications, to achieve a void and pinhole free surface. Depending on the condition of the surface a minimum of 10 wet mils up to a maximum of 30 wet mils per coat is required. Apply additional coats if needed to achieve a void and pinhole free surface. Do not install over working or moving joint sealants.
   3. Important: The number of coats and thickness is highly dependent on CMU composition, unit weight (lightweight or normal weight), porosity, joint profile, and other variables that may exist. For “rough” CMU wall surfaces skim coat the entire wall surface with the leveling material to fill and level the surface prior to applying the air and moisture barrier coating and transition materials. When a skim coat of the leveling material is installed only one coat of the air and moisture barrier coating is typically required. Use the mock-up and site tests as the basis for the work.

E. Sheathing
   1. Glass mat faced gypsum sheathing: install one coat of Sto Gold Coat by spray or roller in a uniform, continuous film of 10 wet mils to the prepared glass mat gypsum substrate to achieve a void and pinhole free surface. Do not install over working or moving joint sealants.
   2. Plywood sheathing: install one coat of Sto Gold Coat by spray or roller in a uniform, continuous film of 10 wet mils to the prepared substrate to achieve a void and pinhole free surface. Do not install over working or moving joint sealants.
   3. OSB sheathing: install one coat of Sto Gold Coat by spray or roller in a uniform, continuous film of 10 wet mils to the prepared substrate and allow to dry. Install a second coat in a uniform, continuous film of 10 wet mils to achieve a void and pinhole free

surface. Do not install over working or moving joint sealants.

F. FIELD QUALITY CONTROL
   1. Owner's qualified testing agency or building envelope consultant shall perform inspections and tests.
   2. Inspections: air barrier materials are subject to inspection to verify compliance with requirements.
   3. Condition of substrates and substrate preparation.
   4. Installation of primary air barrier material, accessory materials, and compatible auxiliary materials over structurally sound substrates and in conformance with architectural design details, contractor's shop drawings, project mock-up, and manufacturer's written installation instructions.
   5. Air barrier continuity and connections without gaps and holes at foundation, floor lines, flashings, lintels and shelf angles, openings and penetrations such as pipes, vents, windows and doors, masonry anchors, rafters or beams, joints in construction, projections such as decks and balconies, and roof line.

G. Tests: air barrier materials and assembly are subject to tests to verify compliance with performance requirements:
   1. Qualitative air leakage test: ASTM E 1186
   2. Quantitative air leakage test: ASTM E 779, E 783, and E 1827
   3. Adhesion test: ASTM D 4541
   4. Qualitative adhesion and compatibility testing: wet sealant manufacturer's field quality control adhesion test
   5. Repair non-conforming substrates and air barrier material installation to conform with project requirements.
   6. Take corrective action to repair and replace, reinstall, seal openings, gaps, or other sources of air leakage to conform with project performance requirements.

H. PROTECTION AND CLEANING
   1. Protect air barrier materials from damage during construction caused by wind, rain, freezing, continuous high humidity, or prolonged exposure to sun light.
   2. Protect air barrier materials from damage from trades, vandals, and water infiltration during construction.
   3. Repair damaged materials to meet project specification requirements.
   4. Clean spills, stains, soiling from finishes or other construction materials that will be exposed in the completed work with compatible cleaners.
   5. Remove all masking materials after work is completed.

END OF SECTION

SECTION 075423
THERMOPLASTIC POLYOLEFIN (TPO) ROOFING

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes:
   1. Adhered TPO membrane roofing system, see basis of design.
   2. Roof insulation.
   3. Cover board

1.02 PERFORMANCE REQUIREMENTS

A. General Performance: Installed membrane roofing and base flashings shall withstand specified uplift pressures, thermally induced movement, and exposure to weather without failure due to defective manufacture, fabrication, installation, or other defects in construction. Membrane roofing and base flashings shall remain watertight.

B. Material Compatibility: Provide roofing materials that are compatible with one another under conditions of service and application required, as demonstrated by membrane roofing manufacturer based on testing and field experience.

1.03 ACTION SUBMITTALS

A. Product Data: For each type of product indicated.

B. Shop Drawings: For roofing system. Include plans, elevations, sections, details, and attachments to other work.
   1. Base flashings and membrane terminations.
   2. Tapered insulation, including slopes.

C. Samples for Verification: For the following products:
   1. Sheet roofing, of color specified, including T-shaped side and end lap seam.
   2. Roof insulation.

1.04 CLOSEOUT SUBMITTALS

A. Maintenance Data: For roofing system to include in maintenance manuals.

1.05 QUALITY ASSURANCE

A. Manufacturer Qualifications: A qualified manufacturer that is UL listed for membrane roofing system identical to that used for this Project.

B. Installer Qualifications: A qualified firm that is approved, authorized, or licensed by membrane roofing system manufacturer to install manufacturer's product and that is eligible to receive manufacturer's special warranty.

C. Source Limitations: Obtain components including roof insulation for membrane roofing system from same manufacturer as membrane roofing or approved by membrane roofing manufacturer.

D. Exterior Fire-Test Exposure: ASTM E 108, Class A; for application and roof slopes indicated, as determined by testing identical membrane roofing materials by a qualified testing agency. Materials shall be identified with appropriate markings of applicable testing agency.

E. Fire-Resistance Ratings: Where indicated, provide fire-resistance-rated roof assemblies identical to those of assemblies tested for fire resistance per ASTM E 119 by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Deliver roofing materials to Project site in original containers with seals unbroken and labeled with manufacturer's name, product brand name and type, date of manufacture, approval or listing agency markings, and directions for storing and mixing with other components.

B. Store liquid materials in their original undamaged containers in a clean, dry, protected location and within the temperature range required by roofing system manufacturer. Protect stored liquid material from direct sunlight.
   1. Discard and legally dispose of liquid material that cannot be applied within its stated shelf life.

C. Protect roof insulation materials from physical damage and from deterioration by sunlight, moisture, soiling, and other sources. Store in a dry location. Comply with insulation manufacturer's written instructions for handling, storing, and protecting during installation.

D. Handle and store roofing materials and place equipment in a manner to avoid permanent deflection of deck.

1.07 PROJECT CONDITIONS

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

PART 2 PRODUCTS

2.01 TPO MEMBRANE ROOFING

A. Fabric-Reinforced Thermoplastic Polyolefin Sheet: ASTM D 6878, internally fabric or scrim reinforced, uniform, flexible TPO sheet.
   1. Thickness: 45 mils (1.1 mm), nominal.
   2. Exposed Face Color: Tan.

2.02 AUXILIARY MEMBRANE ROOFING MATERIALS

A. General: Auxiliary membrane roofing materials recommended by roofing system manufacturer for intended use, and compatible with membrane roofing.
   1. Liquid-type auxiliary materials shall comply with VOC limits of authorities having jurisdiction.
   2. Adhesives and sealants that are not on the exterior side of weather barrier shall comply with the following limits for VOC content when calculated according to 40 CFR 59, Subpart D (EPA Method 24):
      a. Plastic Foam Adhesives: 50 g/L.
      b. Gypsum Board and Panel Adhesives: 50 g/L.
      c. Multipurpose Construction Adhesives: 70 g/L.
      d. Fiberglass Adhesives: 80 g/L.
      e. Single-Ply Roof Membrane Adhesives: 250 g/L.
      f. Other Adhesives: 250 g/L.
      g. Single-Ply Roof Membrane Sealants: 450 g/L.
      h. Nonmembrane Roof Sealants: 300 g/L.
      i. Sealant Primers for Nonporous Substrates: 250 g/L.
      j. Sealant Primers for Porous Substrates: 775 g/L.

B. Sheet Flashing: Manufacturer's standard unreinforced thermoplastic polyolefin sheet flashing, 55 mils (1.4 mm) thick, minimum, of same color as sheet membrane.

C. Bonding Adhesive: Manufacturer's standard.

D. Miscellaneous Accessories: Provide pourable sealers, preformed cone and vent sheet flashings, preformed inside and outside corner sheet flashings, T-joint covers, lap sealants, termination reglets, bird spikes and other accessories.

2.03 ROOF INSULATION

A. General: Preformed roof insulation boards manufactured or approved by TPO membrane roofing manufacturer, selected from manufacturer's standard sizes suitable for application, of thicknesses indicated.

B. Molded-Polystyrene Board Insulation: ASTM C 578, Type II, 1.35-lb/cu. ft. (22-kg/cu. m) minimum density.

C. Tapered Insulation: Provide factory-tapered insulation boards fabricated to slope of 1/4 inch per 12 inches (1:48) unless otherwise indicated.

D. Provide preformed saddles, crickets, tapered edge strips, and other insulation shapes where indicated for sloping to drain. Fabricate to slopes indicated.

2.04 INSULATION ACCESSORIES

A. General: Furnish roof insulation accessories recommended by insulation manufacturer for intended use and compatibility with membrane roofing.

B. Full-Spread Applied Insulation Adhesive: Insulation manufacturer's recommended spray-applied, low-rise, two-component urethane adhesive formulated to attach roof insulation to substrate or to another insulation layer.

2.05 WALKWAYS

A. Flexible Walkways: Factory-formed, nonporous, heavy-duty, slip-resisting, surface-textured walkway pads or rolls, approximately 3/16 inch (5 mm) thick, and acceptable to membrane roofing system manufacturer.

PART 3 EXECUTION

3.01 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with the following requirements and other conditions affecting performance of roofing system:
   1. Verify that roof openings and penetrations are in place and curbs are set and braced and that roof drain bodies are securely clamped in place.
   2. Verify that wood blocking, curbs, and nailers are securely anchored to roof deck at penetrations and terminations and that nailers match thicknesses of insulation.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 PREPARATION

A. Clean substrate of dust, debris, moisture, and other substances detrimental to roofing installation according to roofing system manufacturer's written instructions. Remove sharp projections.

B. Prevent materials from entering and clogging roof drains and conductors and from spilling or migrating onto surfaces of other construction. Remove roof-drain plugs when no work is taking place or when rain is forecast.

C. Complete terminations and base flashings and provide temporary seals to prevent water from entering completed sections of roofing system at the end of the workday or when rain is forecast. Remove and discard temporary seals before beginning work on adjoining roofing.

3.03 SUBSTRATE BOARD

A. Install substrate board with long joints in continuous straight lines, perpendicular to roof slopes with end joints staggered between rows. Tightly butt substrate boards together.
   1. Fasten substrate board to top flanges of steel deck according to recommendations in FM Approvals' "RoofNav" and FM Global Loss Prevention Data Sheet 1-29 for specified Windstorm Resistance Classification.
   2. Fasten substrate board to top flanges of steel deck to resist uplift pressure at corners, perimeter, and field of roof according to membrane roofing system manufacturers' written instructions.

3.04 INSULATION INSTALLATION

A. Coordinate installing membrane roofing system components so insulation is not exposed to precipitation or left exposed at the end of the workday.

B. Comply with membrane roofing system and insulation manufacturer's written instructions for installing roof insulation.

C. Install tapered insulation under area of roofing to conform to slopes indicated.

D. Install insulation under area of roofing to achieve required thickness. Where overall insulation thickness is 2.7 inches (68 mm) or greater, install two or more layers with joints of each succeeding layer staggered from joints of previous layer a minimum of 6 inches (150 mm) in each direction.
   1. Where installing composite and noncomposite insulation in two or more layers, install noncomposite board insulation for bottom layer and intermediate layers, if applicable, and install composite board insulation for top layer.

E. Trim surface of insulation where necessary at roof drains so completed surface is flush and does not restrict flow of water.

F. Install insulation with long joints of insulation in a continuous straight line with end joints staggered between rows, abutting edges and ends between boards. Fill gaps exceeding 1/4 inch (6 mm) with insulation.
   1. Cut and fit insulation within 1/4 inch (6 mm) of nailers, projections, and penetrations.

G. Adhered Insulation: Install each layer of insulation and adhere to substrate as follows:
   1. Set each layer of insulation in a uniform coverage of full-spread insulation adhesive, firmly pressing and maintaining insulation in place.

3.05 ADHERED MEMBRANE ROOFING INSTALLATION

A. Adhere membrane roofing over area to receive roofing and install according to membrane roofing system manufacturer's written instructions.

B. Start installation of membrane roofing in presence of membrane roofing system manufacturer's technical personnel.

C. Accurately align membrane roofing and maintain uniform side and end laps of minimum dimensions required by manufacturer. Stagger end laps.

D. Bonding Adhesive: Apply to substrate and underside of membrane roofing at rate required by manufacturer and allow to partially dry before installing membrane roofing. Do not apply to splice area of membrane roofing.

E. In addition to adhering, mechanically fasten membrane roofing securely at terminations, penetrations, and perimeter of roofing.

F. Apply membrane roofing with side laps shingled with slope of roof deck where possible.

G. Seams: Clean seam areas, overlap membrane roofing, and hot-air weld side and end laps of membrane roofing and sheet flashings according to manufacturer's written instructions to ensure a watertight seam installation.
   1. Test lap edges with probe to verify seam weld continuity. Apply lap sealant to seal cut edges of sheet membrane.
   2. Verify field strength of seams a minimum of twice daily and repair seam sample areas.
   3. Repair tears, voids, and lapped seams in roofing that does not comply with requirements.

H. Spread sealant bed over deck drain flange at roof drains and securely seal membrane roofing in place with clamping ring.

3.06 BASE FLASHING INSTALLATION

A. Install sheet flashings and preformed flashing accessories and adhere to substrates according to membrane roofing system manufacturer's written instructions.

B. Apply bonding adhesive to substrate and underside of sheet flashing at required rate and allow to partially dry. Do not apply to seam area of flashing.

C. Flash penetrations and field-formed inside and outside corners with cured or uncured sheet flashing.

D. Clean seam areas, overlap, and firmly roll sheet flashings into the adhesive. Hot-air weld side and end laps to ensure a watertight seam installation.

3.07 WALKWAY INSTALLATION

A. Flexible Walkways: Install walkway products in locations indicated. Heat weld to substrate or adhere walkway products to substrate with compatible adhesive according to roofing system manufacturer's written instructions.

3.08 PROTECTING AND CLEANING

A. Protect membrane roofing system from damage and wear during remainder of construction period. When remaining construction will not affect or endanger roofing, inspect roofing for deterioration and damage, describing its nature and extent in a written report, with copies to Architect and Owner.

B. Correct deficiencies in or remove membrane roofing system that does not comply with requirements; repair substrates; and repair or reinstall membrane roofing system to a condition free of damage and deterioration at time of Substantial Completion and according to warranty requirements.

C. Clean overspray and spillage from adjacent construction using cleaning agents and procedures recommended by manufacturer of affected construction.

END OF SECTION

SECTION 076200
SHEET METAL FLASHING AND TRIM

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes:
   1. Formed roof-drainage sheet metal fabrications.
   2. Formed steep-slope roof sheet metal fabrications.

1.02 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 flashing and trim installation with adjoining roofing and wall materials, joints, and seams to provide leakproof, secure, and noncorrosive installation.

1.03 ACTION SUBMITTALS

A. Product Data: For each type of product.
   1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for each manufactured product and accessory.

B. Shop Drawings: For sheet metal flashing and trim.
   1. Include plans, elevations, sections, and attachment details.

C. Samples for Initial Selection: For each type of sheet metal and accessory indicated with factory-applied finishes.

1.04 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.

1.05 DELIVERY, STORAGE, AND HANDLING

A. 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.

B. 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.

PART 2 PRODUCTS

2.01 PERFORMANCE REQUIREMENTS

A. General: Sheet metal flashing and trim assemblies shall withstand wind loads, structural movement, thermally induced movement, and exposure to weather without failure due to defective manufacture, fabrication, installation, or other defects in construction. Completed sheet metal flashing and trim shall not rattle, leak, or loosen, and shall remain watertight.

B. Sheet Metal Standard for Flashing and Trim: Comply with SMACNA's "Architectural Sheet Metal Manual" requirements for dimensions and profiles shown unless more stringent requirements are indicated.

C. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes to prevent buckling, opening of joints, overstressing of components, failure of joint sealants, failure of connections, and other detrimental effects. Base calculations on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.
   1. Temperature Change: 120 deg F (67 deg C), ambient; 180 deg F (100 deg C), material surfaces.

2.02 SHEET METALS

A. General: Protect mechanical and other finishes on exposed surfaces from damage by applying strippable, temporary protective film before shipping.

B. Aluminum Sheet: ASTM B 209 (ASTM B 209M), alloy as standard with manufacturer for finish required, with temper as required to suit forming operations and performance required; with smooth, flat surface.
   1. Exposed Coil-Coated Finish:
      a. Two-Coat Fluoropolymer: AAMA 620. Fluoropolymer finish containing not less than 70 percent PVDF resin by weight in color coat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
   2. Color: As selected by Architect from manufacturer's full range.
   3. Concealed Finish: Pretreat with manufacturer's standard white or light-colored acrylic or polyester backer finish, consisting of prime coat and wash coat with minimum total dry film thickness of 0.5 mil (0.013 mm).

2.03 MISCELLANEOUS MATERIALS

A. General: Provide materials and types of fasteners, protective coatings, sealants, and other miscellaneous items as required for complete sheet metal flashing and trim installation and as recommended by manufacturer of primary sheet metal or manufactured item unless otherwise indicated.

B. Fasteners: Wood screws, annular threaded nails, self-tapping screws, self-locking rivets and bolts, and other suitable fasteners designed to withstand design loads and recommended by manufacturer of primary sheet metal or manufactured item.
   1. General: Blind fasteners or self-drilling screws, gasketed, with hex-washer head.
      a. Exposed Fasteners: Heads matching color of sheet metal using plastic caps or factory-applied coating. Provide metal-backed EPDM or PVC sealing washers under heads of exposed fasteners bearing on weather side of metal.
      b. Blind Fasteners: High-strength aluminum or stainless-steel rivets suitable for metal being fastened.
      c. Spikes and Ferrules: Same material as gutter; with spike with ferrule matching internal gutter width.
   2. Fasteners for Aluminum Sheet: Aluminum or Series 300 stainless steel.

C. Sealant Tape: Pressure-sensitive, 100 percent solids, polyisobutylene compound sealant tape with release-paper backing. Provide permanently elastic, nonsag, nontoxic, nonstaining tape 1/2 inch (13 mm) wide and 1/8 inch (3 mm) thick.

D. Elastomeric Sealant: ASTM C 920, elastomeric silicone polymer sealant; of type, grade, class, and use classifications required to seal joints in sheet metal flashing and trim and remain watertight.

E. Butyl Sealant: ASTM C 1311, single-component, solvent-release butyl rubber sealant; polyisobutylene plasticized; heavy bodied for hooked-type expansion joints with limited movement.

F. Epoxy Seam Sealer: Two-part, noncorrosive, aluminum seam-cementing compound, recommended by aluminum manufacturer for exterior nonmoving joints, including riveted joints.

G. Bituminous Coating: Cold-applied asphalt emulsion according to ASTM D 1187.

H. Asphalt Roofing Cement: ASTM D 4586, asbestos free, of consistency required for application.

2.04 FABRICATION, GENERAL

A. General: Custom fabricate sheet metal flashing and trim to comply with details shown and recommendations in cited sheet metal standard that apply to design, dimensions, geometry, metal thickness, and other characteristics of item required. Fabricate sheet metal flashing and trim in shop to greatest extent possible.

1. Fabricate sheet metal flashing and trim in thickness or weight needed to comply with performance requirements, but not less than that specified for each application and metal.
2. Obtain field measurements for accurate fit before shop fabrication.
3. Form sheet metal flashing and trim to fit substrates without excessive oil canning, buckling, and tool marks; true to line, levels, and slopes; and with exposed edges folded back to form hems.
4. Conceal fasteners and expansion provisions where possible. Do not use exposed fasteners on faces exposed to view.

B. Fabrication Tolerances: Fabricate sheet metal flashing and trim that is capable of installation to a tolerance of 1/4 inch in 20 feet (6 mm in 6 m) on slope and location lines indicated on Drawings and within 1/8-inch (3-mm) offset of adjoining faces and of alignment of matching profiles.

C. Fabrication Tolerances: Fabricate sheet metal flashing and trim that is capable of installation to tolerances specified in MCA's "Guide Specification for Residential Metal Roofing."

D. Expansion Provisions: Form metal for thermal expansion of exposed flashing and trim.
1. Form expansion joints of intermeshing hooked flanges, not less than 1 inch (25 mm) deep, filled with butyl sealant concealed within joints.
2. Use lapped expansion joints only where indicated on Drawings.

E. Sealant Joints: Where movable, nonexpansion-type joints are required, form metal to provide for proper installation of elastomeric sealant according to cited sheet metal standard.

F. Fabricate cleats and attachment devices from same material as accessory being anchored or from compatible, noncorrosive metal.

G. Fabricate cleats and attachment devices of sizes as recommended by cited sheet metal standard for application, but not less than thickness of metal being secured.

H. Seams for Aluminum: Fabricate nonmoving seams with flat-lock seams. Form seams and seal with epoxy seam sealer.

I. Do not use graphite pencils to mark metal surfaces.

2.05 ROOF-DRAINAGE SHEET METAL FABRICATIONS

A. Hanging Gutters: Fabricate to cross section required, complete with end pieces, outlet tubes, and other accessories as required. Fabricate in minimum 96-inch- (2400-mm-) long sections. Furnish flat-stock gutter brackets and flat-stock gutter spacers and straps fabricated from same metal as gutters, of size recommended by cited sheet metal standard but with thickness not less than twice the gutter thickness. Fabricate expansion joints, expansion-joint covers, and gutter accessories from same metal as gutters.
1. Gutter Profile: Style J according to cited sheet metal standard.
2. Expansion Joints: Butt type with cover plate.
3. Gutters with Girth up to 15 Inches (380 mm): Fabricate from the following materials:
   a. Aluminum: 0.032 inch (0.81 mm) thick.

B. Downspouts: Fabricate rectangular downspouts to dimensions indicated, complete with mitered elbows. Furnish with metal hangers from same material as downspouts and anchors. Shop fabricate elbows.
1. Fabricated Hanger Style: Fig 1-35A according to SMACNA's "Architectural Sheet Metal Manual."
2. Fabricate from the following materials:
   a. Aluminum: 0.024 inch (0.61 mm) thick.

2.06 STEEP-SLOPE ROOF SHEET METAL FABRICATIONS

A. Apron, Step, Cricket, and Backer Flashing: Fabricate from the following materials:
1. Aluminum: 0.032 inch (0.81 mm) thick.

B. Valley Flashing: Fabricate from the following materials:
1. Aluminum-Zinc Alloy-Coated Steel: 0.028 inch (0.71 mm) thick.

C. Drip Edges: Fabricate from the following materials:
   1. Aluminum: 0.032 inch (0.81 mm) thick.

D. Eave, Rake, and Hip Flashing: Fabricate from the following materials:
   1. Aluminum: 0.032 inch (0.81 mm) thick.

E. Counterflashing: Fabricate from the following materials:
   1. Aluminum: 0.032 inch (0.81 mm) thick.

F. Roof-Penetration Flashing: Fabricate from the following materials:
   1. Aluminum: 0.032 inch (0.81 mm) thick.

2.07 WALL SHEET METAL FABRICATIONS

A. Opening Flashings in Frame Construction: Fabricate head, sill, and similar flashings to extend 4 inches (100 mm) beyond wall openings. Form head and sill flashing with 2-inch- (50-mm-) high, end dams. Fabricate from the following materials:
   1. Aluminum: 0.032 inch (0.81 mm) thick.

PART 3 EXECUTION

3.01 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances, substrate, and other conditions affecting performance of the Work.
   1. Verify compliance with requirements for installation tolerances of substrates.
   2. Verify that substrate is sound, dry, smooth, clean, sloped for drainage, and securely anchored.
   3. Verify that air- or water-resistant barriers have been installed over sheathing or backing substrate to prevent air infiltration or water penetration.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 INSTALLATION, GENERAL

A. General: Anchor sheet metal flashing and trim and other components of the Work securely in place, with provisions for thermal and structural movement. Use fasteners, protective coatings, separators, sealants, and other miscellaneous items as required to complete sheet metal flashing and trim system.
   1. Install sheet metal flashing and trim true to line, levels, and slopes. Provide uniform, neat seams with minimum exposure of solder, welds, and sealant.
   2. Install sheet metal flashing and trim to fit substrates and to result in watertight performance. Verify shapes and dimensions of surfaces to be covered before fabricating sheet metal.
   3. Space cleats not more than 12 inches (300 mm) apart. Attach each cleat with at least two fasteners. Bend tabs over fasteners.
   4. Install exposed sheet metal flashing and trim with limited oil canning, and free of buckling and tool marks.
   5. Torch cutting of sheet metal flashing and trim is not permitted.
   6. Do not use graphite pencils to mark metal surfaces.

B. Metal Protection: Where dissimilar metals contact each other, or where metal contacts pressure-treated wood or other corrosive substrates, protect against galvanic action or corrosion by painting contact surfaces with bituminous coating or by other permanent separation as recommended by sheet metal manufacturer or cited sheet metal standard.
   1. Coat concealed side of uncoated-aluminum sheet metal flashing and trim with bituminous coating where flashing and trim contact wood, ferrous metal, or cementitious construction.
   2. Underlayment: Where installing sheet metal flashing and trim directly on cementitious or wood substrates, install underlayment and cover with slip sheet.

C. Expansion Provisions: Provide for thermal expansion of exposed flashing and trim. Space movement joints at maximum of 10 feet (3 m) with no joints within 24 inches (600 mm) of corner

or intersection.

1. Form expansion joints of intermeshing hooked flanges, not less than 1 inch (25 mm) deep, filled with sealant concealed within joints.
2. Use lapped expansion joints only where indicated on Drawings.

D. Fasteners: Use fastener sizes that penetrate wood blocking or sheathing not less than 1-1/4 inches (32 mm) for nails and not less than 3/4 inch (19 mm) for wood screws.

E. Conceal fasteners and expansion provisions where possible in exposed work and locate to minimize possibility of leakage. Cover and seal fasteners and anchors as required for a tight installation.

F. Seal joints as required for watertight construction.

1. Use sealant-filled joints unless otherwise indicated. Embed hooked flanges of joint members not less than 1 inch (25 mm) into sealant. Form joints to completely conceal sealant. When ambient temperature at time of installation is between 40 and 70 deg F (4 and 21 deg C), set joint members for 50 percent movement each way. Adjust setting proportionately for installation at higher ambient temperatures. Do not install sealant-type joints at temperatures below 40 deg F (4 deg C).

3.03 ROOF-DRAINAGE SYSTEM INSTALLATION

A. General: Install sheet metal roof-drainage items to produce complete roof-drainage system according to cited sheet metal standard unless otherwise indicated. Coordinate installation of roof perimeter flashing with installation of roof-drainage system.

B. Hanging Gutters: Join sections with joints sealed with sealant. Provide for thermal expansion. Attach gutters at eave or fascia to firmly anchor them in position. Provide end closures and seal watertight with sealant. Slope to downspouts.

1. Fasten gutter spacers to front and back of gutter.
2. Anchor gutter with gutter brackets spaced not more than 24 inches (600 mm) apart to roof deck, unless otherwise indicated, and loosely lock to front gutter bead.
3. Install gutter with expansion joints not exceeding, 50 feet (15.24 m) apart. Install expansion-joint caps.

C. Downspouts: Join sections with 1-1/2-inch (38-mm) telescoping joints.

1. Provide hangers with fasteners designed to hold downspouts securely to walls. Locate hangers at top and bottom and at approximately 60 inches (1500 mm) o.c.
2. Provide elbows at base of downspout to direct water away from building.
3. Connect downspouts to underground drainage system.

3.04 ROOF FLASHING INSTALLATION

A. General: Install sheet metal flashing and trim to comply with performance requirements, sheet metal manufacturer's written installation instructions, and cited sheet metal standard. Provide concealed fasteners where possible, and set units true to line, levels, and slopes. Install work with laps, joints, and seams that are permanently watertight and weather resistant.

B. Roof Edge Flashing: Anchor to resist uplift and outward forces according to recommendations in FM Global Property Loss Prevention Data Sheet 1-49 for FM Approvals' listing for required windstorm classification.

C. Copings: Anchor to resist uplift and outward forces according to recommendations in cited sheet metal standard unless otherwise indicated.

D. Pipe or Post Counterflashing: Install counterflashing umbrella with close-fitting collar with top edge flared for elastomeric sealant, extending minimum of 4 inches (100 mm) over base flashing. Install stainless-steel draw band and tighten.

E. Counterflashing: Coordinate installation of counterflashing with installation of base flashing. Insert counterflashing in reglets or receivers and fit tightly to base flashing. Extend counterflashing 4 inches (100 mm) over base flashing. Lap counterflashing joints minimum of 4 inches (100 mm).

F. Roof-Penetration Flashing: Coordinate installation of roof-penetration flashing with installation of roofing and other items penetrating roof. Seal with elastomeric sealant and clamp flashing to pipes that penetrate roof.

3.05 WALL FLASHING INSTALLATION

A. General: Install sheet metal wall flashing to intercept and exclude penetrating moisture according to cited sheet metal standard unless otherwise indicated. Coordinate installation of wall flashing with installation of wall-opening components such as windows, doors, and louvers.

B. Opening Flashings in Frame Construction: Install continuous head, sill, and similar flashings to extend 4 inches (100 mm) beyond wall openings.

3.06 ERECTION TOLERANCES

A. Installation Tolerances: Shim and align sheet metal flashing and trim within installed tolerance of 1/4 inch in 20 feet (6 mm in 6 m) on slope and location lines indicated on Drawings and within 1/8-inch (3-mm) offset of adjoining faces and of alignment of matching profiles.

3.07 CLEANING AND PROTECTION

A. Clean exposed metal surfaces of substances that interfere with uniform oxidation and weathering.

B. Clean off excess sealants.

C. Remove temporary protective coverings and strippable films as sheet metal flashing and trim are installed unless otherwise indicated in manufacturer's written installation instructions. On completion of sheet metal flashing and trim installation, remove unused materials and clean finished surfaces as recommended by sheet metal flashing and trim manufacturer. Maintain sheet metal flashing and trim in clean condition during construction.

D. Replace sheet metal flashing and trim that have been damaged or that have deteriorated beyond successful repair by finish touchup or similar minor repair procedures.

END OF SECTION

SECTION 076500
FLEXIBLE FLASHING AND UNDERLAYMENT

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes:
   1. Sheet underlayment at Portland cement plaster.
   2. Self-adhering sheet underlayment where shown on Drawings.
   3. Self-adhering sheet flashing at perimeter of window, door, and vent openings, and other locations where shown on Drawings.

1.02 ADMINISTRATIVE REQUIREMENTS

A. Submittal Procedures:
   1. Action Submittals shall be submitted in accordance with Section 01 33 00, "Submittal Procedures."
   2. Closeout Submittals shall be submitted in accordance with Section 01 77 00, “Closeout Procedures” and Section 01 78 36, “Warranties.”

B. Coordination:
   1. Coordinate with other applicable Sections for continuity of water resistance at interface of flexible flashing and underlayment with other materials.
   2. Coordinate with installers of anchorage for wall panels, sheet metal, windows, and other work anchored to substrate or otherwise penetrating self-adhering membranes, to ensure that penetrations are sealed with a compatible sealant.
   3. Coordinate with shop drawing, mockup, and warranty requirements of other Sections installed in conjunction with work of this Section.

C. Pre-installation Meetings: Attendance is required at pre-installation meetings specified in related Sections.

1.03 ACTION SUBMITTALS

A. Shop Drawings: Provide plans, sections, elevations, and details showing locations of each specified product and methods of installation.
   1. Provide details drawn for this specific installation, not manufacturer's standard details.
   2. Include details for all penetrations and terminations.
   3. Coordinate with shop drawing requirements specified in related Sections.

B. Product Data:
   1. Provide a list of materials, including fasteners if applicable, to be used on the Project. Indicate location of use for each product.
   2. If other than products of listed manufacturers are proposed for use, submit:
      a. Manufacturer's descriptive data for proposed product, test data, use limitations of materials, and recommended installation procedures.
      b. Statement from manufacturer that all products submitted are compatible with one another and with other specified materials with which they will come in contact.

C. Samples: 12 inches x 12 inches for sheet products if other than specified products are proposed.

1.04 CLOSEOUT SUBMITTALS

A. Manufacturer’s written instructions for recommended maintenance practices and schedules.

B. Specified warranty.

1.05 DELIVERY, HANDLING, AND STORAGE

A. Store materials away from sparks, flames, and other head sources, protected from rain and physical damage, and within temperature range recommended by manufacturer.

B. Comply with additional requirements specified in Section 01 6000, "Product Requirements."

1.06 QUALITY ASSURANCE

A. Mockups:
   1. Provide flexible flashing and underlayment for building mockup specified in Section 01 4339, “Mockups.”
   2. In addition, first installed example of each installation condition, if not illustrated by building mockup, shall serve as a mockup for review and approval by Architect and Owner of workmanship, fit, and interface with adjacent construction.
   3. If requested, make modifications to mockups without additional charge to Owner.
   4. Do not proceed with remainder of installation until mockups have been approved.
   5. Where appropriate and acceptable to Owner, approved mockups may become part of the completed Work.

1.07 AMBIENT CONDITIONS

A. Temperature of air and surfaces to receive underlayment shall be within the range recommended by system manufacturer.

B. Substrate surfaces shall be dry at application.

1.08 WARRANTY

A. Special Installer’s Joint Warranty: Manufacturer’s standard form in which installer agrees to repair or replace products that do not comply with Performance and other specified requirements within specified warranty period.
   1. Warranty Period: Five (5) years from Date of Substantial Completion.

B. Special Manufacturer’s Joint Warranty: Manufacturer’s standard form in which product manufacturer agrees to furnish product to repair or replace those that do not comply with Performance and other specified requirements within specified warranty period.
   1. Warranty Period: Ten (10) years from Date of Substantial Completion.

PART 2 PRODUCTS

2.01 MEMBRANE MATERIALS; PRODUCT FAMILIES

A. The following Product Families are presented as complete systems. Contractor shall select and utilize a complete Product Family. Inter-changing components of different Product Families is not acceptable.

B. Product Family Components: Definition of use:
   1. Nail-on Flashing: Flush window jambs, wood doors, and window sill “bibs” only.
   2. Self-Adhered Membrane Flashing: Recessed windows (unless otherwise noted on Drawings), window rough opening sills, door rough openings, backing for wall penetrations, and as required to separate concrete from sheet metal. Note: Release paper shall be removed and membrane fully adhered with J-roller for all self-adhered membrane.
      a. 25 mil at the following locations unless otherwise indicated on Drawings:
         1) Window sills, jambs, and head.
         2) Corridor and deck edges.
         3) Expansion and control joints.
         4) Inside/outside building corners.
         5) Over drip edges, head flashings, weep screed, roof metal, and other areas indicated on the Drawings.
      b. 40 mil at the following locations unless otherwise indicated on Drawings:
         1) Door jambs and head.
         2) Deep recessed window sills.
         3) Door sills.
         4) Railing and stair connections.
         5) Roof to wall transitions.
         6) Transition metal.

7) Scaffolding attachments.
8) Parapets.
9) Door jambs and head.
10) Storefront sill, jambs, and head.
11) Valley metal.
12) All roof jacks stripped in.
13) Pot shelves (if applicable).
14) Sheet metal penetrations.

3. Primer: Masonry/concrete, OSB; anywhere self-adhered membrane is not fully adhered or where primer is recommended by manufacturer.
4. Sealant (on facer):
   a. Repair of installation at doors, windows, and penetrations.
   b. Lath sealant repair.
5. Sealant (contact adhesive backside): Window heads, lag bolt and anchor bolt penetrations.
6. High Temp Membrane: Horizontal surfaces under metal coping flashing.
7. Building Paper/Underlayment: Fortifiber “Hydrotex” or equivalent.

C. Product Family 1: Products by International Building Components, Inc., except as otherwise specified.
1. Nail-on Flashing: “WaterBlock 25-mil” or “Nail-on Flashing.”
2. Self-Adhered Membrane Flashing: “WaterBlock,” 25-mil and/or 40-mil.
3. Primer: “Elastocol Stick H2O.”
4. Window Corner Piece: “WaterBlock Corner Guard” or TLS Labs Corner Pieces.
5. Sealant (On Facer): WaterBlock Premium Polyurethane.
6. Sealant (Adhesive Side): “WaterBlock Sopramastic.”
7. High Temp Membrane: “WaterBlock Waterproof Flashing Membrane HT,” 40-mil.
8. Building Paper/Underlayment: Fortifiber “Hydrotex” or equivalent.

D. Product Family 2: Products by Fortifiber Building Systems Group, except as otherwise specified.
1. Nail-on Flashing: “Moistop Next Window Flashing.”
2. Self-Adhered Membrane Flashing: “FortiFlash” window flashing, 25-mil and/or 40-mil.
3. Primer: “Aquatac” by the Henry Company, or other approved primer by manufacturer.
4. Window Corner Piece: TLS Labs Corner Pieces.
5. Sealant (“FortiFlash” – On Facer): “Moistop Sealant.”
6. Sealant (“FortiFlash” – Adhesive): “Moistop Sealant,” knock down.
7. Sealant – “Moistop Next”: No restrictions.
8. High Temp Membrane: “Grace Ultra” by Grace Construction Products.
9. Building Paper/Underlayment: Fortifiber “Hydrotex” or equivalent.

E. Product Family 3: Products by Top Industrial, Inc., except as otherwise specified.
1. Nail-on Flashing: “RainBuster 420.”
2. Self-Adhered Membrane Flashing: “RainBuster 415,” 25-mil and/or 40-mil.
3. Primer: “Aquatac” by the Henry Company, or other approved primer by manufacturer.
4. Window Corner Piece: “RainBuster 425.”
5. Sealant (on facer): “RainBuster 450.”
6. Sealant (adhesive site): “RainBuster 450.”
7. High Temp Membrane: “RainBuster 415” up to 180 degrees F, “Vycor Ultra” by Grace Construction Products for added protection up to 230 degrees F. If anticipated temperature cannot be determined, use Grace.
8. Building Paper/Underlayment: Fortifiber “Hydrotex” or equivalent.

F. Product Family 4: Products by Elvation S60 Membrane, except as otherwise specified.
1. Prime all surfaces with Elevation SP1 prior to installing Elevation S60
2. For installation of inside and outside corners refer to:

a. Elevation Inside Corner Detail - EBES 1040
b. Elevation Outside Corner Detail - EBES 1041
3. Provide Elevation Termination Bar (T-Bar) at balconies
4. Provide Elevation T-Bar Termination Pockets at corners

2.02 ACCESSORIES

A. Mechanical Fasteners: Washer-type, as recommended by membrane manufacturer for attachment to substrate.

B. Liquid Membrane: Two-component, 100 percent solids modified urethane, cold-applied; "Bituthene Liquid Membrane," or equal compatible with membrane and acceptable to membrane manufacturer.

C. Penetration Flashing: Quickflash Weatherproofing Products, Inc., or accepted equal.
1. Electrical panels.
2. Box penetrations.
3. Vent penetrations.
4. Pipe penetrations.
5. Conduit penetrations.
6. Air conditioning lines.
7. Door bells.
8. Miscellaneous penetrations, and where indicated on the Drawings.

D. Accessories: Provide primers, mastics, and materials recommended by manufacturer for joints and protrusions.

PART 3 EXECUTION

3.01 EXAMINATION

A. Check to ascertain whether surfaces to receive sheet membrane flashing or underlayment are free of dirt, debris, sharp protrusions, and irregularities at joints.

B. Verify that entire flashing membrane is installed over solid backing.

C. Contractor shall promptly bring any problems or discrepancies to the attention of Owner and Architect, in writing.

D. Application of materials indicates acceptance by installer of surfaces and conditions.

E. Verify that all penetrations are properly flashed with Quickflash or equal, sheet metal, and/or self-adhered membrane unless otherwise noted on the Drawings. Correct deficiencies.

3.02 PREPARATION

A. Where priming is required, prime substrates with primer suitable for each substrate and recommended for this use by membrane manufacturer.

B. Prime concrete if bottom of membrane overlaps and is adhered to concrete foundation or slab. Prime only areas that can be covered with membrane on the same day. Re-prime areas not covered with membrane within 24 hours.

C. Prime other substrates as recommended by manufacturer for installation of sheet membrane.

D. At external corners or gaps in sheathing, install liquid membrane to smooth and ease gaps, and to round corners.

3.03 APPLICATION OF SELF ADHERING FLASHING AND UNDERLAYMENT

A. Install at locations specified and as shown on Drawings.

B. Prime substrates where recommended by membrane manufacturer, or as required to provide appropriate bond.

C. Cut membrane from roll to required lengths, and apply in continuous strips over solid backing.
1. Remove release paper, and adhere membrane fully to substrate or as indicated on Drawings; no exceptions. Use J-rollers to apply all self-adhered membrane.

a. Due to sequencing of multiple trades; peel back, fold/remove release paper, and adhere membrane for work completed at that time. Leave the remaining portion of release paper to be removed at next step of installation.
b. Install self-adhering membrane wrinkle free.
c. Fishmouths are not allowed.

2. Press membrane into corners where shown, and firmly set with J-roller. Self adhering membrane is not required at building corners except as shown.
3. Comply with manufacturer's recommendations for overlapping or side and end seams.

D. Saddle membrane over top of walls. Weather-lap ends 6 inches minimum.

E. Openings: Install as shown on the Drawings, in accordance with details and recommendations of manufacturer, ASTM E2112, and AAMA 2400.
1. Fold and lap flashing to prevent water from migrating behind underlayment.
2. Provide sealant at any "pinholes."

F. Lap self-adhering membrane in the direction of water flow.

G. Press membrane into place using heavy hand pressure, or roll with a wall or countertop roller. Roll seams. Fishmouths are not allowed.

H. Provide mechanical fasteners where recommended by membrane manufacturer. Fastener heads shall be sealed with liquid membrane.

I. Seal joints caused by pipes, conduits, electrical boxes, anchors, and similar items penetrating membrane with liquid membrane to create an airtight seal between penetrating objects and membrane. Apply liquid membrane to seal termination edges.

J. Inspect membrane for continuity. Patch tears, fishmouths, damage, and inadequately lapped seams, overlapping in accordance with manufacturer's instructions.

K. Apply overlying materials within allowable exposure time limits stated in manufacturer's instructions.

L. Protect membranes from exposure to UV or direct sunlight beyond manufacturer's written exposure limits. If exposure limit expires, remove affected membranes, and replace with new, including subsequent materials.

3.04 APPLICATION OF BUILDING PAPER/UNDERLAYMENT AT WALLS

A. Apply one layer of specified underlayment over substrate.
1. Install in one layer to provide a continuous drainage plane between inner and outer layers of underlayment, including around penetrations.
2. Securely staple to substrate.
3. Apply horizontally over entire surface in shingle fashion, lapping courses minimum 3 inches.
4. Stagger vertical joints.
5. Lap vertical joints a minimum of 6 inches.
6. Stagger joints between layers.
7. Begin roll a minimum of 6 inches away from corner, including termination of roll.
8. Apply sealant around all penetrations and underlayment, all four sides and hand tool smooth.
a. Apply sealant to outer face of all penetrations prior to metal lath, around all sides, hand tool smooth.

B. Underlayment shall be continuous under control joints in plaster; do not cut.

C. Flashing material is not considered a "layer."

D. Repair tears and holes:
1. Under 1/2 Inch: Repair with sealant.
2. 1/2 Inch and Over: Remove defective paper. Apply new paper, properly shingled and overlapped into existing.

3.05 FIELD QUALITY CONTROL

A. Comply with requirements of Section 01 91 15, “Building Envelope Consulting and Testing” and Section 01 9116, “Building Envelope Testing Protocol.”

B. Owner may retain a waterproofing consultant to monitor membrane installation daily.

C. In addition, Owner may hire an inspector and/or testing agency in accordance with Section 01 45 00, "Testing Services."
   1. Testing may include water testing of flexible flashing and underlayment in accordance with AAMA 501.1 and ASTM E1105.
   2. Inspector and/or testing agency will interpret tests and state in each report whether tested work complies with or deviates from specified requirements.

D. Patch, or remove and replace, system components where inspection or test results indicate that work does not comply with specified requirements.

END OF SECTION

SECTION 077200
ROOF ACCESSORIES

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 curbs.
   2. Equipment supports.
   3. Pipe supports.
   4. Preformed flashing sleeves.

B. Related Sections:
   1. Section 076200 "Sheet Metal Flashing and Trim" for shop- and field-formed metal flashing, roof-drainage systems, roof expansion-joint covers, and miscellaneous sheet metal trim and accessories.
   2. Section 07 5423 “TPO Roofing” for roofing and roof walkways.

1.03 PERFORMANCE REQUIREMENTS

A. General Performance: Roof accessories shall withstand exposure to weather and resist thermally induced movement without failure, rattling, leaking, or fastener disengagement due to defective manufacture, fabrication, installation, or other defects in construction.

1.04 ACTION SUBMITTALS

A. Product Data: For each type of roof accessory indicated. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes.

B. Shop Drawings: For roof accessories. Include plans, elevations, keyed details, and attachments to other work. Indicate dimensions, loadings, and special conditions. Distinguish between plant- and field-assembled work.

C. Samples: For each exposed product and for each color and texture specified, prepared on Samples of size to adequately show color.

1.05 INFORMATIONAL SUBMITTALS

A. Coordination Drawings: Roof plans, drawn to scale, and coordinating penetrations and roof-mounted items. Show the following:
   1. Size and location of roof accessories specified in this Section.
   2. Method of attaching roof accessories to roof or building structure.
   3. Other roof-mounted items including mechanical and electrical equipment, ductwork, piping, and conduit.
   4. Required clearances.

B. Warranty: Sample of special warranty.

1.06 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For roof accessories to include in operation and maintenance manuals.

1.07 COORDINATION

A. Coordinate layout and installation of roof accessories with roofing system to provide a leakproof, weathertight, secure, and noncorrosive installation.

B. Coordinate dimensions with rough-in information or Shop Drawings of equipment to be supported.

1.08 WARRANTY

A. Special Warranty on Painted Finishes: Manufacturer's standard form in which manufacturer agrees to repair finishes or replace roof accessories that show evidence of deterioration of factory-applied finishes within specified warranty period.
   1. Fluoropolymer Finish: Deterioration includes, but is not limited to, the following:
      a. Color fading more than 5 Hunter units when tested according to ASTM D 2244.
      b. Chalking in excess of a No. 8 rating when tested according to ASTM D 4214.
      c. Cracking, checking, peeling, or failure of paint to adhere to bare metal.
   2. Finish Warranty Period: 10 years from date of Substantial Completion.

PART 2 PRODUCTS

2.01 METAL MATERIALS

A. Zinc-Coated Galvanized Steel Sheet: ASTM A 653/A 653M, G90 (Z275) coating designation and mill phosphatized for field painting where indicated.
   1. Mill-Phosphatized Finish: Manufacturer's standard for field painting.
   2. Factory Prime Coating: Where field painting is indicated, apply pretreatment and white or light-colored, factory-applied, baked-on epoxy primer coat, with a minimum dry film thickness of 0.2 mil (0.005 mm).
   3. Exposed Coil-Coated Finish: Prepainted by the coil-coating process to comply with ASTM A 755/A 755M. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
      a. Two-Coat Fluoropolymer Finish: AAMA 621. System consisting of primer and fluoropolymer color topcoat containing not less than 70 percent PVDF resin by weight.
   4. Baked-Enamel or Powder-Coat Finish: Immediately after cleaning and pretreating, apply manufacturer's standard two-coat, baked-on finish consisting of prime coat and thermosetting topcoat, with a minimum dry film thickness of 1 mil (0.025 mm) for topcoat. Comply with coating manufacturer's written instructions for applying and baking to achieve a minimum dry film thickness of 2 mils (0.05 mm).
   5. Concealed Finish: Pretreat with manufacturer's standard white or light-colored acrylic or polyester-backer finish consisting of prime coat and wash coat, with a minimum total dry film thickness of 0.5 mil (0.013 mm).

B. Aluminum-Zinc Alloy-Coated Steel Sheet: ASTM A 792/A 792M, AZ50 (AZM150) coated.
   1. Factory Prime Coating: Where field painting is indicated, apply pretreatment and white or light-colored, factory-applied, baked-on epoxy primer coat, with a minimum dry film thickness of 0.2 mil (0.005 mm).
   2. Exposed Coil-Coated Finish: Prepainted by the coil-coating process to comply with ASTM A 755/A 755M. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
      a. Two-Coat Fluoropolymer Finish: AAMA 621. System consisting of primer and fluoropolymer color topcoat containing not less than 70 percent PVDF resin by weight.
   3. Baked-Enamel or Powder-Coat Finish: Immediately after cleaning and pretreating, apply manufacturer's standard two-coat, baked-on finish consisting of prime coat and thermosetting topcoat, with a minimum dry film thickness of 1 mil (0.025 mm) for topcoat. Comply with coating manufacturer's written instructions for applying and baking to achieve a minimum dry film thickness of 2 mils (0.05 mm).
   4. Concealed Finish: Pretreat with manufacturer's standard white or light-colored acrylic or polyester-backer finish consisting of prime coat and wash coat, with a minimum total dry film thickness of 0.5 mil (0.013 mm).

C. Aluminum Sheet: ASTM B 209 (ASTM B 209M), manufacturer's standard alloy for finish required, with temper to suit forming operations and performance required.
   1. Mill Finish: As manufactured.

2. Exposed Coil-Coated Finish: Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
    a. Two-Coat Fluoropolymer Finish: AAMA 620. System consisting of primer and fluoropolymer color topcoat containing not less than 70 percent PVDF resin by weight.
3. Concealed Finish: Pretreat with manufacturer's standard white or light-colored acrylic or polyester-backer finish consisting of prime coat and wash coat, with a minimum total dry film thickness of 0.5 mil (0.013 mm).

D. Aluminum Extrusions and Tubes: ASTM B 221 (ASTM B 221M), manufacturer's standard alloy and temper for type of use, finished to match assembly where used, otherwise mill finished.

E. Steel Shapes: ASTM A 36/A 36M, hot-dip galvanized according to ASTM A 123/A 123M unless otherwise indicated.

F. Steel Tube: ASTM A 500, round tube.

G. Galvanized-Steel Tube: ASTM A 500, round tube, hot-dip galvanized according to ASTM A 123/A 123M.

H. Steel Pipe: ASTM A 53/A 53M, galvanized.

2.02 MISCELLANEOUS MATERIALS

A. General: Provide materials and types of fasteners, protective coatings, sealants, and other miscellaneous items required by manufacturer for a complete installation.

B. Wood Nailers: Softwood lumber, pressure treated with waterborne preservatives for aboveground use, acceptable to authorities having jurisdiction, containing no arsenic or chromium, and complying with AWPA C2; not less than 1-1/2 inches (38 mm) thick.

C. Bituminous Coating: Cold-applied asphalt emulsion complying with ASTM D 1187.

D. Fasteners: Roof accessory manufacturer's recommended fasteners suitable for application and metals being fastened. Match finish of exposed fasteners with finish of material being fastened. Provide nonremovable fastener heads to exterior exposed fasteners. Furnish the following unless otherwise indicated:
1. Fasteners for Zinc-Coated or Aluminum-Zinc Alloy-Coated Steel: Series 300 stainless steel or hot-dip zinc-coated steel according to ASTM A 153/A 153M or ASTM F 2329.
2. Fasteners for Aluminum Sheet: Aluminum or Series 300 stainless steel.
3. Fasteners for Copper Sheet: Copper, hardware bronze, or passivated Series 300 stainless steel.
4. Fasteners for Stainless-Steel Sheet: Series 300 stainless steel.

E. Gaskets: Manufacturer's standard tubular or fingered design of neoprene, EPDM, PVC, or silicone or a flat design of foam rubber, sponge neoprene, or cork.

F. Elastomeric Sealant: ASTM C 920, elastomeric polyurethane polymer sealant as recommended by roof accessory manufacturer for installation indicated; low modulus; of type, grade, class, and use classifications required to seal joints and remain watertight.

G. Butyl Sealant: ASTM C 1311, single-component, solvent-release butyl rubber sealant; polyisobutylene plasticized; heavy bodied for expansion joints with limited movement.

2.03 ROOF CURBS

A. Roof Curbs: Internally reinforced roof-curb units with integral spring-type vibration isolators and capable of supporting superimposed live and dead loads, including equipment loads and other construction indicated on Drawings; with welded or mechanically fastened and sealed corner joints, stepped integral metal cant raised the thickness of roof insulation, and integrally formed deck-mounting flange at perimeter bottom.
1. 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:
    a. AES Industries, Inc.

b. Curbs Plus, Inc.
c. Custom Solution Roof and Metal Products.
d. Greenheck Fan Corporation.
e. LM Curbs.
f. Metallic Products Corp.
g. Milcor Inc.; Commercial Products Group of Hart & Cooley, Inc.
h. Pate Company (The).
i. Roof Products, Inc.
j. Safe Air of Illinois.
k. Thybar Corporation.
l. Vent Products Co., Inc.

B. Size: Coordinate dimensions with roughing-in information or Shop Drawings of equipment to be supported.

C. Loads: See mechanical drawings for loads.

D. Material: Zinc-coated (galvanized) steel sheet, [0.052 inch (1.32 mm)] [0.079 inch (2.01 mm)] [Insert dimension] thick.
1. Finish: Mill phosphatized.

E. Construction:
1. Insulation: Factory insulated with 1-1/2-inch- (38-mm-) thick glass-fiber board insulation.
2. Liner: Same material as curb, of manufacturer's standard thickness and finish.
3. Factory-installed wood nailer at top of curb, continuous around curb perimeter.
4. On ribbed or fluted metal roofs, form deck-mounting flange at perimeter bottom to conform to roof profile.
5. Fabricate curbs to minimum height of 9 inches (300 mm) unless otherwise indicated.
6. Top Surface: Level around perimeter with roof slope accommodated by sloping the deck-mounting flange.
7. Sloping Roofs: Where roof slope exceeds 1:48, fabricate curb with perimeter curb height tapered to accommodate roof slope so that top surface of perimeter curb is level. Equip unit with water diverter or cricket on side that obstructs water flow.

2.04 EQUIPMENT SUPPORTS

A. Equipment Supports: Internally reinforced metal equipment supports capable of supporting superimposed live and dead loads, including equipment loads and other construction indicated on Drawings; with welded or mechanically fastened and sealed corner joints, stepped integral metal cant raised the thickness of roof insulation, and integrally formed deck-mounting flange at perimeter bottom.
1. 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:
a. AES Industries, Inc.
b. Curbs Plus, Inc.
c. Custom Solution Roof and Metal Products.
d. Greenheck Fan Corporation.
e. LM Curbs.
f. Milcor Inc.; Commercial Products Group of Hart & Cooley, Inc.
g. Pate Company (The).
h. Roof Products, Inc.
i. Thybar Corporation.
j. Vent Products Co., Inc.

B. Size: Coordinate dimensions with roughing-in information or Shop Drawings of equipment to be supported.

C. Material: Zinc-coated (galvanized) steel sheet, 0.052 inch (1.32 mm) thick.

1. Finish: Mill phosphatized.

D. Construction:
   1. Insulation: Factory insulated with 1-1/2-inch- (38-mm-) thick glass-fiber board insulation.
   2. Liner: Same material as equipment support, of manufacturer's standard thickness and finish.
   3. Factory-installed continuous wood nailers 3-1/2 inches (90 mm) wide at tops of equipment supports.
   4. Metal Counterflashing: Manufacturer's standard, removable, fabricated of same metal and finish as equipment support.
   5. Fabricate equipment supports to minimum height of 8 inches (300 mm) unless otherwise indicated.
   6. Sloping Roofs: Where roof slope exceeds 1:48, fabricate each support with height to accommodate roof slope so that tops of supports are level with each other. Equip supports with water diverters or crickets on sides that obstruct water flow.

2.05 GRAVITY VENTILATORS

A. Low-Profile, Cylindrical-Style Gravity Ventilators: Manufacturer's standard, fabricated as indicated, with manufacturer's standard welded or sealed mechanical joints.
   1. 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:
      a. Greenheck Fan Corporation.
   2. Construction: Integral base flange, vent cylinder, cylinder bird screen, and hood.
   3. Dimensions: As indicated on Drawings.
   4. Configuration: As indicated on Drawings.
   5. Bird Screens: Manufacturer's standard mesh with rewireable frame.
   6. Insect Screens: Manufacturer's standard mesh with rewireable frame.
   7. Vent Cylinder, Base Flange, and Hood Material: Aluminum sheet, of manufacturer's standard thickness.
   8. Finish: As selected by Architect from manufacturer's full range.

2.06 PIPE SUPPORTS

A. Light-Duty Pipe Supports: Extruded-aluminum base assembly and Type 304 stainless-steel roller assembly for pipe sizes indicated, including manufacturer's recommended load-distributing baseplate.
   1. Basis-of-Design Product: Subject to compliance with requirements, provide comparable product by one of the following:
      a. Thaler Metal USA Inc.
   2. Finish: Manufacturer's standard.

2.07 PREFORMED FLASHING SLEEVES

A. Exhaust Vent Flashing: Double-walled metal flashing sleeve or boot, insulation filled, with integral deck flange, 12 inches (300 mm) [Insert dimension] high, with removable metal hood and [slotted] [perforated] metal collar.
   1. Manufacturers: Subject to compliance with requirements, [provide products by one of the following] [available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following]:
   2. Basis-of-Design Product: Subject to compliance with requirements, provide [product indicated on Drawings] [Insert manufacturer's name; product name or designation] or comparable product by one of the following:
      a. Custom Solution Roof and Metal Products.
      b. Thaler Metal USA Inc.
      c. [Insert manufacturer's name].
   3. Metal: [Aluminum sheet, 0.063 inch (1.60 mm) thick] [Copper sheet, 16 oz. (0.55 mm) thick] [Insert material and thickness].

4. Diameter: [As indicated] [3 inches (76 mm)] [4 inches (100 mm)] [5 inches (125 mm)] [6 inches (150 mm)] [7 inches (175 mm)] [8 inches (200 mm)] [9 inches (225 mm)] [10 inches (250 mm)] [Insert dimension].
5. Finish: [Manufacturer's standard] [Insert finish].

B. Vent Stack Flashing: Metal flashing sleeve, uninsulated, with integral deck flange.
1. 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:
   a. Custom Solution Roof and Metal Products.
   b. Milcor Inc.; Commercial Products Group of Hart & Cooley, Inc.
   c. Thaler Metal USA Inc.
2. Metal: Aluminum sheet, 0.063 inch (1.60 mm) thick.
3. Height: 7 inches (175 mm).
4. Diameter: As indicated by vent size.
5. Finish: Manufacturer's standard.

2.08 GENERAL FINISH REQUIREMENTS

A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.

B. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

PART 3 EXECUTION

3.01 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, to verify actual locations, dimensions, and other conditions affecting performance of the Work.

B. Verify that substrate is sound, dry, smooth, clean, sloped for drainage, and securely anchored.

C. Verify dimensions of roof openings for roof accessories.

D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 INSTALLATION

A. General: Install roof accessories according to manufacturer's written instructions.
1. Install roof accessories level, plumb, true to line and elevation, and without warping, jogs in alignment, excessive oil canning, buckling, or tool marks.
2. Anchor roof accessories securely in place so they are capable of resisting indicated loads.
3. Use fasteners, separators, sealants, and other miscellaneous items as required to complete installation of roof accessories and fit them to substrates.
4. Install roof accessories to resist exposure to weather without failing, rattling, leaking, or loosening of fasteners and seals.

B. Metal Protection: Protect metals against galvanic action by separating dissimilar metals from contact with each other or with corrosive substrates by painting contact surfaces with bituminous coating or by other permanent separation as recommended by manufacturer.
1. Coat concealed side of uncoated aluminum roof accessories with bituminous coating where in contact with wood, ferrous metal, or cementitious construction.
2. Underlayment: Where installing roof accessories directly on cementitious or wood substrates, install a course of felt underlayment and cover with a slip sheet, or install a course of polyethylene sheet.
3. Bed flanges in thick coat of asphalt roofing cement where required by manufacturers of roof accessories for waterproof performance.

C. Roof Curb Installation: Install each roof curb so top surface is level.

D. Equipment Support Installation: Install equipment supports so top surfaces are level with each other.

E. Gravity Ventilator Installation: Verify that gravity ventilators operate properly and have unrestricted airflow. Clean, lubricate, and adjust operating mechanisms.

F. Pipe Support Installation: Install pipe supports so top surfaces are in contact with and provide equally distributed support along length of supported item.

G. Preformed Flashing-Sleeve Installation: Secure flashing sleeve to roof membrane according to flashing-sleeve manufacturer's written instructions.

H. Seal joints with elastomeric sealant as required by roof accessory manufacturer.

3.03 REPAIR AND CLEANING

A. Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas and repair galvanizing according to ASTM A 780.

B. Touch up factory-primed surfaces with compatible primer ready for field painting according to Section 099113 "Exterior Painting" and Section 099123 "Interior Painting."

C. Clean exposed surfaces according to manufacturer's written instructions.

D. Clean off excess sealants.

E. Replace roof accessories that have been damaged or that cannot be successfully repaired by finish touchup or similar minor repair procedures.

END OF SECTION 077200

SECTION 077233
ROOF HATCHES

PART 1 GENERAL

1.01 SUMMARY

A. Work Included: Provide factory-fabricated thermally broken roof hatch for ladder access.

1.02 SUBMITTALS

A. Product Data: Submit manufacturer's product data.

B. Shop Drawings: Submit shop drawings including profiles, accessories, location, adjacent construction interface, and dimensions.

C. Warranty: Submit executed copy of manufacturer's standard warranty.

1.03 QUALITY ASSURANCE

A. Manufacturer: A minimum of 5 years experience manufacturing similar products.

B. Installer: A minimum of 2 years experience installing similar products.

C. Manufacturer's Quality System: Registered to ISO 9001:2008 Quality Standards including in-house engineering for product design activities.

1.04 DELIVERY, STORAGE AND HANDLING

A. Deliver products in manufacturer's original packaging. Store materials in a dry, protected, well-vented area. Inspect product upon receipt and report damaged material immediately to delivering carrier and note such damage on the carrier's freight bill of lading.

1.05 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 ROOF HATCH

A. Furnish and install where indicated on plans aluminum roof hatch.

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 (195kg/m2) with a maximum deflection of 1/150th of the span or 20 psf (97kg/m2) 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.
   5. Entire hatch shall be weather tight with fully welded corner joints on cover and curb.

C. Cover: Shall be 11 gauge (2.3mm) aluminum with a 5" (127mm) 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" (75mm) thick polyisocyanurate with an R-value = 18 (U=0.315 W/m2K), fully covered and protected by an 18 gauge (1mm) aluminum liner.

E. Curb: Shall be 12" (305mm) in height and of 11 gauge (2.3mm) 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" (140mm) flange with 7/16" (11mm) holes provided for securing to the roof deck. The curb shall be equipped with an integral metal capflashing 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” (153mm) on center, to be bent inward to hold single ply roofing membrane securely in place.

F. Curb insulation: Shall be 3” (75mm) thick polyisocyanurate with an R-value = 18 (U=0.315 W/m2K).

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 a 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” (25mm) 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. [For installation in highly corrosive environments or when prolonged exposure to hot water or steam is anticipated, specify Type 316 stainless steel hardware].
   7. Cover hardware shall be bolted into heavy gauge channel reinforcing welded to the underside of the cover and concealed within the insulation space.

I. Accessories
   1. Provide wall mounted ladder to access roof hatch.
   2. Provide 42" high folding safety guard around hatch which allows hatch to meet codes adjacent to edge of roof dropoff.

J. Finishes: Factory finish shall be mill finish aluminum.

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

SECTION 078100
APPLIED FIRE PROTECTION

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Applied fire protection of interior structural steel not exposed to damage or moisture.

B. Applied fire protection of structural steel exposed to damage or moisture.

C. Preparation of applied fire protection for application of exposed overcoat finish specified elsewhere.

1.02 REFERENCE STANDARDS

A. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2018.

B. ASTM E605/E605M - Standard Test Methods for Thickness and Density of Sprayed Fire-Resistive Material (SFRM) Applied to Structural Members; 1993, with Editorial Revision (2015).

C. ASTM E736/E736M - Standard Test Method for Cohesion/Adhesion of Sprayed Fire-Resistive Materials Applied to Structural Members; 2017.

D. ASTM E759/E759M - Standard Test Method for Effect of Deflection on Sprayed Fire-Resistive Material Applied to Structural Members; 1992 (Reapproved 2023).

E. ASTM E760/E760M - Standard Test Method for Effect of Impact on Bonding of Sprayed Fire-Resistive Material Applied to Structural Members; 1992 (Reapproved 2023).

F. ASTM E761/E761M - Standard Test Method for Compressive Strength of Sprayed Fire-Resistive Material Applied to Structural Members; 1992 (Reapproved 2023).

G. ASTM E859/E859M - Standard Test Method for Air Erosion of Sprayed Fire-Resistive Materials (SFRMs) Applied to Structural Members; 2023.

H. ASTM E937/E937M - Standard Test Method for Corrosion of Steel by Sprayed Fire-Resistive Material (SFRM) Applied to Structural Members; 1993 (Reapproved 2023).

I. ASTM G21 - Standard Practice for Determining Resistance of Synthetic Polymeric Materials to Fungi; 2015.

J. UL (FRD) - Fire Resistance Directory; Current Edition.

1.03 ADMINISTRATIVE REQUIREMENTS

A. Preinstallation Meeting: Convene one week before starting work of this section.

1.04 SUBMITTALS

A. See Section 013000 - Administrative Requirements, for submittals procedures.

B. Product Data: Provide data indicating product characteristics.

C. Test Reports: Reports from reputable independent testing agencies for proposed products, indicating compliance with specified criteria, conducted under conditions similar to those on project, as follows:
   1. Bond strength.
   2. Bond impact.
   3. Compressive strength.
   4. Fire tests using substrate materials similar those on project.

D. Manufacturer's Installation Instructions: Indicate special procedures.

E. Field Quality Control Submittals: Submit field test report.

1.05 MOCK-UP

A. Construct mock-up, 100 square feet in size.

B. Comply with project requirements for fire ratings.

C. Locate where directed.

D. Examine installation within one hour of application to determine variances from specified requirements due to shrinkage, temperature, and humidity.

E. Where shrinkage and cracking are evident, adjust mixture and method of application as necessary; remove materials and re-construct mock-up.

F. Mock-up may remain as part of the Work.

1.06 FIELD CONDITIONS

A. Do not apply fireproofing when temperature of substrate material and surrounding air is below 40 degrees F or when temperature is predicted to be below said temperature for 24 hours after application.

B. Provide ventilation in areas to receive fireproofing during application and 24 hours afterward, to dry applied material.

C. Provide temporary enclosure to prevent spray from contaminating air.

1.07 WARRANTY

A. See Section 017800 - Closeout Submittals, for additional warranty requirements.

B. Correct defective Work within a two year period after Date of Substantial Completion.
   1. Include coverage for fireproofing to remain free from cracking, checking, dusting, flaking, spalling, separation, and blistering.
   2. Reinstall or repair failures that occur within warranty period.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Applied Fire Protection:
   1. GCP Applied Technologies: www.gcpat.com/#sle.
   2. Isolatek International Corp: www.isolatek.com/#sle.
   3. Southwest Fireproofing Products Company: www.sfrm.com/#sle.
   4. Substitutions: See Section 016000 - Product Requirements.

2.02 APPLIED FIRE PROTECTION ASSEMBLIES

A. Provide fire resistance ratings for following building elements as required by local building code:
   1. Primary structural frame, including columns, girders, and trusses, .
   2. Bearing walls, exterior, .
   3. Bearing walls, interior, .
   4. Nonbearing walls and partitions, exterior, .
   5. Nonbearing walls and partitions, interior, .
   6. Floor construction, including supporting beams and joists, .
   7. Roof construction, including supporting beams and joists, .

2.03 MATERIALS

A. Applied Fire Protection Material for Interior Applications, Concealed: Manufacturer's standard factory mixed material, which when combined with water is capable of providing indicated fire resistance, and complying with following requirements:
   1. Bond Strength: 150 pounds per square foot, minimum, when tested in accordance with ASTM E736/E736M when set and dry.
   2. Compressive Strength: 8.33 pounds per square inch, minimum.
   3. Effect of Impact on Bonding: No cracking, spalling or delamination, when tested in accordance with ASTM E760/E760M.
   4. Corrosivity: No evidence of corrosion, when tested in accordance with ASTM E937/E937M.
   5. Surface Burning Characteristics: Maximum flame spread index of 0 (zero) and maximum smoke developed index of 0 (zero), when tested in accordance with ASTM E84.

B. Applied Fire Protection Material Exposed to Damage or Moisture: Manufacturer's standard factory mixed material, which when combined with water is capable of providing indicated fire resistance, and complying with following requirements:
   1. Bond Strength: 1,000 psf, minimum, when tested in accordance with ASTM E736/E736M when set and dry.
   2. Effect of Impact on Bonding: No cracking, spalling or delamination, when tested in accordance with ASTM E760/E760M.
   3. Corrosivity: No evidence of corrosion, when tested in accordance with ASTM E937/E937M.
   4. Air Erosion Resistance: Weight loss of 0.025 g/sq ft, maximum, when tested in accordance with ASTM E859/E859M after 24 hours.
   5. Surface Burning Characteristics: Maximum flame spread index of 0 (zero) and maximum smoke developed index of 0 (zero), when tested in accordance with ASTM E84.

2.04 ACCESSORIES

A. Primer Adhesive: Of type recommended by applied fire protection manufacturer.

B. Overcoat: As recommended by manufacturer of applied fire protection material.

C. Water: Clean, potable.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that surfaces are ready to receive fireproofing.

B. Verify that clips, hangers, supports, sleeves, and other items required to penetrate fireproofing are in place.

C. Verify that ducts, piping, equipment, or other items that would interfere with application of fireproofing have not been installed.

D. Verify that voids and cracks in substrate have been filled.

E. Verify that projections have been removed where fireproofing will be exposed to view as a finish material.

3.02 PREPARATION

A. Perform tests as recommended by fireproofing manufacturer in applications where adhesion of fireproofing to substrate is in question.

B. Remove incompatible materials that could effect bond by scraping, brushing, scrubbing, or sandblasting.

C. Prepare substrates to receive fireproofing in strict accordance with instructions of fireproofing manufacturer.

D. Protect surfaces not scheduled for fireproofing and equipment from damage by overspray, fall-out, and dusting.

E. Close off and seal duct work in areas where fireproofing is being applied.

3.03 APPLICATION

A. Apply primer adhesive in accordance with manufacturer's instructions.

B. Apply fireproofing in uniform thickness and density as necessary to achieve required ratings.

C. Apply overcoat to a thickness of ____ inches.

3.04 FIELD QUALITY CONTROL

A. Perform field inspection and testing in accordance with Section 014000 - Quality Requirements.

B. Inspect installed fireproofing after application and curing for integrity, prior to its concealment.

C. Ensure that actual thicknesses, densities, and bond strengths meet requirements for specified ratings and requirements of authorities having jurisdiction (AHJ).

D. Re-inspect installed fireproofing for integrity of fire protection, after installation of subsequent Work.

3.05 CLEANING

A. Remove excess material, overspray, droppings, and debris.

B. Remove fireproofing from materials and surfaces not required to be fireproofed.

END OF SECTION

SECTION 078123
INTUMESCENT FIRE PROTECTION

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Thin-film intumescent fire protection.

B. Compressible-rod intumescent fire protection.

1.02 REFERENCE STANDARDS

A. ASTM E119 - Standard Test Methods for Fire Tests of Building Construction and Materials; 2016a.

B. SSPC-PA 2 - Procedure for Determining Conformance to Dry Coating Thickness Requirements; 2022.

C. UL 2079 - Standard for Tests for Fire Resistance of Building Joint Systems; Current Edition, Including All Revisions.

1.03 SUBMITTALS

A. See Section 013000 - Administrative Requirements, for submittals procedures.

B. Product Data: Manufacturer's data sheets on each product to be used, including:
   1. Performance characteristics and test results.
   2. Preparation instructions and recommendations.
   3. Storage and handling requirements and recommendations.
   4. Installation methods.

C. Selection Samples: For decorative top coat, color chips representing manufacturer's full range of available colors and sheens.

D. Test Reports: Published fire resistive designs for structural elements of the types required for the project, indicating hourly ratings of each assembly.

E. Field Quality Control Submittals: Submit field test report.

1.04 MOCK-UP

A. Provide a mock-up for evaluation of surface preparation techniques and application workmanship; approved mock-up will serve as a standard of comparison for subsequent work of this section.

B. Finish at least 100 sq ft of surface in areas as designated by Architect.

C. Evaluate mock-up for compliance with specified requirements, including thickness and finish texture.

D. Do not proceed with remaining work until workmanship, color, and sheen are approved by Architect.

E. Refinish mock-up area as required to produce acceptable work.

F. Approved mock-up may remain as part of the project.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials in manufacturer’s original, unopened containers with identification labels and testing agency markings intact and legible.

B. Store products in manufacturer's unopened packaging until ready for installation.
   1. Store at temperatures not less than 50 degrees F in dry, protected area.
   2. Protect from freezing, and do not store in direct sunlight.
   3. Dispose of any materials that have come into contact with contaminants of any kind prior to application.

C. Dispose of solvent-based materials, and materials used with solvent-based materials, in accordance with requirements of local authorities having jurisdiction.

1.06 FIELD CONDITIONS

A. Protect areas of application from windblown dust and rain.

B. Maintain ambient field conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. Do not install products under ambient conditions outside manufacturer's absolute limits.
   1. Provide temporary enclosures as required to control ambient conditions.
   2. Do not apply intumescent fireproofing when ambient temperatures are below 50 degrees F without specific approval from manufacturer.
   3. Maintain relative humidity between 40 and 60 percent in areas of application.
   4. Maintain ventilation in enclosed spaces during application and for not less than 72 hours afterward.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Intumescent Thin-Film Fire Protection:
   1. Albi Manufacturing Division of StanChem Inc: www.albi.com/#sle.
   2. Contego International, Inc; High Solids Reactive Fire Barrier (HS RFB): www.contegointernational.com/#sle.
   3. Hilti, Inc; Fire Finish Steel Protection Spray CFP-SP WB: www.us.hilti.com/#sle.
   4. Isolatek International Corp: www.isolatek.com/#sle.
   5. Quantum Chemical; SafeCoat Steel: www.quantumchemical.com/#sle.
   6. Substitutions: See Section 016000 - Product Requirements.

B. Intumescent Compressible-Rod Fire Protection:
   1. CEMCO; HOTROD Type-X Compressible Firestopping: www.cemcosteel.com/#sle.
   2. Substitutions: See Section 016000 - Product Requirements.

2.02 SYSTEM REQUIREMENTS

A. Fireproofing: Provide intumescent fire protection systems tested by an independent testing agency in accordance with ASTM E119 and acceptable to authorities having jurisdiction (AHJ).
   1. Provide assemblies listed by UL or FM and bearing listing agency label or mark.

2.03 MATERIALS

A. Fire Resistive Coating System: Thin-film intumescent fire protection system for structural steel, gypsum board, wood, oriented strand board (OSB), concrete, and concrete masonry units (CMU).

B. Fire Resistive Compressible-Rod System: Compressible intumescent fire protection system for structural steel, gypsum board, wood, oriented strand board (OSB), concrete, and concrete masonry units (CMU).

C. Sealers and Primer: As required by tested and listed assemblies, and recommended by fireproofing manufacturer to suit specific substrate conditions.

PART 3 EXECUTION

3.01 EXAMINATION

A. Examine substrates to determine if they are in satisfactory condition to receive intumescent fire protection; verify that substrates are clean and free of oil, grease, incompatible primers, or other foreign substances capable of impairing bond to fireproofing system.

B. Do not begin installation until substrates have been properly prepared.

C. If substrate preparation is responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

3.02 PREPARATION

A. Thoroughly clean surfaces to receive fireproofing.

B. Repair substrates to remove surface imperfections that could effect uniformity of texture and thickness of fireproofing system, and remove minor projections and fill voids that could telegraph through finished work.

C. Cover or otherwise protect other work that might be damaged by fallout or overspray of fireproofing system, and provide temporary enclosures as necessary to confine operations and maintain required ambient field conditions.

3.03 APPLICATION

A. Comply with manufacturer's instructions for each particular intumescent fire protection system installation application as indicated.

B. Apply manufacturer’s recommended primer to required coating thickness.

C. Apply fireproofing to full thickness over entire area of each substrate to be protected.

D. Apply coats at manufacturer’s recommended rate to achieve dry film thickness (DFT) as required for fire resistance ratings designated for each condition.

E. Apply intumescent fire protection by spraying to maximum extent possible, and as necessary complete coverage by roller application or other method acceptable to manufacturer.

3.04 FIELD QUALITY CONTROL

A. Perform field inspection and testing in accordance with Section 014000 - Quality Requirements.
   1. Arrange for testing of installed intumescent fire protection by an independent testing laboratory using magnetic pull-off dry film thickness gauge in accordance with SSPC-PA 2, and ensure it meets requirements of authorities having jurisdiction (AHJ).
   2. Submit field test reports promptly to Contractor and Architect.

B. Repair or replace intumescent fire protection at locations where test results indicate fireproofing does not meet specified requirements.

3.05 CLEANING

A. Immediately after installation of fireproofing in each area, remove overspray and fallout from other surfaces and clean soiled areas.

3.06 PROTECTION

A. Protect installed intumescent fire protection from damage due to subsequent construction activities, so fireproofing is without damage or deterioration before Date of Substantial Completion.

B. Touch-up, repair or replace damaged products before Date of Substantial Completion.

END OF SECTION

SECTION 078400
FIRESTOPPING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Firestopping systems.

B. Firestopping of joints and penetrations in fire resistance rated and smoke resistant assemblies, whether indicated on drawings or not, and other openings indicated.

1.02 REFERENCE STANDARDS

A. ASTM E119 - Standard Test Methods for Fire Tests of Building Construction and Materials; 2016a.

B. ASTM E814 - Standard Test Method for Fire Tests of Penetration Firestop Systems; 2013a (Reapproved 2017).

C. ASTM E1966 - Standard Test Method for Fire-Resistive Joint Systems; 2015.

D. ASTM E2174 - Standard Practice for On-Site Inspection of Installed Firestops; 2014b.

E. ASTM E2393 - Standard Practice for On-Site Inspection of Installed Fire Resistive Joint Systems and Perimeter Fire Barriers; 2010a (Reapproved 2015).

F. ASTM E2307 - Standard Test Method for Determining Fire Resistance of Perimeter Fire Barriers Using Intermediate-Scale, Multi-story Test Apparatus; 2015b, with Editorial Revision (2016).

G. ASTM E2837 - Standard Test Method for Determining the Fire Resistance of Continuity Head-of-Wall Joint Systems Installed Between Rated Wall Assemblies and Nonrated Horizontal Assemblies; 2013 (Reapproved 2017).

H. ASTM G21 - Standard Practice for Determining Resistance of Synthetic Polymeric Materials to Fungi; 2015.

I. ITS (DIR) - Directory of Listed Products; current edition.

J. FM 4991 - Approval Standard for Firestop Contractors; 2013.

K. FM (AG) - FM Approval Guide; current edition.

L. SCAQMD 1168 - Adhesive and Sealant Applications; 1989 (Amended 2017).

M. UL 1479 - Standard for Fire Tests of Penetration Firestops; Current Edition, Including All Revisions.

N. UL 2079 - Standard for Tests for Fire Resistance of Building Joint Systems; Current Edition, Including All Revisions.

O. UL (DIR) - Online Certifications Directory; Current Edition.

P. UL (FRD) - Fire Resistance Directory; Current Edition.

1.03 SUBMITTALS

A. See Section 013000 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide data on product characteristics, performance ratings, and limitations.

C. Manufacturer's Installation Instructions: Indicate preparation and installation instructions.

1.04 QUALITY ASSURANCE

A. Fire Testing: Provide firestopping assemblies of designs that provide the fire ratings when tested in accordance with methods indicated.

1. Listing in UL (FRD), FM (AG), or ITS (DIR) will be considered as constituting an acceptable test report.
2. Valid evaluation report published by ICC Evaluation Service, Inc. (ICC-ES) at www.icc-es.org will be considered as constituting an acceptable test report.

3. Submission of actual test reports is required for assemblies for which none of the above substantiation exists.

1.05 FIELD CONDITIONS

A. Comply with firestopping manufacturer's recommendations for temperature and conditions during and after installation; maintain minimum temperature before, during, and for three days after installation of materials.

B. Provide ventilation in areas where solvent-cured materials are being installed.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Firestopping Manufacturers:
1. 3M Fire Protection Products: www.3m.com/firestop/#sle.
2. A/D Fire Protection Systems Inc: www.adfire.com/#sle.
3. Everkem Diversified Products, Inc; Intumescent Fire-Rated Putty Pads: www.everkemproducts.com/#sle.
4. Grabber Construction Products, Inc; GrabberGard EFC: www.grabberman.com/#sle.
5. Hilti, Inc: www.us.hilti.com/#sle.
6. HoldRite, a Brand of Reliance Worldwide Corporation; HydroFlame 100 Firestop Sealant: www.holdrite.com/#sle.
7. Nelson FireStop Products: www.nelsonfirestop.com/#sle.
8. Passive Fire Protection Partners; Firestop 3600EX: www.firestop.com/#sle.
9. Specified Technologies Inc: www.stifirestop.com/#sle.
10. Tremco Commercial Sealants & Waterproofing; TREMstop Acrylic: www.tremcosealants.com/#sle.
11. Substitutions: See Section 016000 - Product Requirements.

2.02 MATERIALS

A. Firestopping Materials: Any materials meeting requirements.

B. Primers, Sleeves, Forms, Insulation, Packing, Stuffing, and Accessories: Provide type of materials as required for tested firestopping assembly.

2.03 FIRESTOPPING ASSEMBLY REQUIREMENTS

A. Perimeter Fire Containment Firestopping: Use system that has been tested according to ASTM E2307 to have fire resistance F Rating equal to required fire rating of floor assembly.
1. Movement: Provide systems that have been tested to show movement capability as indicated.

B. Head-of-Wall Joint System Firestopping at Joints Between Fire-Rated Wall Assemblies and Non-Rated Horizontal Assemblies: Use system that has been tested according to ASTM E2837 to have fire resistance F Rating equal to required fire rating of floor or wall, whichever is greater.

C. Floor-to-Floor, Wall-to-Wall, and Wall-to-Floor Joints, Except Perimeter, Where Both Are Fire-Rated: Use system that has been tested according to ASTM E1966 or UL 2079 to have fire resistance F Rating equal to required fire rating of the assembly in which the joint occurs.

D. Through Penetration Firestopping: Use system that has been tested according to ASTM E814 to have fire resistance F Rating equal to required fire rating of penetrated assembly.

2.04 FIRESTOPPING SYSTEMS

A. Firestopping: Any material meeting requirements.
1. Fire Ratings: See drawings for required systems and ratings.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify openings are ready to receive the work of this section.

3.02 PREPARATION

A. Clean substrate surfaces of dirt, dust, grease, oil, loose material, or other materials that could adversely affect bond of firestopping material.

B. Remove incompatible materials that could adversely affect bond.

C. Install backing materials to prevent liquid material from leakage.

3.03 INSTALLATION

A. Install materials in manner described in fire test report and in accordance with manufacturer's instructions, completely closing openings.

B. Do not cover installed firestopping until inspected by authorities having jurisdiction.

C. Install labeling required by code.

3.04 CLEANING

A. Clean adjacent surfaces of firestopping materials.

3.05 PROTECTION

A. Protect adjacent surfaces from damage by material installation.

END OF SECTION

SECTION 078413
PENETRATION FIRESTOPPING

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes:
   1. Penetrations in fire-resistance-rated walls.
   2. Penetrations in horizontal assemblies.

1.02 ACTION SUBMITTALS

A. Product Data: For each type of product indicated.

1.03 PROJECT CONDITIONS

A. Environmental Limitations: Do not install penetration firestopping when ambient or substrate temperatures are outside limits permitted by penetration firestopping manufacturers or when substrates are wet because of rain, frost, condensation, or other causes.

B. Install and cure penetration firestopping per manufacturer's written instructions using natural means of ventilations or, where this is inadequate, forced-air circulation.

1.04 COORDINATION

A. Coordinate construction of openings and penetrating items to ensure that penetration firestopping is installed according to specified requirements.

B. Coordinate sizing of sleeves, openings, core-drilled holes, or cut openings to accommodate penetration firestopping.

C. Notify Owner's testing agency at least seven days in advance of penetration firestopping installations; confirm dates and times on day preceding each series of installations.

PART 2 PRODUCTS

2.01 PENETRATION FIRESTOPPING

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.

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.

D. Exposed Penetration Firestopping: Provide products with flame-spread and smoke-developed indexes of less than 25 and 450, respectively, as determined per ASTM E 84.

E. 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.

2.02 FILL MATERIALS

A. Latex Sealants: Single-component latex formulations that do not re-emulsify after cure during exposure to moisture.

B. Intumescent Putties: Nonhardening dielectric, water-resistant putties containing no solvents, inorganic fibers, or silicone compounds.

C. Intumescent Wrap Strips: Single-component intumescent elastomeric sheets with aluminum foil on one side.

D. Silicone Foams: Multicomponent, silicone-based liquid elastomers that, when mixed, expand and cure in place to produce a flexible, nonshrinking foam.

E. Silicone Sealants: Single-component, silicone-based, neutral-curing elastomeric sealants of grade indicated below:
   1. Grade: Pourable (self-leveling) formulation for openings in floors and other horizontal surfaces, and nonsag formulation for openings in vertical and sloped surfaces, unless indicated firestopping limits use of nonsag grade for both opening conditions.

2.03 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, mixing containers, mixing time, and other items or procedures needed to produce products of uniform quality with optimum performance characteristics for application indicated.

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.
   3. Remove laitance and form-release agents from concrete.

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.

3.04 CLEANING AND PROTECTION

A. Clean off excess fill materials adjacent to openings as the Work progresses by methods and with cleaning materials that are approved in writing by penetration firestopping manufacturers and that do not damage materials in which openings occur.

B. Provide final protection and maintain conditions during and after installation that ensure that penetration 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 penetration firestopping and install new materials to produce systems complying with specified requirements.

END OF SECTION 078413

SECTION 079200
JOINT SEALANTS

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes:
   1. Silicone joint sealants.
   2. Urethane joint sealants.
   3. Polysulfide joint sealants.
   4. Latex joint sealants.
   5. Solvent-release-curing joint sealants.
   6. Acoustical joint sealants.

1.02 ACTION SUBMITTALS

A. Product Data: For each joint-sealant product indicated.

B. Samples for Initial Selection: Manufacturer's color charts consisting of strips of cured sealants showing the full range of colors available for each product exposed to view.

1.03 QUALITY ASSURANCE

A. Installer Qualifications: Manufacturer's authorized representative who is trained and approved for installation of units required for this Project.

B. Source Limitations: Obtain each kind of joint sealant from single source from single manufacturer.

C. Product Testing: Test joint sealants using a qualified testing agency.
   1. Testing Agency Qualifications: An independent testing agency qualified according to ASTM C 1021 to conduct the testing indicated.
   2. Test according to SWRI's Sealant Validation Program for compliance with requirements specified by reference to ASTM C 920 for adhesion and cohesion under cyclic movement, adhesion-in-peel, and indentation hardness.

1.04 PROJECT CONDITIONS

A. Do not proceed with installation of joint sealants under the following conditions:
   1. When ambient and substrate temperature conditions are outside limits permitted by joint-sealant manufacturer or are below 40 deg F.
   2. When joint substrates are wet.
   3. Where joint widths are less than those allowed by joint-sealant manufacturer for applications indicated.
   4. Where contaminants capable of interfering with adhesion have not yet been removed from joint substrates.

PART 2 PRODUCTS

2.01 MATERIALS, GENERAL

A. Compatibility: Provide joint sealants, backings, and other related materials that are compatible with one another and with joint substrates under conditions of service and application, as demonstrated by joint-sealant manufacturer, based on testing and field experience.

B. Liquid-Applied Joint Sealants: Comply with ASTM C 920 and other requirements indicated for each liquid-applied joint sealant specified, including those referencing ASTM C 920 classifications for type, grade, class, and uses related to exposure and joint substrates.

C. Stain-Test-Response Characteristics: Where sealants are specified to be nonstaining to porous substrates, provide products that have undergone testing according to ASTM C 1248 and have not stained porous joint substrates indicated for Project.

D. Suitability for Contact with Food: Where sealants are indicated for joints that will come in repeated contact with food, provide products that comply with 21 CFR 177.2600.

E. Colors of Exposed Joint Sealants: As selected by Architect from manufacturer's full range.

2.02 SILICONE JOINT SEALANTS

A. Single-Component, Nonsag, Neutral-Curing Silicone Joint Sealant: ASTM C 920, Type S, Grade NS, Class 100/50, for Use NT.

B. Single-Component, Nonsag, Traffic-Grade, Neutral-Curing Silicone Joint Sealant: ASTM C 920, Type S, Grade NS, Class 100/50, for Use T.

C. Mildew-Resistant, Single-Component, Nonsag, Neutral-Curing Silicone Joint Sealant: ASTM C 920, Type S, Grade NS, Class 25, for Use NT.

2.03 LATEX JOINT SEALANTS

A. Latex Joint Sealant: Acrylic latex or siliconized acrylic latex, ASTM C 834, Type OP, Grade NF.

2.04 ACOUSTICAL JOINT SEALANTS

A. Acoustical Joint Sealant: Manufacturer's standard nonsag, paintable, nonstaining latex sealant complying with ASTM C 834. Product effectively reduces airborne sound transmission through perimeter joints and openings in building construction as demonstrated by testing representative assemblies according to ASTM E 90.

2.05 JOINT SEALANT BACKING

A. General: Provide sealant backings of material that are nonstaining; 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. Cylindrical Sealant Backings: ASTM C 1330, Type C (closed-cell material with a surface skin), and of size and density to control sealant depth and otherwise contribute to producing optimum sealant performance.

C. Bond-Breaker Tape: Polyethylene tape or other plastic tape recommended by sealant manufacturer for preventing sealant from adhering to rigid, inflexible joint-filler materials or joint surfaces at back of joint. Provide self-adhesive tape where applicable.

2.06 MISCELLANEOUS MATERIALS

A. Primer: Material recommended by joint-sealant manufacturer where required for adhesion of sealant to joint substrates indicated, as determined from preconstruction joint-sealant-substrate tests and field tests.

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 joint substrates and adjacent nonporous surfaces in any way, and formulated to promote optimum adhesion of sealants to joint substrates.

C. Masking Tape: Nonstaining, nonabsorbent material compatible with joint sealants and surfaces adjacent to joints.

PART 3 EXECUTION

3.01 EXAMINATION

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.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 PREPARATION

A. Surface Cleaning of Joints: Clean out joints immediately before installing joint sealants to comply with joint-sealant manufacturer's written instructions and the following requirements:

1. Remove all foreign material from joint substrates that could interfere with adhesion of joint sealant, including dust, paints (except for permanent, protective coatings tested and approved for sealant adhesion and compatibility by sealant manufacturer), old joint

sealants, oil, grease, waterproofing, water repellents, water, surface dirt, and frost.

2. Clean porous joint substrate surfaces by brushing, grinding, 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 after cleaning operations above by vacuuming or blowing out joints with oil-free compressed air. Porous joint substrates include the following:
   a. Concrete.
   b. Masonry.
3. Remove laitance and form-release agents from concrete.
4. Clean nonporous joint substrate surfaces with chemical cleaners or other means that do not stain, harm substrates, or leave residues capable of interfering with adhesion of joint sealants. Nonporous joint substrates include the following:
   a. Metal.
   b. Glass.

B. Joint Priming: Prime joint substrates where recommended by joint-sealant manufacturer or as indicated by preconstruction joint-sealant-substrate tests or prior experience. Apply primer to comply with joint-sealant manufacturer's written instructions. Confine primers to areas of joint-sealant bond; do not allow spillage or migration onto adjoining surfaces.

C. Masking Tape: Use masking tape where required to prevent contact of sealant or primer 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.

3.03 INSTALLATION OF JOINT SEALANTS

A. General: Comply with joint-sealant manufacturer's written installation instructions for products and applications indicated, unless more stringent requirements apply.

B. Sealant Installation Standard: Comply with recommendations in ASTM C 1193 for use of joint sealants as applicable to materials, applications, and conditions indicated.

C. Install sealant backings of kind indicated to support sealants during application and at position required to produce cross-sectional shapes and depths of installed sealants relative to joint widths that allow optimum sealant movement capability.
   1. Do not leave gaps between ends of sealant backings.
   2. Do not stretch, twist, puncture, or tear sealant backings.
   3. Remove absorbent sealant backings that have become wet before sealant application and replace them with dry materials.

D. Install bond-breaker tape behind sealants where sealant backings are not used between sealants and backs of joints.

E. Install sealants using proven techniques that comply with the following and at the same time backings are installed:
   1. Place sealants so they directly contact and fully wet joint substrates.
   2. Completely fill recesses in each joint configuration.
   3. Produce uniform, cross-sectional shapes and depths relative to joint widths that allow optimum sealant movement capability.

F. Tooling of Nonsag Sealants: Immediately after sealant application and before skinning or curing begins, tool sealants according to requirements specified in subparagraphs below to form smooth, uniform beads of configuration indicated; to eliminate air pockets; and to ensure contact and adhesion of sealant with sides of joint.
   1. Remove excess sealant from surfaces adjacent to joints.
   2. Use tooling agents that are approved in writing by sealant manufacturer and that do not discolor sealants or adjacent surfaces.
   3. Provide concave joint profile per Figure 8A in ASTM C 1193, unless otherwise indicated.
   4. Provide flush joint profile where indicated per Figure 8B in ASTM C 1193.

5. Provide recessed joint configuration of recess depth and at locations indicated per Figure 8C in ASTM C 1193.
    a. Use masking tape to protect surfaces adjacent to recessed tooled joints.

G. Installation of Preformed Silicone-Sealant System: Comply with the following requirements:
1. Apply masking tape to each side of joint, outside of area to be covered by sealant system.
2. Apply silicone sealant to each side of joint to produce a bead of size complying with preformed silicone-sealant system manufacturer's written instructions and covering a bonding area of not less than 3/8 inch. Hold edge of sealant bead 1/4 inch inside masking tape.
3. Within 10 minutes of sealant application, press silicone extrusion into sealant to wet extrusion and substrate. Use a roller to apply consistent pressure and ensure uniform contact between sealant and both extrusion and substrate.
4. Complete installation of sealant system in horizontal joints before installing in vertical joints. Lap vertical joints over horizontal joints. At ends of joints, cut silicone extrusion with a razor knife.

H. Installation of Preformed Foam Sealants: Install each length of sealant immediately after removing protective wrapping. Do not pull or stretch material. Produce seal continuity at ends, turns, and intersections of joints. For applications at low ambient temperatures, apply heat to sealant in compliance with sealant manufacturer's written instructions.

I. 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 C 919 and with manufacturer's written recommendations.

3.04 CLEANING

A. Clean off excess sealant or sealant smears adjacent to joints as the Work progresses by methods and with cleaning materials approved in writing by manufacturers of joint sealants and of products in which joints occur.

3.05 PROTECTION

A. Protect joint sealants during and after curing period from contact with contaminating substances and from damage resulting from construction operations or other causes so sealants are without deterioration or damage at time of Substantial Completion. If, despite such protection, damage or deterioration occurs, cut out and remove damaged or deteriorated joint sealants immediately so installations with repaired areas are indistinguishable from original work.

3.06 JOINT-SEALANT SCHEDULE

A. Joint-Sealant Application: Exterior joints in horizontal traffic surfaces.
1. Joint Locations:
    a. Control and expansion joints in brick pavers.
    b. Isolation and contraction joints in cast-in-place concrete slabs.
    c. Joints between different materials listed above.
2. Silicone Joint Sealant: Single component, nonsag, traffic grade, neutral curing.
3. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors.

B. Joint-Sealant Application: Exterior joints in vertical surfaces and horizontal nontraffic surfaces.
1. Joint Locations:
    a. Construction joints in cast-in-place concrete.
    b. Control and expansion joints in unit masonry.
    c. Joints between different materials listed above.
    d. Perimeter joints between materials listed above and frames of doors, windows and louvers.
2. Silicone Joint Sealant: Single component, nonsag, neutral curing, Class 100/50.

3. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors.

C. Joint-Sealant Application: Interior joints in vertical surfaces and horizontal nontraffic surfaces.
   1. Joint Locations:
      a. Perimeter joints of exterior openings where indicated.
      b. Vertical joints on exposed surfaces of walls and partitions.
      c. Perimeter joints between interior wall surfaces and frames of interior doors, windows and elevator entrances.
   2. Joint Sealant: Latex.
   3. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors.

D. Joint-Sealant Application: Mildew-resistant interior joints in vertical surfaces and horizontal nontraffic surfaces.
   1. Joint Sealant Location:
      a. Joints between plumbing fixtures and adjoining walls, floors, and counters.
   2. Joint Sealant: Mildew resistant, single component, nonsag, neutral curing, Silicone.
   3. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors.

E. Joint-Sealant Application: Interior acoustical joints in vertical surfaces and horizontal nontraffic surfaces.
   1. Joint Location:
      a. Acoustical joints where indicated.
      b. Other joints as indicated.
   2. Joint Sealant: Acoustical.
   3. Joint-Sealant Color: As selected by Architect from manufacturer's full range.

END OF SECTION

SECTION 079513
EXPANSION JOINT COVER ASSEMBLIES

PART 1 GENERAL

1.01 REFERENCE STANDARDS

A. ASTM B221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes; 2014.

B. ASTM B221M - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes (Metric); 2013.

C. ASTM B308/B308M - Standard Specification for Aluminum-Alloy 6061-T6 Standard Structural Profiles; 2020.

D. ITS (DIR) - Directory of Listed Products; current edition.

E. UL (DIR) - Online Certifications Directory; Current Edition.

1.02 SUBMITTALS

A. Product Data: Provide joint assembly profiles, profile dimensions, anchorage devices and available colors and finish.

B. Shop Drawings: Indicate joint and splice locations, miters, layout of the work, affected adjacent construction and anchorage locations.

C. Samples: Submit two samples 12 ____ inch long, illustrating profile, dimension, color, and finish selected.

D. Manufacturer's Installation Instructions: Indicate rough-in sizes and required tolerances for item placement.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Expansion Joint Cover Assemblies:
   1. Construction Specialties, Inc; _____: www.c-sgroup.com/#sle, Basis of Design.
   2. Inpro; _____: www.inprocorp.com/#sle.
   3. MM Systems Corp; _____: www.mmsystemscorp.com/#sle.
   4. Substitutions: See Section 016000 - Product Requirements.

2.02 EXPANSION JOINT COVER ASSEMBLY APPLICATIONS

A. Interior Floor Joints Subject to Thermal Movement:
   1. Basis of Design:
      a. Construction Specialties, Inc: www.c-sgroup.com/#sle.
      b. Substitutions: See Section 016000 - Product Requirements.

B. Interior Wall/Ceiling Joints Subject to Thermal Movement:
   1. Manufacturers:
      a. Construction Specialties, Inc: www.c-sgroup.com/#sle.
      b. Substitutions: See Section 016000 - Product Requirements.

C. Interior Fire-Rated Wall/Ceiling/Floor Joints Subject to Thermal Movement:
   1. Manufacturers:
      a. Construction Specialties, Inc; Fire Barriers: www.c-sgroup.com/#sle.
      b. Substitutions: See Section 016000 - Product Requirements.

D. Exterior Wall Joints Subject to Thermal Movement:
   1. Manufacturers:
      a. Construction Specialties, Inc: www.c-sgroup.com/#sle.
      b. Substitutions: See Section 016000 - Product Requirements.

E. Parking/Bridge Deck Joints:
   1. Manufacturers:

a. Construction Specialties, Inc; Parking Garage and Stadium Covers: www.c-sgroup.com/#sle.
b. Substitutions: See Section 016000 - Product Requirements.

2.03 EXPANSION JOINT COVER ASSEMBLIES

A. Expansion Joint Cover Assemblies - General: Factory-fabricated and assembled; designed to completely fill joint openings, sealed to prevent passage of air, dust, water, smoke; suitable for traffic expected.
1. Joint Dimensions and Configurations: As indicated on drawings.
2. Joint Cover Sizes: Selected to suit joint width and configuration, based on manufacturer's published recommendations and limitations.
3. Joint Cover Styles: As indicated herein.
4. Lengths: Provide covers in full lengths required; avoid splicing wherever possible.
5. Anchors, Fasteners, and Fittings: Provided by cover manufacturer.

B. Floor Joint Covers: Coordinate with indicated floor coverings.
1. If floor covering is not indicated, obtain instructions from Architect before proceeding.
2. If style is not indicated, provide extruded aluminum frame both sides, resilient seals, and minimize exposed metal.

C. Fire Barriers In Fire Rated Assemblies: Provide cover assembly having fire rating equivalent to that of assembly into which it is installed.
1. Acceptable Evaluation Agencies: UL (DIR) and ITS (DIR).

2.04 MATERIALS

A. Extruded Aluminum: ASTM B221 (ASTM B221M), 6063 alloy, T6 temper; or ASTM B308/B308M, 6061 alloy, T6 temper.
1. Exposed Finish Outdoors: Natural anodized.
2. Exposed Finish at Floors: Selected from manufacturers full color range.
3. Exposed Finish at Walls and Ceilings: Natural anodized.

B. Resilient Seals:
1. For Ceilings: Any resilient material, flush, pleated, or hollow gasket.
2. For Pedestrian Traffic Applications: EPDM rubber, Neoprene, or Santoprene; no PVC; Shore A hardness of 40 to 50 Durometer.
3. For Vehicular Traffic Applications: EPDM rubber, Neoprene, or Santoprene; no PVC; Shore A hardness of 40 to 50 Durometer.
4. Color: as selected by Architect from full range of manufacturer's selection.

C. Anchors and Fasteners: As recommended by cover manufacturer.

D. Threaded Fasteners: Aluminum.

E. Backing Paint for Aluminum Components in Contact with Cementitious Materials: Asphaltic type.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that joint preparation and dimensions are acceptable and in accordance with manufacturer's requirements.

B. Verify that frames and anchors installed by others are in correct locations and suitable for installation of remainder of assembly.

3.02 INSTALLATION

A. Install components and accessories in accordance with manufacturer's instructions.

B. Align work plumb and level, flush with adjacent surfaces.

C. Rigidly anchor to substrate to prevent misalignment.

3.03 PROTECTION

A. Do not permit traffic over unprotected floor joint surfaces.

B. Provide strippable coating to protect finish surface.

END OF SECTION

SECTION 081113
HOLLOW METAL DOORS AND FRAMES

PART 1 GENERAL

1.01 SUMMARY

A. Section includes hollow-metal work.

1.02 COORDINATION

A. Coordinate anchorage installation 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.

1.03 ACTION SUBMITTALS

A. Product Data: For each type of product.
   1. Include construction details, material descriptions, core descriptions, fire-resistance ratings, and finishes.

B. Shop Drawings: Include the following:
   1. Elevations of each door type.
   2. Frame details for each frame type, including dimensioned profiles and metal thicknesses.

C. Schedule: Provide a schedule of hollow-metal work prepared by or under the supervision of supplier, using same reference numbers for details and openings as those on Drawings. Coordinate with final Door Hardware Schedule.

1.04 DELIVERY, STORAGE, AND HANDLING

A. Deliver hollow-metal work palletized, packaged, or crated to provide protection during transit and Project-site storage. Do not use nonvented plastic.
   1. Provide additional protection to prevent damage to factory-finished units.

B. Deliver welded frames with two removable spreader bars across bottom of frames, tack welded to jambs and mullions.

C. Store hollow-metal work vertically under cover at Project site with head up. Place on minimum 4-inch- (102-mm-) high wood blocking. Provide minimum 1/4-inch (6-mm) space between each stacked door to permit air circulation.

PART 2 PRODUCTS

2.01 REGULATORY REQUIREMENTS

A. Fire-Rated Assemblies: Complying with NFPA 80 and listed and labeled by a qualified testing agency acceptable to authorities having jurisdiction for fire-protection ratings indicated, based on testing at positive pressure according to NFPA 252 or UL 10C.

B. Fire-Rated, Borrowed-Light Assemblies: Complying with NFPA 80 and listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction for fire-protection ratings indicated, based on testing according to NFPA 257 or UL 9.

2.02 INTERIOR DOORS AND FRAMES

A. See basis of design.

B. Construct interior doors and frames to comply with the standards indicated for materials, fabrication, hardware locations, hardware reinforcement, tolerances, and clearances, and as specified.

C. Standard-Duty Doors and Frames: SDI A250.8, Level 1..
   1. Physical Performance: Level C according to SDI A250.4.
   2. Doors:
      a. Type: As indicated in the Door and Frame Schedule.
      b. Thickness: 1-3/4 inches (44.5 mm).
      c. Face: Uncoated, cold-rolled steel sheet, minimum thickness of 0.032 inch (0.8 mm).

d. Edge Construction:Model 1, Full Flush.
e. Core: Manufacturer's standard kraft-paper honeycomb, polystyrene, polyurethane, polyisocyanurate, mineral-board, or vertical steel-stiffener core at manufacturer's discretion.

3. Frames:
   a. Materials: Uncoated, cold-rolled steel sheet, minimum thickness of 0.042 inch (1.0 mm).
   b. Construction: Face welded.
4. Exposed Finish: Prime.

2.03 EXTERIOR HOLLOW-METAL DOORS AND FRAMES

A. See basis of design.

B. Construct exterior doors and frames to comply with the standards indicated for materials, fabrication, hardware locations, hardware reinforcement, tolerances, and clearances, and as specified.

C. Heavy-Duty Doors and Frames: SDI A250.8, Level 2.
1. Physical Performance: Level B according to SDI A250.4.
2. Doors:
   a. Type: As indicated in the Door and Frame Schedule.
   b. Thickness: 1-3/4 inches (44.5 mm.)
   c. Face: Metallic-coated steel sheet, minimum thickness of 0.042 inch (1.0 mm), with minimum A40 (ZF120) coating.
   d. Edge Construction: Model 1, Full Flush.
   e. Core: Manufacturer's standard kraft-paper honeycomb, polystyrene, polyurethane, polyisocyanurate, mineral-board, or vertical steel-stiffener core at manufacturer's discretion.
      1) Thermal-Rated Doors: Provide doors fabricated with thermal-resistance value (R-value) of not less than 2.1 deg F x h x sq. ft./Btu (0.370 K x sq. m/W) when tested according to ASTM C 1363.
3. Frames:
   a. Materials: Metallic-coated steel sheet, minimum thickness of 0.053 inch (1.3 mm), with minimum A40 (ZF120) coating.
   b. Construction: Face welded.
4. Exposed Finish: Prime.

2.04 FRAME ANCHORS

A. Jamb Anchors:
1. Stud-Wall Type: Designed to engage stud, welded to back of frames; not less than 0.042 inch (1.0 mm) thick.
2. Compression Type for Drywall Slip-on Frames: Adjustable compression anchors.

B. Floor Anchors: Formed from same material as frames, minimum thickness of 0.042 inch (1.0 mm), and as follows:
1. Monolithic Concrete Slabs: Clip-type anchors, with two holes to receive fasteners.
2. Separate Topping Concrete Slabs: Adjustable-type anchors with extension clips, allowing not less than 2-inch (51-mm) height adjustment. Terminate bottom of frames at finish floor surface.

2.05 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.

D. Frame Anchors: ASTM A 879/A 879M, Commercial Steel (CS), 04Z (12G) 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 1011M, 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. Glazing: Comply with requirements in Section 088000 "Glazing."

G. Bituminous Coating: Cold-applied asphalt mastic, compounded for 15-mil (0.4-mm) dry film thickness per coat. Provide inert-type noncorrosive compound free of asbestos fibers, sulfur components, and other deleterious impurities.

2.06 FABRICATION

A. Fabricate hollow-metal work to be rigid and free of defects, warp, or buckle. Accurately form metal to required sizes and profiles, with minimum radius for metal thickness. Where practical, fit and assemble units in manufacturer's plant. To ensure proper assembly at Project site, clearly identify work that cannot be permanently factory assembled before shipment.

B. Hollow-Metal Doors:
   1. Steel-Stiffened Door Cores: Provide minimum thickness 0.026 inch (0.66 mm), steel vertical stiffeners of same material as face sheets extending full-door height, with vertical webs spaced not more than 6 inches (152 mm) apart. Spot weld to face sheets no more than 5 inches (127 mm) o.c. Fill spaces between stiffeners with glass- or mineral-fiber insulation.
   2. Fire Door Cores: As required to provide fire-protection ratings indicated.
   3. Vertical Edges for Single-Acting Doors: Provide beveled or square edges at manufacturer's discretion.
   4. Top Edge Closures: Close top edges of doors with inverted closures, except provide flush closures at exterior doors of same material as face sheets.
   5. Bottom Edge Closures: Close bottom edges of doors where required for attachment of weather stripping with end closures or channels of same material as face sheets.
   6. Exterior Doors: Provide weep-hole openings in bottoms of exterior doors to permit moisture to escape. Seal joints in top edges of doors against water penetration.
   7. 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 (19 mm) beyond edge of door on which astragal is mounted or as required to comply with published listing of qualified testing agency.

C. Hollow-Metal Frames: Where frames are fabricated in sections due to shipping or handling limitations, provide alignment plates or angles at each joint, fabricated of same thickness metal as frames.
   1. Frames: Provide 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. Provide countersunk, flat- or oval-head exposed screws and bolts for exposed fasteners unless otherwise indicated.
   3. Floor Anchors: Weld anchors to bottoms of jambs with at least four spot welds per anchor; however, for slip-on drywall frames, provide anchor clips or countersunk holes at bottoms of jambs.
   4. Jamb Anchors: Provide number and spacing of anchors as follows:
      a. Stud-Wall Type: Locate anchors not more than 18 inches (457 mm) from top and bottom of frame. Space anchors not more than 32 inches (813 mm) o.c. and as follows:
         1) Three anchors per jamb up to 60 inches (1524 mm) high.
         2) Four anchors per jamb from 60 to 90 inches (1524 to 2286 mm) high.
   5. Door Silencers: Except on weather-stripped frames, drill stops to receive door silencers as follows. Keep holes clear during construction.

a. Single-Door Frames: Drill stop in strike jamb to receive three door silencers.
b. Double-Door Frames: Drill stop in head jamb to receive two door silencers.

D. Fabricate concealed stiffeners and edge channels from either cold- or hot-rolled steel sheet.

E. Hardware Preparation: Factory prepare hollow-metal work to receive templated mortised hardware; include cutouts, reinforcement, mortising, drilling, and tapping according to SDI A250.6, the Door Hardware Schedule, and templates.
1. Reinforce doors and frames to receive nontemplated, mortised, and surface-mounted door hardware.
2. Comply with applicable requirements in SDI A250.6 and BHMA A156.115 for preparation of hollow-metal work for hardware.

F. Stops and Moldings: Provide stops and moldings around glazed lites and louvers where indicated. Form corners of stops and moldings with butted or mitered hairline joints.
1. Single Glazed Lites: Provide fixed stops and moldings welded on secure side of hollow-metal work.
2. Provide fixed frame moldings on outside of exterior and on secure side of interior doors and frames.
3. Provide loose stops and moldings on inside of hollow-metal work.
4. Coordinate rabbet width between fixed and removable stops with glazing and installation types indicated.

2.07 STEEL FINISHES

A. Prime Finish: Clean, pretreat, and apply manufacturer's standard primer.
1. Shop Primer: Manufacturer's standard, fast-curing, lead- and chromate-free primer complying with SDI A250.10; recommended by primer manufacturer for substrate; compatible with substrate and field-applied coatings despite prolonged exposure.

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 PREPARATION

A. Remove welded-in shipping spreaders installed at factory. Restore exposed finish by grinding, filling, and dressing, as required to make repaired area smooth, flush, and invisible on exposed faces.

B. Drill and tap doors and frames to receive nontemplated, mortised, and surface-mounted door hardware.

3.03 INSTALLATION

A. General: Install hollow-metal work plumb, rigid, properly aligned, and securely fastened in place. Comply with Drawings and manufacturer's written instructions.

B. Hollow-Metal Frames: Install hollow-metal frames of size and profile indicated. Comply with SDI A250.11 or NAAMM-HMMA 840 as required by standards specified.
1. Set frames accurately in position; plumbed, aligned, and braced securely until permanent anchors are set. After wall construction is complete, remove temporary braces, leaving surfaces smooth and undamaged.
a. At fire-rated openings, install frames according to NFPA 80.

b. Where frames are fabricated in sections because of shipping or handling limitations, field splice at approved locations by welding face joint continuously; grind, fill, dress, and make splice smooth, flush, and invisible on exposed faces.
c. Install frames with removable stops located on secure side of opening.
d. Install door silencers in frames before grouting.
e. Remove temporary braces necessary for installation only after frames have been properly set and secured.
f. Check plumb, square, and twist of frames as walls are constructed. Shim as necessary to comply with installation tolerances.

2. Floor Anchors: Provide floor anchors for each jamb and mullion that extends to floor, and secure with postinstalled expansion anchors.
   a. Floor anchors may be set with power-actuated fasteners instead of postinstalled expansion anchors if so indicated and approved on Shop Drawings.
3. In-Place Wood-Stud Partitions: Secure slip-on drywall frames in place according to manufacturer's written instructions.
4. Installation Tolerances: Adjust hollow-metal door frames for squareness, alignment, twist, and plumb to the following tolerances:
   a. Squareness: Plus or minus 1/16 inch (1.6 mm), measured at door rabbet on a line 90 degrees from jamb perpendicular to frame head.
   b. Alignment: Plus or minus 1/16 inch (1.6 mm), measured at jambs on a horizontal line parallel to plane of wall.
   c. Twist: Plus or minus 1/16 inch (1.6 mm), measured at opposite face corners of jambs on parallel lines, and perpendicular to plane of wall.
   d. Plumbness: Plus or minus 1/16 inch (1.6 mm), measured at jambs at floor.

C. Hollow-Metal Doors: Fit hollow-metal doors accurately in frames, within clearances specified below. Shim as necessary.
1. Non-Fire-Rated Steel Doors:
   a. Between Door and Frame Jambs and Head: 1/8 inch (3.2 mm) plus or minus 1/32 inch (0.8 mm).
   b. Between Edges of Pairs of Doors: 1/8 inch (3.2 mm) to 1/4 inch (6.3 mm) plus or minus 1/32 inch (0.8 mm).
   c. At Bottom of Door: 3/4 inch (19.1 mm) plus or minus 1/32 inch (0.8 mm).
   d. Between Door Face and Stop: 1/16 inch (1.6 mm) to 1/8 inch (3.2 mm) plus or minus 1/32 inch (0.8 mm).
2. Fire-Rated Doors: Install doors with clearances according to NFPA 80.

D. Glazing: Comply with installation requirements in Section 088000 "Glazing" and with hollow-metal manufacturer's written instructions.
1. Secure stops with countersunk flat- or oval-head machine screws spaced uniformly not more than 9 inches (230 mm) o.c. and not more than 2 inches (51 mm) o.c. from each corner.

3.04 ADJUSTING AND CLEANING

A. Final Adjustments: Check and readjust operating hardware items immediately before final inspection. Leave work in complete and proper operating condition. Remove and replace defective work, including hollow-metal work that is warped, bowed, or otherwise unacceptable.

B. Remove grout and other bonding material from hollow-metal work immediately after installation.

C. Prime-Coat Touchup: Immediately after erection, sand smooth rusted or damaged areas of prime coat and apply touchup of compatible air-drying, rust-inhibitive primer.

D. Metallic-Coated Surface Touchup: Clean abraded areas and repair with galvanizing repair paint according to manufacturer's written instructions.

END OF SECTION

SECTION 081416
FLUSH WOOD DOORS

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes:
   1. Solid-core doors with wood-veneer faces.
   2. Hollow-core doors with hardboard or MDF faces.
   3. Shop priming and factory finishing flush wood doors.
   4. Factory fitting flush wood doors to frames and factory machining for hardware.

1.02 ACTION SUBMITTALS

A. Product Data: For each type of door. Include details of core and edge construction and trim for openings. Include factory-finishing specifications.

B. Shop Drawings: Indicate location, size, and hand of each door; elevation of each kind of door; construction details not covered in Product Data

C. Samples for Initial Selection: For factory-finished doors.

1.03 DELIVERY, STORAGE, AND HANDLING

A. Comply with requirements of referenced standard and manufacturer's written instructions.

B. Package doors individually in plastic bags or cardboard cartons.

C. Mark each door on bottom rail with opening number used on Shop Drawings.

1.04 FIELD CONDITIONS

A. Environmental Limitations: Do not deliver or install doors until spaces are enclosed and weathertight, wet work in spaces is complete and dry, and HVAC system is operating and maintaining ambient temperature and humidity conditions at occupancy levels during remainder of construction period.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Source Limitations: Obtain flush wood doors from single manufacturer.

2.02 FLUSH WOOD DOORS, GENERAL

A. See basis of design,

B. Quality Standard: In addition to requirements specified, comply with WDMA I.S.1-A, "Architectural Wood Flush Doors."

C. Low-Emitting Materials: Fabricate doors with adhesives and composite wood products that do not contain urea formaldehyde.

D. WDMA I.S.1-A Performance Grade: Standard Duty.

E. Fire-Rated Wood Doors: Doors complying with NFPA 80 that are listed and labeled by a qualified testing agency, for fire-protection ratings indicated, based on testing at positive pressure according to NFPA 252 or UL 10C.
   1. Cores: Provide core specified or mineral core as needed to provide fire-protection rating indicated.
   2. Edge Construction: Provide edge construction with intumescent seals concealed by outer stile. Comply with specified requirements for exposed edges.
   3. Pairs: Provide fire-retardant stiles that are listed and labeled for applications indicated without formed-steel edges and astragals. Provide stiles with concealed intumescent seals. Comply with specified requirements for exposed edges.

F. Particleboard-Core Doors:

1. Particleboard: ANSI A208.1, Grade LD-1, made with binder containing no urea-formaldehyde.
2. Blocking: Provide wood blocking in particleboard-core doors as needed to eliminate through-bolting hardware.
3. Provide doors with glued-wood-stave or structural-composite-lumber cores instead of particleboard cores for doors indicated to receive exit devices.

G. Hollow-Core Doors:
1. Construction: Standard hollow core.
2. Blocking: Provide wood blocking with minimum dimensions as follows:
a. 5-by-18-inch (125-by-460-mm) lock blocks.
b. 5-inch (125-mm) top-rail blocking.
c. 10-inch (250-mm)bottom-rail blocking.
d. 2-1/2-inch (64-mm) midrail blocking.

2.03 VENEER-FACED DOORS FOR TRANSPARENT FINISH

A. Interior Solid-Core Doors:
1. Grade: Custom (Grade A faces).
2. Species: Select red birch.
3. Cut: Rotary cut.
4. Match between Veneer Leaves: Book match.
5. Assembly of Veneer Leaves on Door Faces: Center-balance match.
6. Pair and Set Match: Provide for doors hung in same opening.
7. Room Match: Provide door faces of compatible color and grain within each separate room or area of building.
8. Exposed Vertical Edges: Same species as faces or a compatible species - edge Type A.
9. Core: Particleboard.
10. Construction: Five or seven plies. Stiles and rails are bonded to core, then entire unit is abrasive planed before veneering.
11. WDMA I.S.1-A Performance Grade: Standard Duty.

B. Interior Hollow-Core Doors:
1. Grade: Custom (Grade A faces).
2. Species: Select red birch.
3. Cut: Rotary cut.
4. Match between Veneer Leaves: Book match.
5. Assembly of Veneer Leaves on Door Faces: Center-balance match.
6. Pair and Set Match: Provide for doors hung in same opening.
7. Exposed Vertical Edges: Same species as faces or a compatible species - edge Type A.
8. Construction: Seven plies.
9. WDMA I.S.1-A Performance Grade: Standard Duty.

2.04 DOORS FOR OPAQUE FINISH

A. Interior Solid-Core Doors:
1. Grade: Custom.
2. Faces: Hardboard or MDF.
a. Hardboard Faces: ANSI A135.4, Class 1 (tempered) or Class 2 (standard).
b. MDF Faces: ANSI A208.2, Grade 150 or Grade 160.
3. Exposed Vertical and Top Edges: Any closed-grain hardwood.
4. Core: Particleboard.
5. Construction: Five or seven plies. Stiles and rails are bonded to core, then entire unit is abrasive planed before veneering.
6. WDMA I.S.1-A Performance Grade: Standard Duty.

B. Interior Hollow-Core Doors:
1. Grade: Custom.

2. Faces: Hardboard or MDF.
   a. Hardboard Faces: ANSI A135.4, Class 1 (tempered) or Class 2 (standard).
   b. MDF Faces: ANSI A208.2, Grade 150 or Grade 160.
3. Exposed Vertical and Top Edges: Any closed-grain hardwood.
4. WDMA I.S.1-A Performance Grade: Standard Duty.

2.05 FABRICATION

A. Factory fit doors to suit frame-opening sizes indicated. Comply with clearance requirements of referenced quality standard for fitting unless otherwise indicated.
   1. Comply with NFPA 80 requirements for fire-rated doors.

B. Factory machine doors for hardware that is not surface applied. Locate hardware to comply with DHI-WDHS-3. Comply with final hardware schedules, door frame Shop Drawings, BHMA-156.115-W, and hardware templates.
   1. Coordinate with hardware mortises in metal frames to verify dimensions and alignment before factory machining.
   2. Metal Astragals: Factory machine astragals and formed-steel edges for hardware for pairs of fire-rated doors.

2.06 SHOP PRIMING

A. Doors for Opaque Finish: Shop prime faces, all four edges, edges of cutouts, and mortises with one coat of wood primer.

2.07 FACTORY FINISHING

A. General: Comply with referenced quality standard for factory finishing. Complete fabrication, including fitting doors for openings and machining for hardware that is not surface applied, before finishing.
   1. Finish faces, all four edges, edges of cutouts, and mortises. Stains and fillers may be omitted on top and bottom edges, edges of cutouts, and mortises.

B. Factory finish doors that are indicated to receive transparent finish.

C. Transparent Finish:
   1. Grade: Custom.
   2. Finish: WDMA TR-4 conversion varnish or WDMA TR-6 catalyzed polyurethane.
   3. Staining: As selected by Architect from manufacturer's full range.
   4. Effect: Open-grain finish.
   5. Sheen: Satin.

PART 3 EXECUTION

3.01 EXAMINATION

A. Examine doors and installed door frames, with Installer present, before hanging doors.
   1. Verify that installed frames comply with indicated requirements for type, size, location, and swing characteristics and have been installed with level heads and plumb jambs.
   2. Reject doors with defects.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 INSTALLATION

A. Installation Instructions: Install doors to comply with manufacturer's written instructions and referenced quality standard, and as indicated.
   1. Install fire-rated doors according to NFPA 80.

B. 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 edges of doors, edges of cutouts, and mortises after fitting and machining.
   1. Clearances: Provide 1/8 inch (3.2 mm) at heads, jambs, and between pairs of doors. Provide 1/8 inch (3.2 mm) from bottom of door to top of decorative floor finish or covering

unless otherwise indicated. Where threshold is shown or scheduled, provide 1/4 inch (6.4 mm) from bottom of door to top of threshold unless otherwise indicated.

a. Comply with NFPA 80 for fire-rated doors.

2. Bevel non-fire-rated doors 1/8 inch in 2 inches (3-1/2 degrees) at lock and hinge edges.
3. Bevel fire-rated doors 1/8 inch in 2 inches (3-1/2 degrees) at lock edge; trim stiles and rails only to extent permitted by labeling agency.

C. Factory-Fitted Doors: Align in frames for uniform clearance at each edge.

D. Factory-Finished Doors: Restore finish before installation if fitting or machining is required at Project site.

3.03 ADJUSTING

A. Operation: Rehang or replace doors that do not swing or operate freely.

B. Finished Doors: Replace doors that are damaged or that do not comply with requirements. Doors may be repaired or refinished if Work complies with requirements and shows no evidence of repair or refinishing.

END OF SECTION

SECTION 083113
ACCESS DOORS AND FRAMES

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes:
   1. Access doors and frames for walls.

1.02 ALLOWANCES

A. Access doors and frames are part of an access door and frame allowance.

1.03 ACTION SUBMITTALS

A. Product Data: For each type of product.
   1. Include construction details, fire ratings, materials, individual components and profiles, and finishes.

B. Shop Drawings:
   1. Include plans, elevations, sections, details, and attachments to other work.
   2. Detail fabrication and installation of access doors and frames for each type of substrate.

PART 2 PRODUCTS

2.01 PERFORMANCE REQUIREMENTS

A. Fire-Rated Access Doors and Frames: Units complying with NFPA 80 that are identical to access door and frame assemblies tested for fire-test-response characteristics according to the following test method and that are listed and labeled by UL or another testing and inspecting agency acceptable to authorities having jurisdiction:
   1. NFPA 252 or UL 10B for fire-rated access door assemblies installed vertically.

2.02 ACCESS DOORS AND FRAMES FOR WALLS

A. Fire-Rated, Flush Access Doors with Exposed Flanges:
   1. Assembly Description: Fabricate door to fit flush to frame, uninsulated. Provide self-latching door with automatic closer and interior latch release. Provide manufacturer's standard-width exposed flange, proportional to door size.
   2. Locations: Wall.
   3. Fire-Resistance Rating: Not less than that indicated.
   4. Uncoated Steel Sheet for Door: Nominal 0.036 inch (0.91 mm), 20 gage.
      a. Finish: Factory prime.
   5. Frame Material: Same material, thickness, and finish as door.
   6. Hinges: Manufacturer's standard.
   7. Hardware: Latch.

B. Hardware:
   1. Latch: Cam latch operated as shown on Drawings.

2.03 MATERIALS

A. Steel Plates, Shapes, and Bars: ASTM A 36/A 36M.

B. Steel Sheet: Uncoated or electrolytic zinc coated, ASTM A 879/A 879M, with cold-rolled steel sheet substrate complying with ASTM A 1008/A 1008M, Commercial Steel (CS), exposed.

C. Frame Anchors: Same type as door face.

D. Inserts, Bolts, and Anchor Fasteners: Hot-dip galvanized steel according to ASTM A 153/A 153M or ASTM F 2329.

2.04 FABRICATION

A. General: Provide access door and frame assemblies manufactured as integral units ready for installation.

B. Metal Surfaces: For metal surfaces 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.

C. Doors and Frames: Grind exposed welds smooth and flush with adjacent surfaces. Furnish attachment devices and fasteners of type required to secure access doors to types of supports indicated.
   1. Provide mounting holes in frames for attachment of units to wood framing.

D. Latching Mechanisms: Furnish number required to hold doors in flush, smooth plane when closed.

E. Extruded Aluminum: After fabrication, apply manufacturer's standard protective coating on aluminum that will come in contact with concrete.

2.05 FINISHES

A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.

B. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

C. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

D. Steel and Metallic-Coated-Steel Finishes:
   1. Factory Prime: Apply manufacturer's standard, fast-curing, lead- and chromate-free, universal primer immediately after surface preparation and pretreatment.

PART 3 EXECUTION

3.01 EXAMINATION

A. Examine substrates 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 INSTALLATION

A. Comply with manufacturer's written instructions for installing access doors and frames.

B. Install doors flush with adjacent finish surfaces or recessed to receive finish material.

3.03 ADJUSTING

A. Adjust doors and hardware, after installation, for proper operation.

B. Remove and replace doors and frames that are warped, bowed, or otherwise damaged.

END OF SECTION

SECTION 083343
ELEVATOR OVERHEAD COILING DOOR SMOKE CONTAINMENT SYSTEM

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes: Smoke detector activated elevator door smoke containment screen and control system designed to provide a tight-fitting, smoke- and draft-control assembly as noted on drawings.

B. Products Supplied but Not Installed Under This Section:
   1. End-of-line diode (3.9V, 2W). Installed at smoke detector to monitor the circuit.

1.02 RELATED SECTIONS:

A. 09 2200-Non-Load Bearing Wall Framing: Metal backing in housing mounting area.

B. 28 3000-Detection and Alarm: Provision of smoke detectors.

C. 14 2100-Electric Elevators.

D. Division 26 Sections for 120VAC and control circuit power including conduit, boxes, conductors, wiring devices, and emergency power.

1.03 ACTION SUBMITTALS

A. Reference Section 01 3300-Submittal Procedures; submit following items:
   1. Product Data.
   2. Shop Drawings: Include door width and height, jamb width, jamb and head projection, screen width, mounting height, and housing width. Show and identify related work performed under other sections of the specifications.
   3. Quality Assurance/Control Submittals:
      a. Qualifications:
         1) Proof of manufacturer qualifications.
         2) Proof of Installer qualifications.
            (a) Certifications: Copy of specified items.
            (b) Manufacturer’s installation instructions and testing procedures

1.04 CLOSEOUT SUBMITTALS

A. Comply with Section 01 7700-Closeout Submittals; submit following items:
   1. Operation and Maintenance Manual and Video.
   2. Manufacturer’s Warranties

1.05 QUALITY ASSURANCE

A. Overall Standards:
   1. Manufacturer shall maintain a quality control program in accordance with ICC-ES Acceptance Criteria 77.
   2. Qualifications:
      a. Manufacturer Qualifications: Minimum seven years of experience in producing smoke containment systems of the type specified.
      b. Installer Qualifications: Factory trained by manufacturer.
   3. Certifications:
      a. Manufacturer’s ICC Evaluation Service report ESR-1136 showing compliance with:
         1) ICC-ES AC77
         2) UL standard 1784
         3) AST, E84
         4) NFPA 105
   4. Pre-Installation Meeting:
      a. Schedule and convene a pre-installation meeting prior to commencement of field operations with representatives of the following in attendance: Owner, Architect,

General Contractor, smoke containment system sub-contractor, painting sub-contractor, and electrical sub-contractor.

b. Review substrate conditions, requirements of related work, installation instructions, storage and handling procedures, and protection measures.

c. Keep minutes of meeting including responsibilities of various parties and deviations from specifications and installation instructions.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Deliver, store, and handle materials, components, and equipment in manufacturer's protective packaging. Store materials, components, and equipment off of ground, under cover, and in a dry location.

1.07 COORDINATION

A. Coordinate installation of sleeves, block outs, elevator equipment with integral anchors, and other items that are embedded in concrete or masonry for elevator equipment. Furnish templates, sleeves, elevator equipment with integral anchors, and installation instructions and deliver to Project site in time for installation.

1.08 WARRANTY

A. Provide manufacturer’s standard one year warranty.

B. Maintenance and Testing:

1. Perform minimum semi-annual maintenance and testing on each smoke containment system as required by the manufacturer’s warranty, code agency evaluation reports, and as required by local authority having jurisdiction.
2. Provide test documentation.

PART 2 - PRODUCTS

2.01 MANUFACTURED UNITS

A. Manufacturer:

1. Smoke Guard, 287 Maple Grove, Boise, Idaho 83704 http://www.smokeguard.com/ Model M200 **Basis of Design**
2. Door Systems, Inc. DSI Smoke and Fire Curtain Model-C1HRE – 1 Hour Fire-Rated Multi-Barrel with Egress: www.doorsysinc.com/#sle.

B. Fabrication

1. Label each smoke containment system with following information:
   a. Manufacturer’s name.
   b. Maximum leakage rating at specified pressure and temperature conditions.
   c. Label of quality control agency.

2.02 PERFORMANCE

A. Air Leakage: Not to exceed 3 cfm (0.001416 m3/s) per sf of door opening at 0.1 in (25 Pa) water pressure differential at ambient temperature and 400 degrees F (204 degrees C) tested per IBC 2006, 2009, and 2012.

2.03 COMPONENTS

A. Screen:

1. Film: Minimum 1 mil (0.025 mm) thick transparent polyimide film reinforced with minimum 100 denier Nomex yarn at .25 in (6.35 mm) each way.
2. Magnetic Strips: Flexible multi-pole strips attached to longitudinal edges of film with low modulus silicone adhesive.
3. Housing: 20 gage, powder coated, cold rolled steel container with dust cover and door with concealed hinges and a latch. Housings are 55 inches or 64 inches in length, plus 1-1/2 inches for a junction box on the left side.
4. Mandatory Auxiliary Rails:
   a. Material: 16 gage ASTM A 240/240M, Type 430, ferritic stainless steel.

b. Size: 2 in (51 mm) wide, 1” (25 mm) deep, as shown in Shop Drawings.

5. Rewind Motor: NFPA 70, 90v DC.
6. Release Mechanism: IAS (IAS is a trademark of International Accreditation Service) Accredited Testing Laboratory Labels for UL Standard 864
7. Screen Rewind Switch: Include switch to rewind screen into housing.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Examine substrates upon which work will be installed.
   1. Verify related work performed under other sections is complete and in accordance with Shop Drawings.
   2. Verify wall surfaces and elevator door frames are acceptable for installation of smoke containment system components.
   3. Coordinate with responsible entity to perform corrective work on unsatisfactory substrates.
   4. Commencement of work by installer is acceptance of substrate.

3.02 INSTALLATION

A. Install smoke containment system components in accordance with manufacturer’s installation instructions.

3.03 FIELD QUALITY CONTROL

A. Field Test: Follow manufacturer’s cycle test procedures.

B. Notify Owner’s Representative, local Fire Marshal, alarm sub-contractor and elevator sub-contractor minimum one week in advance of scheduled testing.

C. Complete maintenance service record.

3.04 DEMONSTRATION

A. Demonstrate required testing and maintenance procedures to Owner’s Representative.

B. Maintenance and Testing:
   1. Perform minimum semi-annual maintenance and testing on each smoke containment system as required by the manufacturer’s warranty, code agency evaluation reports, and as required by local authority having jurisdiction.
   2. Retain permanent record of tests.
   3. Future Painting: Paint elevator door frame and/or auxiliary rails in accordance with Operation and Maintenance Manual.
   4. Qualified Smoke Guard Inspector assesses unit(s) after exposure to a fire event.

END OF SECTION

SECTION 084113
ALUMINUM-FRAMED ENTRANCES AND STOREFRONTS

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes:
   1. Exterior and interior storefront framing.
   2. Storefront framing for window walls.
   3. Storefront framing for punched openings.
   4. Exterior and interior manual-swing entrance doors and door-frame units.

1.02 ACTION SUBMITTALS

A. Product Data: For each type of product.
   1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes.

B. Shop Drawings: For aluminum-framed entrances and storefronts. Include plans, elevations, sections, full-size details, and attachments to other work.
   1. Include details of provisions for assembly expansion and contraction and for draining moisture occurring within the assembly to the exterior.
   2. Include full-size isometric details of each vertical-to-horizontal intersection of aluminum-framed entrances and storefronts, showing the following:
      a. Joinery, including concealed welds.
      b. Anchorage.
      c. Expansion provisions.
      d. Glazing.
      e. Flashing and drainage.
   3. Show connection to and continuity with adjacent thermal, weather, air, and vapor barriers.

C. Samples for Initial Selection: For units with factory-applied color finishes.

D. Samples for Verification: For each type of exposed finish required, in manufacturer's standard sizes.

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

1.03 CLOSEOUT SUBMITTALS

A. Maintenance Data: For aluminum-framed entrances and storefronts to include in maintenance manuals.

1.04 QUALITY ASSURANCE

A. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by manufacturer.

B. Product Options: Information on Drawings and in Specifications establishes requirements for aesthetic effects and performance characteristics of assemblies. Aesthetic effects are indicated by dimensions, arrangements, alignment, and profiles of components and assemblies as they relate to sightlines, to one another, and to adjoining construction.
   1. Do not change intended aesthetic effects, as judged solely by Architect, except with Architect's approval. If changes are proposed, submit comprehensive explanatory data to Architect for review.

PART 2 PRODUCTS

2.01 PERFORMANCE REQUIREMENTS

A. General Performance: Comply with performance requirements specified, as determined by testing of aluminum-framed entrances and storefronts representing those indicated for this Project without failure due to defective manufacture, fabrication, installation, or other defects in construction.
   1. Aluminum-framed entrances and storefronts shall withstand movements of supporting structure including, but not limited to, story drift, twist, column shortening, long-term creep, and deflection from uniformly distributed and concentrated live loads.
   2. Failure also includes the following:
      a. Thermal stresses transferring to building structure.
      b. Glass breakage.
      c. Noise or vibration created by wind and thermal and structural movements.
      d. Loosening or weakening of fasteners, attachments, and other components.
      e. Failure of operating units.

B. Deflection of Framing Members: At design wind pressure, as follows:
   1. Deflection Normal to Wall Plane: Limited to edge of glass in a direction perpendicular to glass plane not exceeding 1/175 of the glass edge length for each individual glazing lite or an amount that restricts edge deflection of individual glazing lites to 3/4 inch (19.1 mm), whichever is less.
   2. Deflection Parallel to Glazing Plane: Limited to 1/360 of clear span or 1/8 inch (3.2 mm), whichever is smaller.
      a. Operable Units: Provide a minimum 1/16-inch (1.6-mm) clearance between framing members and operable units.

C. Air Infiltration: Test according to ASTM E 283 for infiltration as follows:
   1. Fixed Framing and Glass Area:
      a. Maximum air leakage of 0.06 cfm/sq. ft. (0.30 L/s per sq. m) at a static-air-pressure differential of 1.57 lbf/sq. ft. (75 Pa).
   2. Entrance Doors:
      a. Pair of Doors: Maximum air leakage of 1.0 cfm/sq. ft. (5.08 L/s per sq. m) at a static-air-pressure differential of 1.57 lbf/sq. ft. (75 Pa).
      b. Single Doors: Maximum air leakage of 0.5 cfm/sq. ft. (2.54 L/s per sq. m) at a static-air-pressure differential of 1.57 lbf/sq. ft. (75 Pa).

D. Water Penetration under Static Pressure: Test according to ASTM E 331 as follows:
   1. No evidence of water penetration through fixed glazing and framing areas when tested according to a minimum static-air-pressure differential of 20 percent of positive wind-load design pressure, but not less than 6.24 lbf/sq. ft. (300 Pa).

E. Water Penetration under Dynamic Pressure: Test according to AAMA 501.1 as follows:
   1. No evidence of water penetration through fixed glazing and framing areas when tested at dynamic pressure equal to 20 percent of positive wind-load design pressure, but not less than 6.24 lbf/sq. ft. (300 Pa).
   2. Maximum Water Leakage: According to AAMA 501.1. Water leakage does not include water controlled by flashing and gutters, or water that is drained to exterior.

F. Energy Performance: Certify and label energy performance according to NFRC as follows:
   1. Thermal Transmittance (U-factor): Fixed glazing and framing areas shall have U-factor of not more than 0.45 Btu/sq. ft. x h x deg F (2.55 W/sq. m x K) as determined according to NFRC 100.
   2. Solar Heat Gain Coefficient: Fixed glazing and framing areas shall have a solar heat gain coefficient of no greater than 0.35 as determined according to NFRC 200.
   3. Condensation Resistance: Fixed glazing and framing areas shall have an NFRC-certified condensation resistance rating of no less than 15 as determined according to NFRC 500.

G. Thermal Movements: Allow for thermal movements resulting from ambient and surface temperature changes:
   1. Temperature Change: 120 deg F (67 deg C), ambient; 180 deg F (100 deg C), material surfaces.
   2. Thermal Cycling: No buckling; stress on glass; sealant failure; excess stress on framing, anchors, and fasteners; or reduction of performance when tested according to AAMA 501.5.
      a. High Exterior Ambient-Air Temperature: That which produces an exterior metal-surface temperature of 180 deg F (82 deg C).
      b. Low Exterior Ambient-Air Temperature: 0 deg F (minus 18 deg C).
      c. Interior Ambient-Air Temperature: 75 deg F (24 deg C).

2.02 MANUFACTURERS

A. Source Limitations: Obtain all components of aluminum-framed entrance and storefront system, including framing and accessories, from single manufacturer.

2.03 FRAMING

A. Framing Members: Manufacturer's extruded- or formed-aluminum framing members of thickness required and reinforced as required to support imposed loads.
   1. Construction: Thermally broken.
   2. Glazing System: Retained mechanically with gaskets on four sides.
   3. Glazing Plane: Front.
   4. Finish: Color anodic finish.
   5. Fabrication Method: Field-fabricated stick system.

B. Backer Plates: Manufacturer's standard, continuous backer plates for framing members, if not integral, where framing abuts adjacent construction.

C. Brackets and Reinforcements: Manufacturer's standard high-strength aluminum with nonstaining, nonferrous shims for aligning system components.

D. Materials:
   1. Aluminum: Alloy and temper recommended by manufacturer for type of use and finish indicated.
      a. Sheet and Plate: ASTM B 209 (ASTM B 209M).
      b. Extruded Bars, Rods, Profiles, and Tubes: ASTM B 221 (ASTM B 221M).
      c. Extruded Structural Pipe and Tubes: ASTM B 429/B 429M.
      d. Structural Profiles: ASTM B 308/B 308M.
   2. Steel Reinforcement: Manufacturer's standard zinc-rich, corrosion-resistant primer complying with SSPC-PS Guide No. 12.00; applied immediately after surface preparation and pretreatment. Select surface preparation methods according to recommendations in SSPC-SP COM, and prepare surfaces according to applicable SSPC standard.
      a. Structural Shapes, Plates, and Bars: ASTM A 36/A 36M.
      b. Cold-Rolled Sheet and Strip: ASTM A 1008/A 1008M.
      c. Hot-Rolled Sheet and Strip: ASTM A 1011/A 1011M.

2.04 ENTRANCE DOOR SYSTEMS

A. Entrance Doors: Manufacturer's standard glazed entrance doors for manual-swing operation.
   1. Door Construction: 2-inch (50.8-mm) overall thickness, with minimum 0.188-inch- (4.8-mm-) thick, extruded-aluminum tubular rail and stile members. Mechanically fasten corners with reinforcing brackets that are deeply penetrated and fillet welded or that incorporate concealed tie rods.
      a. Thermal Construction: High-performance plastic connectors separate aluminum members exposed to the exterior from members exposed to the interior.
   2. Door Design: Medium stile; 3-1/2-inch (88.9-mm) nominal width.

3. Glazing Stops and Gaskets: Beveled, snap-on, extruded-aluminum stops and preformed gaskets.
    a. Provide nonremovable glazing stops on outside of door.

2.05 ENTRANCE DOOR HARDWARE

A. Entrance Door Hardware: Hardware not specified in this Section is specified in Section 087100 "Door Hardware."

B. Weather Stripping: Manufacturer's standard replaceable components.
    1. Compression Type: Made of ASTM D 2000, molded neoprene, or ASTM D 2287, molded PVC.

C. Weather Sweeps: Manufacturer's standard exterior-door bottom sweep with concealed fasteners on mounting strip.

D. Silencers: BHMA A156.16, Grade 1.

2.06 GLAZING

A. Glazing: Comply with Section 088000 "Glazing."

B. Glazing Gaskets: Manufacturer's standard sealed-corner pressure-glazing system of black, resilient elastomeric glazing gaskets, setting blocks, and shims or spacers.

C. Sealants used inside the weatherproofing system shall comply with the testing and product requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."

D. Weatherseal Sealants: ASTM C 920 for Type S; Grade NS; Class 25; Uses NT, G, A, and O; chemically curing silicone formulation that is compatible with structural sealant and other system components with which it comes in contact; recommended by structural-sealant, weatherseal-sealant, and structural-sealant-glazed storefront manufacturers for this use.

2.07 ACCESSORIES

A. Fasteners and Accessories: Manufacturer's standard corrosion-resistant, nonstaining, nonbleeding fasteners and accessories compatible with adjacent materials.
    1. Use self-locking devices where fasteners are subject to loosening or turning out from thermal and structural movements, wind loads, or vibration.
    2. Reinforce members as required to receive fastener threads.
    3. Use exposed fasteners with countersunk Phillips screw heads, finished to match framing system.

B. Anchors: Three-way adjustable anchors with minimum adjustment of 1 inch (25.4 mm) that accommodate fabrication and installation tolerances in material and finish compatible with adjoining materials and recommended by manufacturer.

C. Concealed Flashing: Manufacturer's standard corrosion-resistant, nonstaining, nonbleeding flashing compatible with adjacent materials.

D. Bituminous Paint: Cold-applied asphalt-mastic paint complying with SSPC-Paint 12 requirements except containing no asbestos, formulated for 30-mil (0.762-mm) thickness per coat.

2.08 FABRICATION

A. Form or extrude aluminum shapes before finishing.

B. Weld in concealed locations to greatest extent possible to minimize distortion or discoloration of finish. Remove weld spatter and welding oxides from exposed surfaces by descaling or grinding.

C. Fabricate components that, when assembled, have the following characteristics:
    1. Profiles that are sharp, straight, and free of defects or deformations.
    2. Accurately fitted joints with ends coped or mitered.

3. Physical and thermal isolation of glazing from framing members.
4. Accommodations for thermal and mechanical movements of glazing and framing to maintain required glazing edge clearances.
5. Provisions for field replacement of glazing from interior.
6. Fasteners, anchors, and connection devices that are concealed from view to greatest extent possible.

D. Mechanically Glazed Framing Members: Fabricate for flush glazing without projecting stops.

E. Storefront Framing: Fabricate components for assembly using shear-block system.

F. Entrance Door Frames: Reinforce as required to support loads imposed by door operation and for installing entrance door hardware.
1. At exterior doors, provide compression weather stripping at fixed stops.
2. At interior doors, provide silencers at stops to prevent metal-to-metal contact. Install three silencers on strike jamb of single-door frames and two silencers on head of frames for pairs of doors.

G. Entrance Doors: Reinforce doors as required for installing entrance door hardware.
1. At pairs of exterior doors, provide sliding-type weather stripping retained in adjustable strip and mortised into door edge.
2. At exterior doors, provide weather sweeps applied to door bottoms.

H. After fabrication, clearly mark components to identify their locations in Project according to Shop Drawings.

2.09 ALUMINUM FINISHES

A. Color Anodic Finish: AAMA 611, AA-M12C22A42/A44, Class I, 0.018 mm or thicker.
1. Color: Medium bronze.

PART 3 EXECUTION

3.01 EXAMINATION

A. Examine areas, with Installer present, 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. Prepare surfaces that are in contact with structural sealant according to sealant manufacturer's written instructions to ensure compatibility and adhesion. Preparation includes, but is not limited to, cleaning and priming surfaces.

3.03 INSTALLATION

A. General:
1. Comply with manufacturer's written instructions.
2. Do not install damaged components.
3. Fit joints to produce hairline joints free of burrs and distortion.
4. Rigidly secure nonmovement joints.
5. Install anchors with separators and isolators to prevent metal corrosion and electrolytic deterioration and to prevent impeding movement of moving joints.
6. Seal perimeter and other joints watertight unless otherwise indicated.

B. Metal Protection:
1. Where aluminum is in contact with dissimilar metals, protect against galvanic action by painting contact surfaces with materials recommended by manufacturer for this purpose or by installing nonconductive spacers.
2. Where aluminum is in contact with concrete or masonry, protect against corrosion by painting contact surfaces with bituminous paint.

C. Set continuous sill members and flashing in full sealant bed to produce weathertight installation.

D. Install components plumb and true in alignment with established lines and grades.

E. Install operable units level and plumb, securely anchored, and without distortion. Adjust weather-stripping contact and hardware movement to produce proper operation.

F. Install glazing as specified in Section 088000 "Glazing."

G. Install weatherseal sealant and according to sealant manufacturer's written instructions to produce weatherproof joints. Install joint filler behind sealant as recommended by sealant manufacturer.

H. Entrance Doors: Install doors to produce smooth operation and tight fit at contact points.
   1. Exterior Doors: Install to produce weathertight enclosure and tight fit at weather stripping.
   2. Field-Installed Entrance Door Hardware: Install surface-mounted entrance door hardware according to entrance door hardware manufacturers' written instructions using concealed fasteners to greatest extent possible.

3.04 ERECTION TOLERANCES

A. Erection Tolerances: Install aluminum-framed entrances and storefronts to comply with the following maximum tolerances:
   1. Plumb: 1/8 inch in 10 feet (3.2 mm in 3 m); 1/4 inch in 40 feet (6.35 mm in 12.2 m).
   2. Level: 1/8 inch in 20 feet (3.2 mm in 6 m); 1/4 inch in 40 feet (6.35 mm in 12.2 m).
   3. Alignment:
      a. Where surfaces abut in line or are separated by reveal or protruding element up to 1/2 inch (12.7 mm) wide, limit offset from true alignment to 1/16 inch (1.6 mm).
      b. Where surfaces are separated by reveal or protruding element from 1/2 to 1 inch (12.7 to 25.4 mm) wide, limit offset from true alignment to 1/8 inch (3.2 mm).
      c. Where surfaces are separated by reveal or protruding element of 1 inch (25.4 mm) wide or more, limit offset from true alignment to 1/4 inch (6 mm).
   4. Location: Limit variation from plane to 1/8 inch in 12 feet (3.2 mm in 3.6 m); 1/2 inch (12.7 mm) over total length.

END OF SECTION

SECTION 088000
GLAZING

PART 1 GENERAL

1.01 SUMMARY

A. Section includes glazing for the following products and applications, including those specified in other Sections where glazing requirements are specified by reference to this Section:
   1. Windows.
   2. Doors.
   3. Storefront framing.
   4. Interior borrowed lites.

1.02 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. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes acting on glass framing members and glazing components.
   1. Temperature Change: 120 deg F (67 deg C), ambient; 180 deg F (100 deg C), material surfaces.

1.03 ACTION SUBMITTALS

A. Product Data: For each glass product and glazing material indicated.

1.04 QUALITY ASSURANCE

A. Manufacturer Qualifications for Insulating-Glass Units with Sputter-Coated, Low-E Coatings: A qualified insulating-glass manufacturer who is approved and certified by coated-glass manufacturer.

B. Installer Qualifications: A qualified installer who employs glass installers for this Project who are certified under the National Glass Association's Certified Glass Installer Program.

C. Source Limitations for Glazing Accessories: Obtain from single source from single manufacturer for each product and installation method.

D. Glazing Publications: Comply with published recommendations of glass product manufacturers and organizations below, unless more stringent requirements are indicated. Refer to these publications for glazing terms not otherwise defined in this Section or in referenced standards.
   1. GANA Publications: GANA's "Glazing Manual."
   2. IGMA Publication for Insulating Glass: SIGMA TM-3000, "North American Glazing Guidelines for Sealed Insulating Glass Units for Commercial and Residential Use."

E. Safety Glazing Labeling: Where safety glazing labeling is indicated, permanently mark glazing with certification label of the manufacturer. Label shall indicate manufacturer's name, type of glass, thickness, and safety glazing standard with which glass complies.

F. Fire-Protection-Rated Glazing Labeling: Permanently mark fire-protection-rated glazing with certification label of a testing agency acceptable to authorities having jurisdiction. Label shall indicate manufacturer's name, test standard, whether glazing is for use in fire doors or other openings, whether or not glazing passes hose-stream test, whether or not glazing has a temperature rise rating of 450 deg F (250 deg C), and the fire-resistance rating in minutes.

G. Insulating-Glass Certification Program: Permanently marked either on spacers or on at least one component lite of units with appropriate certification label of IGCC.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Protect glazing materials according to manufacturer's written instructions. Prevent damage to glass and glazing materials from condensation, temperature changes, direct exposure to sun, or other causes.

B. Comply with insulating-glass manufacturer's written recommendations for venting and sealing units to avoid hermetic seal ruptures due to altitude change.

1.06 PROJECT CONDITIONS

A. Environmental Limitations: Do not proceed with glazing when ambient and substrate temperature conditions are outside limits permitted by glazing material manufacturers and when glazing channel substrates are wet from rain, frost, condensation, or other causes.
   1. Do not install glazing sealants when ambient and substrate temperature conditions are outside limits permitted by sealant manufacturer or below 40 deg F (4.4 deg C).

PART 2 PRODUCTS

2.01 GLASS PRODUCTS, GENERAL

A. Thickness: Where glass thickness is indicated, it is a minimum. Provide glass lites in thicknesses as needed to comply with requirements indicated.

B. Strength: Where float glass is indicated, provide annealed float glass, Kind HS heat-treated float glass, or Kind FT heat-treated float glass. Where heat-strengthened glass is indicated, provide Kind HS heat-treated float glass or Kind FT heat-treated float glass. Where fully tempered glass is indicated, 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 insulating-glass units, properties are based on units of thickness indicated for overall unit and for each lite.
   3. U-Factors: Center-of-glazing values, according to NFRC 100 and based on LBL's WINDOW 5.2 computer program, expressed as Btu/sq. ft. x h x deg F (W/sq. m x K).
   4. 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.
   5. Visible Reflectance: Center-of-glazing values, according to NFRC 300.

2.02 GLASS PRODUCTS

A. Float Glass: ASTM C 1036, Type I, Quality-Q3, Class I (clear) unless otherwise indicated.

B. Heat-Treated Float Glass: ASTM C 1048; Type I; Quality-Q3; Class I (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).

2.03 INSULATING GLASS

A. Insulating-Glass Units: Factory-assembled units consisting of sealed lites of glass separated by a dehydrated interspace, qualified according to ASTM E 2190, and complying with other requirements specified.
   1. Sealing System: Dual seal, with manufacturer's standard primary and secondary.
   2. Spacer: Manufacturer's standard spacer material and construction.
   3. Desiccant: Molecular sieve or silica gel, or blend of both.

B. Glass: Comply with applicable requirements in "Glass Products" Article as indicated by designations in "Insulating-Glass Types" Article.

2.04 FIRE-PROTECTION-RATED GLAZING

A. Fire-Protection-Rated Glazing, General: Listed and labeled by a testing agency acceptable to authorities having jurisdiction, for fire-protection ratings indicated, based on testing according to NFPA 252 for door assemblies and NFPA 257 for window assemblies.

B. Film-Faced Ceramic Glazing: Clear, ceramic flat glass; 3/16-inch (5-mm) nominal thickness; faced on one surface with a clear glazing film; complying with testing requirements in 16 CFR 1201 for Category II materials.

2.05 GLAZING GASKETS

A. 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 C 864.
   2. EPDM complying with ASTM C 864.
   3. Silicone complying with ASTM C 1115.
   4. Thermoplastic polyolefin rubber complying with ASTM C 1115.

B. Soft Compression Gaskets: Extruded or molded, closed-cell, integral-skinned neoprene EPDM silicone or thermoplastic polyolefin rubber gaskets complying with ASTM C 509, Type II, black; of profile and hardness required to maintain watertight seal.

2.06 GLAZING TAPES

A. Back-Bedding Mastic Glazing Tapes: Preformed, butyl-based, 100 percent solids elastomeric tape; nonstaining and nonmigrating in contact with nonporous surfaces; with or without spacer rod as recommended in writing by tape and glass manufacturers for application indicated; and complying with ASTM C 1281 and AAMA 800 for products indicated below:
   1. AAMA 804.3 tape, where indicated.
   2. AAMA 806.3 tape, for glazing applications in which tape is subject to continuous pressure.
   3. AAMA 807.3 tape, for glazing applications in which tape is not subject to continuous pressure.

B. Expanded Cellular Glazing Tapes: Closed-cell, PVC foam tapes; factory coated with adhesive on both surfaces; and complying with AAMA 800 for the following types:
   1. AAMA 810.1, Type 1, for glazing applications in which tape acts as the primary sealant.
   2. AAMA 810.1, Type 2, for glazing applications in which tape is used in combination with a full bead of liquid sealant.

2.07 MISCELLANEOUS GLAZING MATERIALS

A. General: Provide products of material, size, and shape complying with referenced glazing standard, requirements of manufacturers of glass and other glazing materials for application indicated, and with a proven record of compatibility with surfaces contacted in installation.

B. Cleaners, Primers, and Sealers: Types recommended by sealant or gasket manufacturer.

C. Setting Blocks: Elastomeric material with a Shore, Type A durometer hardness of 85, plus or minus 5.

D. Spacers: Elastomeric blocks or continuous extrusions of hardness required by glass manufacturer to maintain glass lites in place for installation indicated.

E. Edge Blocks: Elastomeric material of hardness needed to limit glass lateral movement (side walking).

F. Cylindrical Glazing Sealant Backing: ASTM C 1330, Type O (open-cell material), of size and density to control glazing sealant depth and otherwise produce optimum glazing sealant performance.

G. Perimeter Insulation for Fire-Resistive Glazing: Product that is approved by testing agency that listed and labeled fire-resistant glazing product with which it is used for application and fire-protection rating indicated.

2.08 FABRICATION OF GLAZING UNITS

A. Fabricate glazing units in sizes required to fit openings indicated for Project, with edge and face clearances, edge and surface conditions, and bite complying with written instructions of product manufacturer and referenced glazing publications, to comply with system performance requirements.

B. Clean-cut or flat-grind vertical edges of butt-glazed monolithic lites to produce square edges with slight chamfers at junctions of edges and faces.

C. Grind smooth and polish exposed glass edges and corners.

2.09 MONOLITHIC-GLASS TYPES

A. Glass Type: Clear fully tempered float glass.
   1. Thickness: 6.0 mm.
   2. Provide safety glazing labeling.

2.10 INSULATING-GLASS TYPES

A. Glass Type: Low-e-coated, clear insulating glass.
   1. Overall Unit Thickness: 1 inch (25 mm).
   2. Thickness of Each Glass Lite: 6.0 mm.
   3. Outdoor Lite: Fully tempered float glass.
   4. Interspace Content: Air.
   5. Indoor Lite: Fully tempered float glass.
   6. Low-E Coating: Pyrolytic or sputtered on second or third surface.
   7. Provide safety glazing labeling.

2.11 FIRE-PROTECTION-RATED GLAZING TYPES

A. Glass Type : 45-minute fire-rated glazing; film-faced ceramic glazing.
   1. Provide safety glazing labeling.

PART 3 EXECUTION

3.01 EXAMINATION

A. Examine framing, glazing channels, and stops, with Installer present, for compliance with the following:
   1. Manufacturing and installation tolerances, including those for size, squareness, and offsets at corners.
   2. Presence and functioning of weep systems.
   3. Minimum required face and edge clearances.
   4. Effective sealing between joints of glass-framing members.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 PREPARATION

A. Clean glazing channels and other framing members receiving glass immediately before glazing. Remove coatings not firmly bonded to substrates.

B. Examine glazing units to locate exterior and interior surfaces. Label or mark units as needed so that exterior and interior surfaces are readily identifiable. Do not use materials that will leave visible marks in the completed work.

3.03 GLAZING, GENERAL

A. Comply with combined written instructions of manufacturers of glass, sealants, gaskets, and other glazing materials, unless more stringent requirements are indicated, including those in referenced glazing publications.

B. Adjust glazing channel dimensions as required by Project conditions during installation to provide necessary bite on glass, minimum edge and face clearances, and adequate sealant thicknesses, with reasonable tolerances.

C. Protect glass edges from damage during handling and installation. Remove damaged glass from Project site and legally dispose of off Project site. Damaged glass is glass with edge damage or other imperfections that, when installed, could weaken glass and impair performance and appearance.

D. Apply primers to joint surfaces where required for adhesion of sealants, as determined by preconstruction testing.

E. Install setting blocks in sill rabbets, sized and located to comply with referenced glazing publications, unless otherwise required by glass manufacturer. Set blocks in thin course of compatible sealant suitable for heel bead.

F. Do not exceed edge pressures stipulated by glass manufacturers for installing glass lites.

G. Provide spacers for glass lites where length plus width is larger than 50 inches (1270 mm).
   1. Locate spacers directly opposite each other on both inside and outside faces of glass. Install correct size and spacing to preserve required face clearances, unless gaskets and glazing tapes are used that have demonstrated ability to maintain required face clearances and to comply with system performance requirements.
   2. Provide 1/8-inch (3-mm) minimum bite of spacers on glass and use thickness equal to sealant width. With glazing tape, use thickness slightly less than final compressed thickness of tape.

H. Provide edge blocking where indicated or needed to prevent glass lites from moving sideways in glazing channel, as recommended in writing by glass manufacturer and according to requirements in referenced glazing publications.

I. Set glass lites in each series with uniform pattern, draw, bow, and similar characteristics.

J. Where wedge-shaped gaskets are driven into one side of channel to pressurize sealant or gasket on opposite side, provide adequate anchorage so gasket cannot walk out when installation is subjected to movement.

K. Square cut wedge-shaped gaskets at corners and install gaskets in a manner recommended by gasket manufacturer to prevent corners from pulling away; seal corner joints and butt joints with sealant recommended by gasket manufacturer.

3.04 TAPE GLAZING

A. Position tapes on fixed stops so that, when compressed by glass, their exposed edges are flush with or protrude slightly above sightline of stops.

B. Install tapes continuously, but not necessarily in one continuous length. Do not stretch tapes to make them fit opening.

C. Cover vertical framing joints by applying tapes to heads and sills first and then to jambs. Cover horizontal framing joints by applying tapes to jambs and then to heads and sills.

D. Place joints in tapes at corners of opening with adjoining lengths butted together, not lapped. Seal joints in tapes with compatible sealant approved by tape manufacturer.

E. Do not remove release paper from tape until right before each glazing unit is installed.

F. Apply heel bead of elastomeric sealant.

G. Center glass lites in openings on setting blocks and press firmly against tape by inserting dense compression gaskets formed and installed to lock in place against faces of removable stops. Start gasket applications at corners and work toward centers of openings.

H. Apply cap bead of elastomeric sealant over exposed edge of tape.

3.05 GASKET GLAZING (DRY)

A. Cut compression gaskets to lengths recommended by gasket manufacturer to fit openings exactly, with allowance for stretch during installation.

B. Insert soft compression gasket between glass and frame or fixed stop so it is securely in place with joints miter cut and bonded together at corners.

C. Installation with Drive-in Wedge Gaskets: Center glass lites in openings on setting blocks and press firmly against soft compression gasket by inserting dense compression gaskets formed and installed to lock in place against faces of removable stops. Start gasket applications at corners and work toward centers of openings. Compress gaskets to produce a weathertight seal without developing bending stresses in glass. Seal gasket joints with sealant recommended by gasket manufacturer.

D. Installation with Pressure-Glazing Stops: Center glass lites in openings on setting blocks and press firmly against soft compression gasket. Install dense compression gaskets and pressure-glazing stops, applying pressure uniformly to compression gaskets. Compress gaskets to produce a weathertight seal without developing bending stresses in glass. Seal gasket joints with sealant recommended by gasket manufacturer.

E. Install gaskets so they protrude past face of glazing stops.

3.06 CLEANING AND PROTECTION

A. Protect exterior glass from damage immediately after installation by attaching crossed streamers to framing held away from glass. Do not apply markers to glass surface. Remove nonpermanent labels and clean surfaces.

B. Protect glass from contact with contaminating substances resulting from construction operations. If, despite such protection, contaminating substances do come into contact with glass, remove substances immediately as recommended in writing by glass manufacturer.

C. Examine glass surfaces adjacent to or below exterior concrete and other masonry surfaces at frequent intervals during construction, but not less than once a month, for buildup of dirt, scum, alkaline deposits, or stains; remove as recommended in writing by glass manufacturer.

D. Remove and replace glass that is broken, chipped, cracked, or abraded or that is damaged from natural causes, accidents, and vandalism, during construction period.

E. Wash glass on both exposed surfaces in each area of Project not more than four days before date scheduled for inspections that establish date of Substantial Completion. Wash glass as recommended in writing by glass manufacturer.

END OF SECTION

SECTION 092116
GYPSUM BOARD SHAFT WALL ASSEMBLIES

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: Gypsum board shaft wall assemblies.

1.03 ACTION SUBMITTALS

A. Product Data: For each component of gypsum board shaft wall assembly.

B. Sustainable Submittals:
   1. Product Data for Recycled Materials: For products having recycled content, documentation indicating percentages by weight of postconsumer and preconsumer recycled content. Include statement indicating cost for each product having recycled content.
   2. Product Certificates for Regional Materials:
      a. For products and materials required to comply with requirements for regional materials, certificates indicating location of material manufacturer and point of extraction, harvest, or recovery for each raw material. Include statement indicating distance to Project, cost for each regional material, and fraction by weight that is considered regional.
      b. For products and materials required to comply with requirements for regionally manufactured[and regionally extracted and manufactured] materials. Include statement indicating cost for each regionally manufactured material.
      c. Include statement indicating location of manufacturer and distance to Project for each regionally manufactured material.
      d. Include statement indicating location of manufacturer and point of extraction, harvest, or recovery for each raw material used in regionally extracted and manufactured materials. Indicate distance to Project and fraction by weight of each regionally manufactured material that is regionally extracted.
   3. Product Data for VOC: For adhesives used to laminate gypsum board panels to substrates, documentation including printed statement of VOC content.

1.04 INFORMATIONAL SUBMITTALS

A. Evaluation Reports: For shaft wall assemblies from ICC-ES.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Store materials inside under cover and keep them dry and protected against weather, condensation, direct sunlight, construction traffic, and other potential causes of damage. Stack panels flat and supported on risers on a flat platform to prevent sagging.

1.06 FIELD CONDITIONS

A. Environmental Limitations: Comply with ASTM C 840 requirements or with gypsum board manufacturer's written recommendations, whichever are more stringent.

B. Do not install interior products until installation areas are enclosed and conditioned.

C. Do not install panels that are wet, moisture damaged, or mold damaged.
   1. Indications that panels are wet or moisture damaged include, but are not limited to, discoloration, sagging, and irregular shape.
   2. Indications that panels are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration.

PART 2 PRODUCTS

2.01 PERFORMANCE REQUIREMENTS

A. Fire-Resistance-Rated Assemblies: For fire-resistance-rated assemblies, provide materials and construction identical to those tested in assembly indicated according to ASTM E 119 by an independent testing agency.

B. Low-Emitting Materials: Gypsum shaft wall assemblies shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

2.02 GYPSUM BOARD SHAFT WALL ASSEMBLIES - SEE DRAWINGS.

A. Fire-Resistance Rating: As indicated.

B. Studs: Manufacturer's standard profile for repetitive members, corner and end members, and fire-resistance-rated assembly indicated.
   1. Depth: 2-1/2 inches (64 mm).
   2. Minimum Base-Metal Thickness: 0.018 inch (0.45 mm).

C. Runner Tracks: Manufacturer's standard J-profile track with manufacturer's standard long-leg length, but at least 2 inches (51 mm) long and matching studs in depth.
   1. Minimum Base-Metal Thickness: Matching steel studs

D. Firestop Tracks: Provide firestop track at head of shaft wall on each floor level.

E. Room-Side Finish: Gypsum board.

F. Shaft-Side Finish: Gypsum shaftliner board, Type X.

G. Insulation: Sound attenuation blankets.

2.03 PANEL PRODUCTS

A. Panel Size: Provide in maximum lengths and widths available that will minimize joints in each area and that correspond with support system indicated.

B. Gypsum Shaftliner Board, Moisture- and Mold-Resistant Type X: ASTM C 1396/C 1396M; manufacturer's proprietary fire-resistive liner panels with moisture- and mold-resistant core and surfaces.
   1. Products: Subject to compliance with requirements, provide one of the following:
      a. CertainTeed Corp.; ProRoc Moisture and Mold Resistant Shaftliner.
      b. Georgia-Pacific Gypsum LLC, Subsidiary of Georgia Pacific; Dens-Glass Ultra Shaftliner.
      c. Lafarge North America, Inc.; Firecheck Moldcheck Type X Shaftliner.
      d. National Gypsum Company; Gold Bond Brand Fire-Shield Shaftliner XP.
      e. PABCO Gypsum; Pabcore Mold Curb Shaftliner Type X.
      f. Temple-Inland Inc.; Fire-Rated SilentGuard TS Mold-Resistant Gypsum Shaftliner System.
      g. USG Corporation; Sheetrock Brand Mold Tough Gypsum Liner Panel.
   2. Long Edges: Double bevel.
   3. Mold Resistance: ASTM D 3273, score of 10 as rated according to ASTM D 3274.

C. Gypsum Board: As specified in Section 092900 "Gypsum Board."

2.04 NON-LOAD-BEARING STEEL FRAMING

A. Recycled Content of Steel: Postconsumer recycled content plus one-half of preconsumer recycled content not less than 25 percent.

B. Steel Framing Members: Comply with ASTM C 645 requirements for metal unless otherwise indicated.
   1. Protective Coating: Coating with equivalent corrosion resistance of ASTM A 653/A 653M, G40 (Z120)] [ASTM A 653/A 653M, G40 (Z120), hot-dip galvanized unless otherwise

indicated.

C. 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:
      a. Fire Trak Corp.; Fire Trak System attached to studs with Fire Trak Posi Klip.
      b. Grace Construction Products; FlameSafe FlowTrak System.
      c. Metal-Lite, Inc.; The System.
      d. Steel Network Inc. (The); VertiClip SLD or VertiTrack VTD Series.

2.05 AUXILIARY MATERIALS

A. General: Provide auxiliary materials that comply with manufacturer's written recommendations.

B. Trim Accessories: Cornerbead, edge trim, and control joints of material and shapes as specified in Section 092900 "Gypsum Board" that comply with gypsum board shaft wall assembly manufacturer's written recommendations for application indicated.

C. Steel Drill Screws: ASTM C 1002 unless otherwise indicated.

D. Track Fasteners: Power-driven fasteners of size and material required to withstand loading conditions imposed on shaft wall assemblies without exceeding allowable design stress of track, fasteners, or structural substrates in which anchors are embedded.
   1. Expansion Anchors: Fabricated from corrosion-resistant materials, with capability to sustain, without failure, a load equal to 5 times design load, as determined by testing according to ASTM E 488 conducted by a qualified testing agency.
   2. Power-Actuated Anchors: Fastener system of type suitable for application indicated, fabricated from corrosion-resistant materials, with capability to sustain, without failure, a load equal to 10 times design load, as determined by testing according to ASTM E 1190 conducted by a qualified testing agency.

E. Sound Attenuation Blankets: As specified in Section 092900 "Gypsum Board."

F. Acoustical Sealant: As specified in Section 092900 "Gypsum Board."

2.06 EXECUTION

2.07 EXAMINATION

A. Examine substrates to which gypsum board shaft wall assemblies attach or abut, with Installer present, including hollow-metal frames, elevator hoistway door frames, cast-in anchors, and structural framing. Examine for compliance with requirements for installation tolerances and other conditions affecting performance.

B. Examine panels before installation. Reject panels that are wet, moisture damaged, or mold damaged.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

2.08 PREPARATION

A. Sprayed Fire-Resistive Materials: Coordinate with gypsum board shaft wall assemblies so both elements of Work remain complete and undamaged. Patch or replace sprayed fire-resistive materials removed or damaged during installation of shaft wall assemblies to comply with requirements specified in Section 078100 "Applied Fireproofing."

B. After sprayed fire-resistive materials are applied, remove only to extent necessary for installation of gypsum board shaft wall assemblies and without reducing the fire-resistive material thickness below that which is required to obtain fire-resistance rating indicated. Protect remaining fire-resistive materials from damage.

2.09 INSTALLATION

A. General: Install gypsum board shaft wall assemblies to comply with requirements of fire-resistance-rated assemblies indicated, manufacturer's written installation instructions, and

ASTM C 754 other than stud-spacing requirements.

B. Do not bridge building expansion joints with shaft wall assemblies; frame both sides of expansion joints with furring and other support.

C. Install supplementary framing in gypsum board shaft wall assemblies around openings and as required for blocking, bracing, and support of gravity and pullout loads of fixtures, equipment, services, heavy trim, furnishings, wall-mounted door stops, and similar items that cannot be supported directly by shaft wall assembly framing.
   1. Elevator Hoistway: At elevator hoistway-entrance door frames, provide jamb struts on each side of door frame.
   2. Reinforcing: Where handrails directly attach to gypsum board shaft wall assemblies, provide galvanized steel reinforcing strip with 0.033-inch (0.84-mm) minimum thickness of base metal (uncoated), accurately positioned and secured behind at least one layer of face panel.

D. Penetrations: At penetrations in shaft wall, maintain fire-resistance rating of shaft wall assembly by installing supplementary steel framing around perimeter of penetration and fire protection behind boxes containing wiring devices, elevator call buttons, elevator floor indicators, and similar items.

E. Isolate perimeter of gypsum panels from building structure to prevent cracking of panels, while maintaining continuity of fire-rated construction.

F. Firestop Tracks: Where indicated, install to maintain continuity of fire-resistance-rated assembly indicated.

G. Control Joints: Install control joints [at locations indicated on Drawings] [according to ASTM C 840 and in specific locations approved by Architect] while maintaining fire-resistance rating of gypsum board shaft wall assemblies.

H. Sound-Rated Shaft Wall Assemblies: Seal gypsum board shaft walls with acoustical sealant at perimeter of each assembly where it abuts other work and at joints and penetrations within each assembly.

I. Cant Panels: At projections into shaft exceeding 4 inches (102 mm), install 1/2- or 5/8-inch- (13- or 16-mm-) thick gypsum board cants covering tops of projections.
   1. Slope cant panels at least 75 degrees from horizontal. Set base edge of panels in adhesive and secure top edges to shaft walls at 24 inches (610 mm) o.c. with screws fastened to shaft wall framing.
   2. Where steel framing is required to support gypsum board cants, install framing at 24 inches (610 mm) o.c. and extend studs from the projection to shaft wall framing.

J. Installation Tolerance: Install each framing member so fastening surfaces vary not more than 1/8 inch (3 mm) from the plane formed by faces of adjacent framing.

2.10 PROTECTION

A. Protect installed products from damage from weather, condensation, direct sunlight, construction, and other causes during remainder of the construction period.

B. Remove and replace panels that are wet, moisture damaged, or mold damaged.
   1. Indications that panels are wet or moisture damaged include, but are not limited to, discoloration, sagging, and irregular shape.
   2. Indications that panels are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration.

END OF SECTION 092116.23

SECTION 092900
GYPSUM BOARD

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes:
   1. Interior gypsum board.
   2. Tile backing panels.
   3. Texture finishes.

1.02 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Samples: For the following products:
   1. Trim Accessories: Full-size Sample in 12-inch- (300-mm-) long length for each trim accessory indicated.
   2. Textured Finishes: Manufacturer's standard size for each textured finish indicated and on same backing indicated for Work.

1.03 DELIVERY, STORAGE AND HANDLING

A. Store materials inside under cover and keep them dry and protected against weather, condensation, direct sunlight, construction traffic, and other potential causes of damage. Stack panels flat and supported on risers on a flat platform to prevent sagging.

1.04 FIELD CONDITIONS

A. Environmental Limitations: Comply with ASTM C 840 requirements or gypsum board manufacturer's written recommendations, whichever are more stringent.

B. Do not install paper-faced gypsum panels until installation areas are enclosed and conditioned.

C. Do not install panels that are wet, those that are moisture damaged, and those that are mold damaged.
   1. Indications that panels are wet or moisture damaged include, but are not limited to, discoloration, sagging, or irregular shape.
   2. Indications that panels are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration.

PART 2 PRODUCTS

2.01 PERFORMANCE REQUIREMENTS

A. Fire-Resistance-Rated Assemblies: For fire-resistance-rated assemblies, provide materials and construction identical to those tested in assembly indicated according to ASTM E 119 by an independent testing agency.

B. STC-Rated Assemblies: For STC-rated assemblies, provide materials and construction identical to those tested in assembly indicated according to ASTM E 90 and classified according to ASTM E 413 by an independent testing agency.

2.02 GYPSUM BOARD, GENERAL

A. Size: Provide maximum lengths and widths available that will minimize joints in each area and that correspond with support system indicated.

2.03 INTERIOR GYPSUM BOARD

A. Gypsum Wallboard: ASTM C 1396/C 1396M.
   1. Thickness: 1/2 inch (12.7 mm).
   2. Long Edges: Tapered.

B. Gypsum Board, Type X: ASTM C 1396/C 1396M.
   1. Thickness: 5/8 inch (15.9 mm).
   2. Long Edges: Tapered.

C. Gypsum Board, Type C: ASTM C 1396/C 1396M.
   1. Thickness: 5/8 inch (15.9 mm).
   2. Long Edges: Tapered.

D. Gypsum Ceiling Board: ASTM C 1396/C 1396M.
   1. Thickness: 5/8 inch (12.7 mm).
   2. Long Edges: Tapered.

E. Abuse-Resistant Gypsum Board: ASTM C 1629/C 1629M, Level 2.
   1. Core: 5/8 inch (15.9 mm), Type X.
   2. Long Edges: Tapered.
   3. Mold Resistance: ASTM D 3273, score of 10 as rated according to ASTM D 3274.

F. Moisture- and Mold-Resistant Gypsum Board: ASTM C 1396/C 1396M. With moisture- and mold-resistant core and paper surfaces.
   1. Core: 5/8 inch (15.9 mm), Type X.
   2. Long Edges: Tapered.
   3. Mold Resistance: ASTM D 3273, score of 10 as rated according to ASTM D 3274.

G. Gypsum-Based Sheathing
   1. Exterior rated

2.04 TILE BACKING PANELS

A. Cementitious Backer Units: ANSI A118.9 and ASTM C 1288 or 1325, with manufacturer's standard edges.
   1. Thickness: 5/8 inch (15.9 mm).
   2. Mold Resistance: ASTM D 3273, score of 10 as rated according to ASTM D 3274.

2.05 TRIM ACCESSORIES

A. Interior Trim: ASTM C 1047.
   1. Material: Galvanized or aluminum-coated steel sheet, rolled zinc, plastic, or paper-faced galvanized steel sheet.
   2. Shapes:
      a. Cornerbead.
      b. LC-Bead: J-shaped; exposed long flange receives joint compound.

2.06 JOINT TREATMENT MATERIALS

A. General: Comply with ASTM C 475/C 475M.

B. Joint Tape:
   1. Interior Gypsum Board: Paper.
   2. Tile Backing Panels: As recommended by panel manufacturer.

C. Joint Compound for Interior Gypsum Board: For each coat use formulation that is compatible with other compounds applied on previous or for successive coats.
   1. Prefilling: At open joints and damaged surface areas, use setting-type taping compound.
   2. Embedding and First Coat: For embedding tape and first coat on joints, fasteners, and trim flanges, use setting-type taping compound.
   3. Fill Coat: For second coat, use setting-type, sandable topping compound.
   4. Finish Coat: For third coat, use setting-type, sandable topping compound.

D. Joint Compound for Tile Backing Panels:
   1. Glass-Mat, Water-Resistant Backing Panel: As recommended by backing panel manufacturer.
   2. Cementitious Backer Units: As recommended by backer unit manufacturer.
   3. Water-Resistant Gypsum Backing Board: Use setting-type taping compound and setting-type, sandable topping compound.

2.07 AUXILIARY MATERIALS

A. General: Provide auxiliary materials that comply with referenced installation standards and manufacturer's written recommendations.

B. Steel Drill Screws: ASTM C 1002, unless otherwise indicated.

C. Sound Attenuation Blankets: ASTM C 665, Type I (blankets without membrane facing) produced by combining thermosetting resins with mineral fibers manufactured from glass, slag wool, or rock wool.
   1. Fire-Resistance-Rated Assemblies: Comply with mineral-fiber requirements of assembly.

D. Acoustical Joint Sealant: Manufacturer's standard nonsag, paintable, nonstaining latex sealant complying with ASTM C 834. Product effectively reduces airborne sound transmission through perimeter joints and openings in building construction as demonstrated by testing representative assemblies according to ASTM E 90.

2.08 TEXTURE FINISHES

A. Primer: As recommended by textured finish manufacturer.

B. Non-Aggregate Finish: Pre-mixed, vinyl texture finish for spray application.
   1. Texture: Orange Peel.

PART 3 EXECUTION

3.01 EXAMINATION

A. Examine areas and substrates including welded hollow-metal frames and framing, with Installer present, for compliance with requirements and other conditions affecting performance.

B. Examine panels before installation. Reject panels that are wet, moisture damaged, and mold damaged.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 APPLYING AND FINISHING PANELS, GENERAL

A. Comply with ASTM C 840.

B. Install ceiling panels across framing to minimize the number of abutting end joints and to avoid abutting end joints in central area of each ceiling. Stagger abutting end joints of adjacent panels not less than one framing member.

C. Install panels with face side out. Butt panels together for a light contact at edges and ends with not more than 1/16 inch (1.5 mm) of open space between panels. Do not force into place.

D. Locate edge and end joints over supports, except in ceiling applications where intermediate supports or gypsum board back-blocking is provided behind end joints. Do not place tapered edges against cut edges or ends. Stagger vertical joints on opposite sides of partitions. Do not make joints other than control joints at corners of framed openings.

E. Form control and expansion joints with space between edges of adjoining gypsum panels.

F. Cover both faces of support framing with gypsum panels in concealed spaces (above ceilings, etc.), except in chases braced internally.
   1. Unless concealed application is indicated or required for sound, fire, air, or smoke ratings, coverage may be accomplished with scraps of not less than 8 sq. ft. (0.7 sq. m) in area.
   2. Fit gypsum panels around ducts, pipes, and conduits.
   3. Where partitions intersect structural members projecting below underside of floor/roof slabs and decks, cut gypsum panels to fit profile formed by structural members; allow 1/4- to 3/8-inch- (6.4- to 9.5-mm-) wide joints to install sealant.

G. Isolate perimeter of gypsum board applied to non-load-bearing partitions at structural abutments, except floors. Provide 1/4- to 1/2-inch- (6.4- to 12.7-mm-) wide spaces at these locations and trim edges with edge trim where edges of panels are exposed. Seal joints between edges and abutting structural surfaces with acoustical sealant.

H. Wood Framing: Install gypsum panels over wood framing, with floating internal corner construction. Do not attach gypsum panels across the flat grain of wide-dimension lumber, including floor joists and headers. Float gypsum panels over these members or provide control joints to counteract wood shrinkage.

I. STC-Rated Assemblies: 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 C 919 and with manufacturer's written recommendations for locating edge trim and closing off sound-flanking paths around or through assemblies, including sealing partitions above acoustical ceilings.

J. Install sound attenuation blankets before installing gypsum panels unless blankets are readily installed after panels have been installed on one side.

3.03 APPLYING INTERIOR GYPSUM BOARD

A. Install interior gypsum board in the following locations:
   1. Wallboard Type: As indicated on Drawings.
   2. Type X: As indicated on Drawings.
   3. Ceiling Type: As indicated on Drawings.
   4. Abuse-Resistant Type: As indicated on Drawings.
   5. Moisture- and Mold-Resistant Type: As indicated on Drawings.

B. Single-Layer Application:
   1. On ceilings, apply gypsum panels before wall/partition board application to greatest extent possible and at right angles to framing unless otherwise indicated.
   2. On partitions/walls, apply gypsum panels vertically (parallel to framing) unless otherwise indicated or required by fire-resistance-rated assembly, and minimize end joints.
      a. Stagger abutting end joints not less than one framing member in alternate courses of panels.
      b. At stairwells and other high walls, install panels horizontally unless otherwise indicated or required by fire-resistance-rated assembly.
   3. On Z-furring members, apply gypsum panels vertically (parallel to framing) with no end joints. Locate edge joints over furring members.
   4. Fastening Methods: Apply gypsum panels to supports with steel drill screws.

C. Multilayer Application:
   1. On ceilings, apply gypsum board indicated for base layers before applying base layers on walls/partitions; apply face layers in same sequence. Apply base layers at right angles to framing members and offset face-layer joints one framing member, 16 inches (400 mm) minimum, from parallel base-layer joints, unless otherwise indicated or required by fire-resistance-rated assembly.
   2. On partitions/walls, apply gypsum board indicated for base layers and face layers vertically (parallel to framing) with joints of base layers located over stud or furring member and face-layer joints offset at least one stud or furring member with base-layer joints, unless otherwise indicated or required by fire-resistance-rated assembly. Stagger joints on opposite sides of partitions.
   3. On Z-furring members, apply base layer vertically (parallel to framing) and face layer either vertically (parallel to framing) or horizontally (perpendicular to framing) with vertical joints offset at least one furring member. Locate edge joints of base layer over furring members.
   4. Fastening Methods: Fasten base layers and face layers separately to supports with screws.

D. Curved Surfaces:
   1. Install panels horizontally (perpendicular to supports) and unbroken, to extent possible, across curved surface plus 12-inch- (300-mm-) long straight sections at ends of curves and tangent to them.

3.04 APPLYING TILE BACKING PANELS

A. Cementitious Backer Units: ANSI A108.11, at showers, tubs, and where indicated and locations indicated to receive tile.

B. Where tile backing panels abut other types of panels in same plane, shim surfaces to produce a uniform plane across panel surfaces.

3.05 INSTALLING TRIM ACCESSORIES

A. General: For trim with back flanges intended for fasteners, attach to framing with same fasteners used for panels. Otherwise, attach trim according to manufacturer's written instructions.

B. Interior Trim: Install in the following locations:
   1. Cornerbead: Use at outside corners.
   2. LC-Bead: Use at exposed panel edges.

3.06 FINISHING GYPSUM BOARD

A. General: Treat gypsum board joints, interior angles, edge trim, control joints, penetrations, fastener heads, surface defects, and elsewhere as required to prepare gypsum board surfaces for decoration. Promptly remove residual joint compound from adjacent surfaces.

B. Prefill open joints and damaged surface areas.

C. Apply joint tape over gypsum board joints, except for trim products specifically indicated as not intended to receive tape.

D. Gypsum Board Finish Levels: Finish panels to levels indicated below and according to ASTM C 840:
   1. Level 1: Ceiling plenum areas, concealed areas, and where indicated.
   2. Level 2: Panels that are substrate for tile.
   3. Level 4: At panel surfaces that will be exposed to view unless otherwise indicated.

E. Cementitious Backer Units: Finish according to manufacturer's written instructions.

3.07 APPLYING TEXTURE FINISHES

A. Surface Preparation and Primer: Prepare and apply primer to gypsum panels and other surfaces receiving texture finishes. Apply primer to surfaces that are clean, dry, and smooth.

B. Texture Finish Application: Mix and apply finish using powered spray equipment, to produce a uniform texture free of starved spots or other evidence of thin application or of application patterns.

C. Prevent texture finishes from coming into contact with surfaces not indicated to receive texture finish by covering them with masking agents, polyethylene film, or other means. If, despite these precautions, texture finishes contact these surfaces, immediately remove droppings and overspray to prevent damage according to texture-finish manufacturer's written recommendations.

3.08 PROTECTION

A. Protect adjacent surfaces from drywall compound and promptly remove from floors and other non-drywall surfaces. Repair surfaces stained, marred, or otherwise damaged during drywall application.

B. Protect installed products from damage from weather, condensation, direct sunlight, construction, and other causes during remainder of the construction period.

C. Remove and replace panels that are wet, moisture damaged, and mold damaged.
   1. Indications that panels are wet or moisture damaged include, but are not limited to, discoloration, sagging, or irregular shape.
   2. Indications that panels are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration.

END OF SECTION

SECTION 095113
ACOUSTICAL PANEL CEILINGS

PART 1 GENERAL

1.01 SUMMARY

A. Section includes acoustical panels and exposed suspension systems for ceilings.

1.02 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Samples for Verification: For each component indicated and for each exposed finish required, prepared on Samples of size indicated below.
   1. Acoustical Panel: Set of 6-inch- (150-mm-) square Samples of each type, color, pattern, and texture.

1.03 DELIVERY, STORAGE, AND HANDLING

A. Deliver acoustical panels, suspension-system components, and accessories to Project site in original, unopened packages and store them in a fully enclosed, conditioned space where they will be protected against damage from moisture, humidity, temperature extremes, direct sunlight, surface contamination, and other causes.

B. Before installing acoustical panels, permit them to reach room temperature and a stabilized moisture content.

C. Handle acoustical panels carefully to avoid chipping edges or damaging units in any way.

1.04 FIELD CONDITIONS

A. Environmental Limitations: Do not install acoustical panel ceilings until spaces are enclosed and weatherproof, wet work in spaces is complete and dry, work above ceilings is complete, and ambient temperature and humidity conditions are maintained at the levels indicated for Project when occupied for its intended use.

PART 2 PRODUCTS

2.01 PERFORMANCE REQUIREMENTS

A. Surface-Burning Characteristics: Comply with ASTM E 84; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
   1. Flame-Spread Index: Comply with ASTM E 1264 for Class A materials.
   2. Smoke-Developed Index: 50 or less.

B. Fire-Resistance Ratings: Comply with ASTM E 119; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
   1. Indicate design designations from UL's "Fire Resistance Directory" or from the listings of another qualified testing agency.

2.02 ACOUSTICAL PANELS, GENERAL

A. Source Limitations:
   1. Acoustical Ceiling Panel: Obtain each type from single source from single manufacturer.
   2. Suspension System: Obtain each type from single source from single manufacturer.

B. Glass-Fiber-Based Panels: Made with binder containing no urea formaldehyde.

C. Acoustical Panel Standard: Provide manufacturer's standard panels of configuration indicated that comply with ASTM E 1264 classifications as designated by types, patterns, acoustical ratings, and light reflectances unless otherwise indicated.
   1. Mounting Method for Measuring NRC: Type E-400; plenum mounting in which face of test specimen is 15-3/4 inches (400 mm) away from test surface according to ASTM E 795.

D. Acoustical Panel Colors and Patterns: Match appearance characteristics indicated for each product type.

1. Where appearance characteristics of acoustical panels are indicated by referencing pattern designations in ASTM E 1264 and not manufacturers' proprietary product designations, provide products selected by Architect from each manufacturer's full range that comply with requirements indicated for type, pattern, color, light reflectance, acoustical performance, edge detail, and size.

2.03 ACOUSTICAL PANELS

A. Basis-of-Design Product: USG - Mars Ceiling Tile

B. Classification: Provide panels complying with ASTM E 1264 for type, form, and pattern as follows:
   1. As scheduled in the drawings.

C. Color: White.

D. LR: Not less than 0.80.

E. NRC: Not less than 0.70.

F. CAC: Not less than 35 .

G. Edge/Joint Detail: Reveal sized to fit flange of exposed suspension-system members.

H. Thickness: 3/4 inch (19 mm).

I. Modular Size: 24 by 24 inches (610 by 610 mm).

2.04 METAL SUSPENSION SYSTEMS, GENERAL

A. Metal Suspension-System Standard: Provide manufacturer's standard direct-hung metal suspension systems of types, structural classifications, and finishes indicated that comply with applicable requirements in ASTM C 635/C 635M.

B. Attachment Devices: Size for five times the design load indicated in ASTM C 635/C 635M, Table 1, "Direct Hung," unless otherwise indicated. Comply with seismic design requirements.

C. Wire Hangers, Braces, and Ties: Provide wires complying with the following requirements:
   1. Zinc-Coated, Carbon-Steel Wire: ASTM A 641/A 641M, Class 1 zinc coating, soft temper.
   2. Size: Select wire diameter so its stress at three times hanger design load (ASTM C 635/C 635M, Table 1, "Direct Hung") will be less than yield stress of wire, but provide not less than 0.106-inch- (2.69-mm-) diameter wire.

D. Angle Hangers: Angles with legs not less than 7/8 inch (22 mm) wide; formed with 0.04-inch- (1-mm-) thick, galvanized-steel sheet complying with ASTM A 653/A 653M, G90 (Z275) coating designation; with bolted connections and 5/16-inch- (8-mm-) diameter bolts.

2.05 METAL SUSPENSION SYSTEM

A. Wide-Face, Capped, Double-Web, Steel Suspension System: Main and cross runners roll formed from cold-rolled steel sheet; prepainted, electrolytically zinc coated, or hot-dip galvanized according to ASTM A 653/A 653M, not less than G30 (Z90) coating designation; with prefinished 15/16-inch- (24-mm-) wide metal caps on flanges.
   1. Structural Classification: Intermediate-duty system.
   2. End Condition of Cross Runners: Override (stepped) or butt-edge type.
   3. Face Design: Flat, flush.
   4. Cap Material: Steel or aluminum cold-rolled sheet.
   5. Cap Finish: Painted white.

2.06 METAL EDGE MOLDINGS AND TRIM

A. Roll-Formed, Sheet-Metal Edge Moldings and Trim: Type and profile indicated or, if not indicated, manufacturer's standard moldings for edges and penetrations that comply with seismic design requirements; formed from sheet metal of same material, finish, and color as that used for exposed flanges of suspension-system runners.
   1. Provide manufacturer's standard edge moldings that fit acoustical panel edge details and suspension systems indicated and that match width and configuration of exposed runners

unless otherwise indicated.

2. For lay-in panels with reveal edge details, provide stepped edge molding that forms reveal of same depth and width as that formed between edge of panel and flange at exposed suspension member.
3. For circular penetrations of ceiling, provide edge moldings fabricated to diameter required to fit penetration exactly.

PART 3 EXECUTION

3.01 EXAMINATION

A. Examine substrates, areas, and conditions, including structural framing to which acoustical panel ceilings attach or abut, with Installer present, for compliance with requirements specified in this and other Sections that affect ceiling installation and anchorage and with requirements for installation tolerances and other conditions affecting performance of acoustical panel ceilings.

B. Examine acoustical panels before installation. Reject acoustical panels that are wet, moisture damaged, or mold damaged.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 PREPARATION

A. Measure each ceiling area and establish layout of acoustical panels to balance border widths at opposite edges of each ceiling. Avoid using less-than-half-width panels at borders, and comply with layout shown on reflected ceiling plans.

3.03 INSTALLATION

A. General: Install acoustical panel ceilings to comply with ASTM C 636/C 636M and seismic design requirements indicated, according to manufacturer's written instructions and CISCA's "Ceiling Systems Handbook."

B. Suspend ceiling hangers from building's structural members and as follows:
   1. Install hangers plumb and free from contact with insulation or other objects within ceiling plenum that are not part of supporting structure or of ceiling suspension system.
   2. Splay hangers only where required to miss obstructions; offset resulting horizontal forces by bracing, countersplaying, or other equally effective means.
   3. Where width of ducts and other construction within ceiling plenum produces hanger spacings that interfere with location of hangers at spacings required to support standard suspension-system members, install supplemental suspension members and hangers in form of trapezes or equivalent devices.
   4. Secure wire hangers to ceiling-suspension members and to supports above with a minimum of three tight turns. Connect hangers directly either to structures or to inserts, eye screws, or other devices that are secure and appropriate for substrate and that will not deteriorate or otherwise fail due to age, corrosion, or elevated temperatures.
   5. When steel framing does not permit installation of hanger wires at spacing required, install carrying channels or other supplemental support for attachment of hanger wires.
   6. Space hangers not more than 48 inches (1200 mm) o.c. along each member supported directly from hangers unless otherwise indicated; provide hangers not more than 8 inches (200 mm) from ends of each member.
   7. Size supplemental suspension members and hangers to support ceiling loads within performance limits established by referenced standards and publications.

C. Install edge moldings and trim of type indicated at perimeter of acoustical ceiling area and where necessary to conceal edges of acoustical panels.
   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 more than 16 inches (400 mm) o.c. and not more than 3 inches (75 mm) from ends, leveling with ceiling suspension system to a tolerance of 1/8 inch in 12 feet (3.2 mm in 3.6 m). Miter corners accurately and connect

securely.

3. Do not use exposed fasteners, including pop rivets, on moldings and trim.

D. Install suspension-system runners so they are square and securely interlocked with one another. Remove and replace dented, bent, or kinked members.

E. Install acoustical panels with undamaged edges and fit accurately into suspension-system runners and edge moldings. Scribe and cut panels at borders and penetrations to provide a neat, precise fit.

1. For reveal-edged panels on suspension-system runners, install panels with bottom of reveal in firm contact with top surface of runner flanges.
2. Paint cut edges of panel remaining exposed after installation; match color of exposed panel surfaces using coating recommended in writing for this purpose by acoustical panel manufacturer.
3. Protect lighting fixtures and air ducts to comply with requirements indicated for fire-resistance-rated assembly.

3.04 CLEANING

A. Clean exposed surfaces of acoustical panel ceilings, including trim, edge moldings, and suspension-system members. Comply with manufacturer's written instructions for cleaning and touchup of minor finish damage. Remove and replace ceiling components that cannot be successfully cleaned and repaired to permanently eliminate evidence of damage.

END OF SECTION

SECTION 096500
RESILIENT FLOORING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Resilient sheet flooring.

B. Resilient tile flooring.

C. Resilient base.

D. Resilient stair accessories.

E. Installation accessories.

1.02 REFERENCE STANDARDS

A. ASTM F1066 - Standard Specification for Vinyl Composition Floor Tile; 2004 (Reapproved 2018).

B. ASTM F1700 - Standard Specification for Solid Vinyl Floor Tile; 2013a.

C. ASTM F1861 - Standard Specification for Resilient Wall Base; 2016.

1.03 SUBMITTALS

A. Product Data: Provide data on specified products, describing physical and performance characteristics; including sizes, patterns and colors available; and installation instructions.

B. Verification Samples: Submit two samples, ___ by ___ inch in size illustrating color and pattern for each resilient flooring product specified.

1.04 FIELD CONDITIONS

A. Store materials for not less than 48 hours prior to installation in area of installation at a temperature of 70 degrees F to achieve temperature stability. Thereafter, maintain conditions above 55 degrees F.

PART 2 PRODUCTS

2.01 SHEET FLOORING

A. Vinyl Sheet Flooring: Homogeneous without backing, with color and pattern throughout full thickness.
   1. Manufacturer:
      a. Armstrong Flooring, Inc; Accolade Plus: www.armstrongflooring.com/#sle.
      b. Shannon Specialty Floors, Inc; TEKNOFLOR Medscapes HPD: www.shannonspecialtyfloors.com/#sle.
      c. Substitutions: See Section 016000 - Product Requirements.
   2. Thickness: .085 inch nominal.
   3. Sheet Width: 72 inch minimum.
   4. Seams: Chemically bonded using seam sealer.
   5. Color: To be selected by Architect from manufacturer's full range.

2.02 TILE FLOORING

A. Vinyl Composition Tile: Homogeneous, with color extending throughout thickness.
   1. Manufacturers:
      a. Armstrong Flooring, Inc; Excelon SDT: www.armstrongflooring.com/#sle.
      b. Johnsonite, a Tarkett Company; _____: www.johnsonite.com/#sle.
   2. Minimum Requirements: Comply with ASTM F1066, of Class corresponding to type specified.
   3. Size: 12 by 12 inch.
   4. Thickness: 0.125 inch.
   5. Color: To be selected by Architect from manufacturer's full range.

B. Luxury Vinyl Plank: See basis of design. .
   1. Manufacturers:
      a. Feather Lodge.
      b. Substitutions: See Section 016000 - Product Requirements.
   2. Minimum Requirements: Comply with ASTM F1700, of Class corresponding to type specified.
   3. Total Thickness: 0.125 inch.
   4. Color: To be selected by Architect from manufacturer's full range.

2.03 STAIR COVERING

A. Stair Treads: Rubber; full width and depth of stair tread in one piece; tapered thickness. See basis of design.
   1. Manufacturers:
      a. Johnsonite, : www.johnsonite.com/#sle.
      b. Substitutions: See Section 016000 - Product Requirements.
   2. Striping: 2 inch wide contrasting color abrasive strips.
   3. Color: To be selected by Architect from manufacturer's full range.

B. Stair Risers: Full height and width of tread in one piece, matching treads in material and color. See basis of design.
   1. Manufacturers:
      a. Johnsonite, a Tarkett Company: www.johnsonite.com/#sle.
      b. Substitutions: See Section 016000 - Product Requirements.

C. Stair Stringers: Full height in one piece and in maximum available lengths, matching treads in material and color.
   1. Manufacturers:
      a. Burke Flooring; Linear Series Stair Stringers: www.burkeflooring.com/#sle.
      b. Johnsonite, a Tarkett Company: www.johnsonite.com/#sle.
      c. Roppe Corp: www.roppe.com/#sle.
      d. Substitutions: See Section 016000 - Product Requirements.
   2. Nominal Thickness: 0.080 inch.

2.04 RESILIENT BASE

A. Resilient Base: ASTM F1861, Type TS rubber, vulcanized thermoset; style as scheduled. See basis of design.
   1. Manufacturers:
      a. Johnsonite, a Tarkett Company: www.johnsonite.com/#sle.
      b. Substitutions: See Section 016000 - Product Requirements.
   2. Height: 4 inch.
   3. Color: To be selected by Architect from manufacturer's full range.
   4. Accessories: Premolded external corners and internal corners.

2.05 ACCESSORIES

A. Subfloor Filler: White premix latex; type recommended by adhesive material manufacturer.

B. Primers, Adhesives, and Seam Sealer: Waterproof; types recommended by flooring manufacturer.

C. Moldings, Transition and Edge Strips: _____. See basis of design.

D. Sound Control Underlayment, See basis of design.
   1. Manufacturers:
      a. Hacker Firm Fill: SCM 125 Sound Mat.
      b. Substitutions: Section 016000 - Product Requirements.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that surfaces are flat to tolerances acceptable to flooring manufacturer, free of cracks that might telegraph through flooring, clean, dry, and free of curing compounds, surface hardeners, and other chemicals that might interfere with bonding of flooring to substrate.

3.02 PREPARATION

A. Prepare floor substrates as recommended by flooring and adhesive manufacturers.

B. Remove subfloor ridges and bumps. Fill minor low spots, cracks, joints, holes, and other defects with subfloor filler to achieve smooth, flat, hard surface.

C. Prohibit traffic until filler is fully cured.

3.03 INSTALLATION - GENERAL

A. Starting installation constitutes acceptance of sub-floor conditions.

B. Install in accordance with manufacturer's written instructions.

3.04 INSTALLATION - SOUND CONTROL UNDERLAYMENT

A. Install in accordance with underlayment manufacturer's instructions.

3.05 INSTALLATION - SHEET FLOORING

A. Lay flooring with joints and seams parallel to longer room dimensions, to produce minimum number of seams. Lay out seams to avoid widths less than 1/3 of roll width; match patterns at seams.

3.06 INSTALLATION - TILE FLOORING

A. Mix tile from container to ensure shade variations are consistent when tile is placed, unless otherwise indicated in manufacturer's installation instructions.

B. Install plank tile with a random offset of at least 6 inches from adjacent rows.

3.07 INSTALLATION - RESILIENT BASE

A. Fit joints tightly and make vertical. Maintain minimum dimension of 18 inches between joints.

B. Install base on solid backing. Bond tightly to wall and floor surfaces.

3.08 INSTALLATION - STAIR COVERINGS

A. Install stringers configured tightly to stair profile.

B. Adhere over entire surface. Fit accurately and securely.

3.09 CLEANING

A. Remove excess adhesive from floor, base, and wall surfaces without damage.

B. Clean in accordance with manufacturer's written instructions.

3.10 PROTECTION

A. Prohibit traffic on resilient flooring for 48 hours after installation.

END OF SECTION

SECTION 096513
RESILIENT WALL BASE AND ACCESSORIES

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes:
   1. Resilient base.
   2. Resilient molding accessories.

1.02 SUBMITTALS

A. Product Data: For each type of product indicated.

B. Environmental Submittals:
   1. For adhesives, including printed statement of VOC content.

C. Samples: For each type of product indicated, in manufacturer's standard-size samples, but not less than 12 inches long, of each resilient product color, texture, and pattern required.

1.03 QUALITY ASSURANCE

A. Fire-Test-Response Characteristics: As determined by testing identical products according to ASTM E 648 or NFPA 253 by a qualified testing agency.
   1. Critical Radiant Flux Classification: Class I, not less than 0.45 W/sq. cm.

1.04 PROJECT CONDITIONS

A. Maintain ambient temperatures within range recommended by manufacturer in spaces to receive resilient products.

B. Until Substantial Completion, maintain ambient temperatures within range recommended by manufacturer.

C. Install resilient products after other finishing operations, including painting, have been completed.

PART 2 PRODUCTS

2.01 RESILIENT BASE

A. Basis-of-Design Product: Subject to compliance with requirements, provide listed product or comparable product by one of the following:

2.02 RESILIENT MOLDING ACCESSORY

A. Resilient Molding Accessory:
   1. Manufacturers: Subject to compliance with requirements, provide products that coordinate with the base and stair materials provided.

B. Description: Carpet edge for glue-down applications, Reducer strip for resilient floor covering, Joiner for tile and carpet, transition strips.

C. Material: Vinyl.

D. Profile and Dimensions: As indicated.

E. Colors and Patterns: As selected by Architect from full range of industry colors.

2.03 INSTALLATION MATERIALS

A. Trowelable Leveling and Patching Compounds: Latex-modified, portland cement based or blended hydraulic-cement-based formulation provided or approved by manufacturer for applications indicated.

B. Adhesives: Water-resistant type recommended by manufacturer to suit resilient products and substrate conditions indicated.
   1. Use adhesives that comply with the following limits for VOC content when calculated according to 40 CFR 59, Subpart D (EPA Method 24):
      a. Cove Base Adhesives: Not more than 50 g/L.

PART 3 EXECUTION

3.01 PREPARATION

A. Prepare substrates according to manufacturer's written instructions to ensure adhesion of resilient products.

B. Fill cracks, holes, and depressions in substrates with trowelable leveling and patching compound and remove bumps and ridges to produce a uniform and smooth substrate.

C. Do not install resilient products until they are same temperature as the space where they are to be installed.
   1. Move resilient products and installation materials into spaces where they will be installed at least 48 hours in advance of installation.

D. Sweep and vacuum clean substrates to be covered by resilient products immediately before installation.

3.02 RESILIENT BASE INSTALLATION

A. Comply with manufacturer's written instructions for installing resilient base.

B. Apply resilient base to walls, columns, pilasters, casework and cabinets in toe spaces, and other permanent fixtures in rooms and areas where base is required.

C. Install resilient base in lengths as long as practicable without gaps at seams and with tops of adjacent pieces aligned.

D. Tightly adhere resilient base to substrate throughout length of each piece, with base in continuous contact with horizontal and vertical substrates.

E. Do not stretch resilient base during installation.

3.03 RESILIENT ACCESSORY INSTALLATION

A. Comply with manufacturer's written instructions for installing resilient accessories.

B. Resilient Molding Accessories: Butt to adjacent materials and tightly adhere to substrates throughout length of each piece. Install reducer strips at edges of carpet, or resilient floor covering that would otherwise be exposed.

3.04 CLEANING AND PROTECTION

A. Comply with manufacturer's written instructions for cleaning and protection of resilient products.

B. Cover resilient products until Substantial Completion.

END OF SECTION 096513

SECTION 096813
TILE CARPETING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Carpet tile, fully adhered.

1.02 SUBMITTALS

A. Product Data: Provide data on specified products, describing physical and performance characteristics; sizes, patterns, colors available, and method of installation.

B. Samples: Submit two carpet tiles illustrating color for each carpet color selected.

1.03 FIELD CONDITIONS

A. Store materials in area of installation for minimum period of 24 hours prior to installation.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Tile Carpeting, see basis of design.
   1. Mohawk Group; Framed Structure Tile.
   2. J & J
   3. Substitutions: See Section 016000 - Product Requirements.

2.02 ACCESSORIES

A. Carpet Tile Adhesive: Recommended by carpet tile manufacturer; releasable type.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that sub-floor surfaces are smooth and flat within tolerances specified for that type of work and are ready to receive carpet tile.

B. Verify that sub-floor surfaces are dust-free and free of substances that could impair bonding of adhesive materials to sub-floor surfaces.

3.02 INSTALLATION

A. Starting installation constitutes acceptance of sub-floor conditions.

B. Install carpet tile in accordance with manufacturer's instructions.

C. Blend carpet from different cartons to ensure minimal variation in color match.

D. Cut carpet tile clean. Fit carpet tight to intersection with vertical surfaces without gaps.

E. Lay carpet tile in brick ashlar pattern pattern, with pile direction parallel to next unit, set parallel to building lines.

F. Fully adhere carpet tile to substrate.

G. Trim carpet tile neatly at walls and around interruptions.

H. Complete installation of edge strips, concealing exposed edges.

3.03 CLEANING

A. Remove excess adhesive without damage, from floor, base, and wall surfaces.

B. Clean and vacuum carpet surfaces.

END OF SECTION

SECTION 099123
INTERIOR PAINTING

PART 1 GENERAL

1.01 SUMMARY

A. Section includes surface preparation and the application of paint systems on the following interior substrates:
   1. Steel.
   2. Galvanized metal.
   3. Wood.
   4. Gypsum board.

1.02 ACTION SUBMITTALS

A. Product Data: For each type of product. Include preparation requirements and application instructions.

B. Samples for Verification: For each type of paint system and in each color and gloss of topcoat.
   1. Submit Samples on rigid backing, 8 inches (200 mm) square.
   2. Step coats on Samples to show each coat required for system.
   3. Label each coat of each Sample.
   4. Label each Sample for location and application area.

1.03 DELIVERY, STORAGE, AND HANDLING

A. Store materials not in use in tightly covered containers in well-ventilated areas with ambient temperatures continuously maintained at not less than 45 deg F (7 deg C).
   1. Maintain containers in clean condition, free of foreign materials and residue.
   2. Remove rags and waste from storage areas daily.

1.04 FIELD CONDITIONS

A. Apply paints only when temperature of surfaces to be painted and ambient air temperatures are between 50 and 95 deg F (10 and 35 deg C).

B. Do not apply paints when relative humidity exceeds 85 percent; at temperatures less than 5 deg F (3 deg C) above the dew point; or to damp or wet surfaces.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by the following:
   1. Sherwin-Williams Company (The).

2.02 PAINT, GENERAL

A. Material Compatibility:
   1. Provide materials for use within each paint system that are compatible with one another and substrates indicated, under conditions of service and application as demonstrated by manufacturer, based on testing and field experience.
   2. For each coat in a paint system, provide products recommended in writing by manufacturers of topcoat for use in paint system and on substrate indicated.

B. VOC Content: Products shall comply with VOC limits of authorities having jurisdiction and, for interior paints and coatings applied at Project site, the following VOC limits, exclusive of colorants added to a tint base, when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
   1. Flat Paints and Coatings: 50 g/L.
   2. Nonflat Paints and Coatings: 150 g/L.
   3. Dry-Fog Coatings: 400 g/L.
   4. Primers, Sealers, and Undercoaters: 200 g/L.
   5. Anticorrosive and Antirust Paints Applied to Ferrous Metals: 250 g/L.

6. Zinc-Rich Industrial Maintenance Primers: 340 g/L.
7. Pretreatment Wash Primers: 420 g/L.
8. Floor Coatings: 100 g/L.
9. Shellacs, Clear: 730 g/L.
10. Shellacs, Pigmented: 550 g/L.

C. Colors: As indicated in a finish schedule.
1. 20 percent of surface area will be painted with deep tones.

2.03 PRIMERS/SEALERS

A. Primer Sealer, Latex, Interior: MPI #50.

B. Wood-Knot Sealer: Sealer recommended in writing by topcoat manufacturer for use in paint systems indicated.

2.04 METAL PRIMERS

A. Primer, Rust-Inhibitive, Water Based: MPI #107.

2.05 WATER-BASED PAINTS

A. Latex, Flat, see basis of design.
1. Sherwin Williams Solo, 100% Acrylic Interior/Exterior Latex Paint

B. Latex, Eggshell, see basis of design.
1. Sherwin Williams Solo, 100% Acrylic Interior/Exterior Latex Paint

C. Latex, Semi-Gloss, see basis of design.
1. Sherwin Williams Solo, 100% Acrylic Interior/Exterior Latex Paint

D. Latex, Satin, see basis of design.
1. Sherwin Williams Solo, 100% Acrylic Interior/Exterior Latex Paint

PART 3 EXECUTION

3.01 EXAMINATION

A. Examine substrates and conditions, with Applicator present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work.

B. Maximum Moisture Content of Substrates: When measured with an electronic moisture meter as follows:
1. Wood: 15 percent.
2. Gypsum Board: 12 percent.

C. Gypsum Board Substrates: Verify that finishing compound is sanded smooth.

D. Verify suitability of substrates, including surface conditions and compatibility with existing finishes and primers.

E. Proceed with coating application only after unsatisfactory conditions have been corrected.
1. Application of coating indicates acceptance of surfaces and conditions.

3.02 PREPARATION

A. Comply with manufacturer's written instructions applicable to substrates indicated.

B. Remove hardware, covers, plates, and similar items already in place that are removable and are not to be painted. If removal is impractical or impossible because of size or weight of item, provide surface-applied protection before surface preparation and painting.
1. After completing painting operations, use workers skilled in the trades involved to reinstall items that were removed. Remove surface-applied protection if any.

C. Clean substrates of substances that could impair bond of paints, including dust, dirt, oil, grease, and incompatible paints and encapsulants.
1. Remove incompatible primers and reprime substrate with compatible primers or apply tie coat as required to produce paint systems indicated.

D. Steel Substrates: Remove rust, loose mill scale, and shop primer, if any. Clean using methods recommended in writing by paint manufacturer.

E. Shop-Primed Steel Substrates: Clean field welds, bolted connections, and abraded areas of shop paint, and paint exposed areas with the same material as used for shop priming to comply with SSPC-PA 1 for touching up shop-primed surfaces.

F. Galvanized-Metal Substrates: Remove grease and oil residue from galvanized sheet metal fabricated from coil stock by mechanical methods to produce clean, lightly etched surfaces that promote adhesion of subsequently applied paints.

G. Wood Substrates:
   1. Scrape and clean knots, and apply coat of knot sealer before applying primer.
   2. Sand surfaces that will be exposed to view, and dust off.
   3. Prime edges, ends, faces, undersides, and backsides of wood.
   4. After priming, fill holes and imperfections in the finish surfaces with putty or plastic wood filler. Sand smooth when dried.

3.03 APPLICATION

A. Apply paints according to manufacturer's written instructions.
   1. Use applicators and techniques suited for paint and substrate indicated.
   2. Paint surfaces behind movable equipment and furniture same as similar exposed surfaces. Before final installation, paint surfaces behind permanently fixed equipment or furniture with prime coat only.
   3. Paint front and backsides of access panels, removable or hinged covers, and similar hinged items to match exposed surfaces.
   4. Do not paint over labels of independent testing agencies or equipment name, identification, performance rating, or nomenclature plates.
   5. Primers specified in painting schedules may be omitted on items that are factory primed or factory finished if acceptable to topcoat manufacturers.

B. Tint each undercoat a lighter shade to facilitate identification of each coat if multiple coats of same material are to be applied. Tint undercoats to match color of topcoat, but provide sufficient difference in shade of undercoats to distinguish each separate coat.

C. If undercoats or other conditions show through topcoat, apply additional coats until cured film has a uniform paint finish, color, and appearance.

D. Apply paints to produce surface films without cloudiness, spotting, holidays, laps, brush marks, roller tracking, runs, sags, ropiness, or other surface imperfections. Cut in sharp lines and color breaks.

E. Paint portions of internal surfaces of metal ducts, without liner, behind air inlets and outlets that are visible from occupied spaces.

3.04 CLEANING AND PROTECTION

A. At end of each workday, remove rubbish, empty cans, rags, and other discarded materials from Project site.

B. After completing paint application, clean spattered surfaces. Remove spattered paints by washing, scraping, or other methods. Do not scratch or damage adjacent finished surfaces.

C. Protect work of other trades against damage from paint application. Correct damage to work of other trades by cleaning, repairing, replacing, and refinishing, as approved by Architect, and leave in an undamaged condition.

D. At completion of construction activities of other trades, touch up and restore damaged or defaced painted surfaces.

END OF SECTION

SECTION 101400
SIGNAGE

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Room and door signs.

1.02 REFERENCE STANDARDS

A. 36 CFR 1191 - Americans with Disabilities Act (ADA) Accessibility Guidelines for Buildings and Facilities; Architectural Barriers Act (ABA) Accessibility Guidelines; current edition.

B. ADA Standards - Americans with Disabilities Act (ADA) Standards for Accessible Design; 2010.

C. ICC A117.1 - Accessible and Usable Buildings and Facilities; 2017.

1.03 SUBMITTALS

A. Product Data: Manufacturer's printed product literature for each type of sign, indicating sign styles, font, foreground and background colors, locations, overall dimensions of each sign.

B. Selection Samples: Where colors are not specified, submit two sets of color selection charts or chips.

1.04 FIELD CONDITIONS

A. Do not install tape adhesive when ambient temperature is lower than recommended by manufacturer.

B. Maintain this minimum temperature during and after installation of signs.

PART 2 PRODUCTS

2.01 SIGNAGE APPLICATIONS

A. Accessibility Compliance: Signs are required to comply with ADA Standards and ICC A117.1 and applicable building codes, unless otherwise indicated; in the event of conflicting requirements, comply with the most comprehensive and specific requirements.

B. Room and Door Signs: Provide a sign for every doorway, whether it has a door or not, not including corridors, lobbies, and similar open areas.
   1. Sign Type: Flat signs with engraved panel media as specified.
   2. Provide "tactile" signage, with letters raised minimum 1/32 inch and Grade II braille.
   3. Character Height: 1 inch.
   4. Sign Height: 2 inches, unless otherwise indicated.
   5. Office Doors: Identify with the room numbers indicated on drawings.
   6. Unit Doors: Identify with the room numbers indicated on drawings[<>].
   7. Service Rooms: Identify with the room names and numbers indicated on drawings.
   8. Rest Rooms: Identify with pictograms, the names "MEN" and "WOMEN", and braille.

2.02 SIGN TYPES

A. Flat Signs: Signage media without frame.
   1. Edges: Square.
   2. Corners: Square.
   3. Wall Mounting of One-Sided Signs: Tape adhesive.

B. Color and Font: Unless otherwise indicated:
   1. Character Font: Helvetica, Arial, or other sans serif font.
   2. Character Case: Upper case only.
   3. Background Color: _____.
   4. Character Color: Contrasting color.

2.03 TACTILE SIGNAGE MEDIA

A. Engraved Panels: Laminated colored plastic; engraved through face to expose core as background color:
   1. Total Thickness: 1/16 inch.

PART 3 EXECUTION

3.01 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Install neatly, with horizontal edges level.

C. Locate signs and mount at heights indicated on drawings and in accordance with ADA Standards and ICC A117.1.

D. Protect from damage until Substantial Completion; repair or replace damaged items.

END OF SECTION

SECTION 104400
FIRE PROTECTION SPECIALTIES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Fire extinguishers.

B. Fire extinguisher cabinets.

C. Accessories.

1.02 SUBMITTALS

A. Product Data: Provide extinguisher operational features, extinguisher ratings and classifications, color and finish, anchorage details, and installation instructions.

PART 2 PRODUCTS

2.01 FIRE EXTINGUISHERS

A. Fire Extinguishers - General: Comply with product requirements of NFPA 10 and applicable codes, whichever is more stringent.

B. Multipurpose Dry Chemical Type Fire Extinguishers: Carbon steel tank, with pressure gauge.
   1. Class: A:B:C type.
   2. Size: 10 pound.
   3. Finish: Baked polyester powder coat, color as selected.

2.02 FIRE EXTINGUISHER CABINETS

A. Fire Rating: Listed and labeled in accordance with ASTM E814 requirements for fire resistance rating of walls where being installed.

B. Fire Rated Cabinet Construction: One-hour fire rated.

C. Cabinet Configuration: Semi-recessed type.
   1. Size to accommodate accessories.
   2. Projected Trim: Returned to wall surface, with [4] inch projection.

D. Door: 0.036 inch metal thickness, reinforced for flatness and rigidity with nylon catch. Hinge doors for 180 degree opening with continuous piano hinge.

E. Door Glazing: Tempered glass, clear, 1/8 inch thick, and set in resilient channel glazing gasket.

F. Cabinet Mounting Hardware: Appropriate to cabinet, with pre-drilled holes for placement of anchors.

G. Weld, fill, and grind components smooth.

H. Finish of Cabinet Exterior Trim and Door: Baked enamel, color as selected.

I. Finish of Cabinet Interior: White colored enamel.

2.03 ACCESSORIES

A. Lettering: FIRE EXTINGUISHER decal, or vinyl self-adhering, pre-spaced black lettering in accordance with authorities having jurisdiction (AHJ).

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify existing conditions before starting work.

B. Verify rough openings for cabinet are correctly sized and located.

3.02 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Install cabinets plumb and level in wall openings, ____ inches from finished floor to inside bottom of cabinet.

C. Secure rigidly in place.

D. Place extinguishers in cabinets.

END OF SECTION

SECTION 105500
POSTAL SPECIALTIES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Central mail delivery boxes.

1.02 RELATED REQUIREMENTS

A. Section 033000 - Cast-in-Place Concrete: Concrete pedestal and anchor bolts for mail box.

B. Section 055000 - Metal Fabrications: Fabricated metal pedestal and anchor bolts for mail box.

1.03 REFERENCE STANDARDS

A. 36 CFR 1191 - Americans with Disabilities Act (ADA) Accessibility Guidelines for Buildings and Facilities; Architectural Barriers Act (ABA) Accessibility Guidelines; current edition.

B. 39 CFR 111 - U.S. Postal Service Standard 4C; Current Edition.

C. ADA Standards - Americans with Disabilities Act (ADA) Standards for Accessible Design; 2010.

1.04 SUBMITTALS

A. See Section 013000 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide manufacturer's specifications and descriptive literature, installation instructions, maintenance information, and current USPS approval documentation.

C. Shop Drawings: Indicate plans for each unit or groups of units, front elevations with compartment layout and model number, overall dimensions, rough-in opening sizes, construction and anchorage details.

D. Samples: Submit two sets of manufacturer's available colors.

1.05 WARRANTY

A. See Section 017800 - Closeout Submittals, for additional warranty requirements.

B. Provide manufacturer's warranty against defects in materials or workmanship for a period of 5 years from Date of Substantial Completion.

PART 2 PRODUCTS

2.01 CENTRAL MAIL DELIVERY BOXES

A. Manufacturers see basis of design:
   1. Salsbury Industries: www.mailboxes.com/#sle.
   2. Substitutions: See Section 016000 - Product Requirements.

B. Central Mail Delivery Boxes: Provide products approved for United States Postal Service (USPS) delivery.
   1. Materials: Aluminum with stainless steel hardware.
   2. Finish: Powder coat in color selected by Architect from manufacturer's standard colors.
   3. Unit Types and Sizes: As indicated on drawings.
   4. Configurations: See drawings for overall dimensions and layouts.

2.02 COMPONENTS

A. Locking - Front Loading Master Door: Three-point latching mechanism with USPS master lock furnished and installed by postmaster.

B. Locking - Customer Compartment Doors: USPS approved cam lock, 3 keys each lock.

C. Locking - Parcel Compartment Doors: Double-lock arrangement with USPS approved cam lock for customer access, and USPS master lock furnished and installed by postmaster.

D. Identification - Customer and Parcel Compartments: Sequential numerical or alphabetic characters, top to bottom, left to right; factory-installed.
   1. Engraved characters, 3/4 inch high, with black fill.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that concrete base and anchor bolts are ready to receive pedestal-mounted units.

B. Verify that rough-openings are ready to receive wall-mounted units.

C. Do not begin installation until unacceptable conditions are corrected.

3.02 INSTALLATION

A. Install postal specialties in accordance with approved shop drawings, manufacturer's instructions, and USPS requirements.

B. Adjust and lubricate door hardware to operate properly.

END OF SECTION

SECTION 105550
KEY KEEPER ENTRY SPECIALTIES

PART 1 GENERAL

1.01 WORK INCLUDED

A. Provide Knox box in location shown on the drawings.
   1. Fire Department-approved key keeper entry box.

B. Related Sections:
   1. Division 04 Masonry.

1.02 SUBMITTALS

A. Product Data: For each type of product indicated. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for each type of postal specialty.

B. Shop Drawings: For entry specialties. Include plans, elevations, sections, details, and attachments to other work.
   1. Include setting drawings, templates, and installation instructions for anchor bolts and other anchorages installed as part of the work of other Sections.

C. Samples for Initial Selection: For units with factory-applied color finishes.

1.03 DELIVERY, STORAGE, AND HANDLING

A. Coordinate installation of lock with Fire Department.

1.04 WARRANTY

A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of postal specialties which fail in materials or workmanship within specified warranty period.
   1. Failures include, but are not limited to, the following:
      a. Structural failures.
      b. Faulty operation of hardware.
      c. Deterioration of metals, metal finishes, and other materials beyond normal weathering.
   2. Warranty Period: Five years from date of Substantial Completion.

PART 2 PRODUCTS

2.01 KEY KEEPER RAPID ENTRY SYSTEM (KNOX BOX ON DRAWINGS): CONSISTING OF SINGLE COMPARTMENT WITH DOOR; INTERIOR COMPARTMENT SIZE NOT LESS THAN 4 INCHES HIGH BY 5 INCHES WIDE X 3 INCHES DEEP OR AS APPROVED BY LOCAL FIRE DEPARTMENT.

A. Manufacturers: Subject to compliance with requirements, provide products by the following:
   1. Knox Company.
   2. Mounting: Recessed.
   3. Style: Compartment door with recessed Knox Vault and recessed mounting kit, no exposed frame.
   4. Type of Operation: Per local Fire Department.
   5. Door Lock: Door prepared to receive lock furnished by local Fire Department.
   6. UL Tamper Switch: not required.
   7. Exposed Materials: Fabricated from extruded or sheet steel.
      a. Baked-Enamel or Powder-Coated Finish: Color as selected by Architect from manufacturer's full range.

PART 3 EXECUTION

3.01 INSTALLATION

A. All mailboxes in accordance with local Fire Department regulations and manufacturer's instructions. Verify said regulations prior to ordering mailboxes.

3.02 FIELD QUALITY CONTROL

A. Arrange for local Fire Department personnel to examine and test entry specialties after they have been installed according to their regulations.

B. Obtain written final approval of entry specialties to be served by local Fire Department.

3.03 ADJUSTING, CLEANING, AND PROTECTION

A. Remove temporary protective coverings and strippable films, if any, as entry specialties are installed unless otherwise indicated in manufacturer's written installation instructions.

B. Adjust doors, hardware, and moving parts to function smoothly, and lubricate as recommended by manufacturer. Verify that integral locking devices operate properly.

C. Touch-up marred finishes or replace entry specialties that cannot be restored to factory-finished appearance. Use only materials and procedures recommended or furnished by entry specialty manufacturer.

D. Replace entry specialties that have been damaged or have deteriorated beyond successful repair by finish touchup or similar minor repair procedures.

E. On completion of entry specialty installation, clean interior and exterior surfaces as recommended by manufacturer.

3.04 DEMONSTRATION

A. Engage local Fire Department representative to train Owner's maintenance personnel to adjust, operate, and maintain entry specialties.

END OF SECTION 105500.13

SECTION 107313
AWNINGS

PART 1 - GENERAL

SUMMARY

2.01 SECTION INCLUDES:

A. Building supported metal awnings including framing, enclosure, and attachment hardware.
   1. Related Sections:
      a. Division 01: Administrative, procedural, and temporary work requirements.

B. REFERENCES
   1. American Society of Civil Engineers (ASCE) 7 - Minimum Design Loads for Buildings and Other Structures.
   2. ASTM International (ASTM)
      a. B221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes.
      b. B429 - Standard Specification for Aluminum-Alloy Extruded Pipe and Tube.

C. SYSTEM DESCRIPTION
   1. Design Requirements: Design awning system to withstand:
      a. Standards for wind pressure, snow load, and drifting snow load in accordance with current adopted form of the Uniform Construction code or accepted requirements of local municipality.

D. SUBMITTALS
   1. Submittals for Review:
      a. Shop Drawings: Indicate system components, dimensions, attachments, and accessories.
      b. Samples:
         1) 3 x 3 inch coating samples in specified color.
         2) 6 inch decking/ siding samples showing profile and finish.

E. QUALITY ASSURANCE
   1. Installer Qualifications: Minimum 5 years experience in installation of MASA products.

PART 2 - PRODUCTS

MANUFACTURER

4.01 CONTRACT DOCUMENTS ARE BASED ON: EXTRUDECK

A. MASA Architectural Canopies 21 Randolph Ave.
   1. Avenel, NJ 07001
   2. 800-761-7446
   3. www.architecturalcanopies.com.
   4. Acceptable alternates: per requirements of Division 1.

B. MATERIALS
   1. Aluminum Extrusions:
      a. ASTM B221& ASTM B429 6061-T6 alloy and temper.
   2. Hardware:
      a. All fasteners shall be stainless steel or hot dip galvanized for corrosion resistance.

C. ACCESSORIES
   1. Anchors and Fasteners: Stainless steel or hot dip galvanized and corrosion resistant

D. FABRICATION
   1. Fabricate canopy system in accordance with approved Shop Drawings.

E. FINISHES
   1. Aluminum Framing:

a. Color: (color) to be selected by architect from EXTRUDECK color range

PART 3 - EXECUTION

FIELD DIMENSIONS

6.01 FIELD VERIFY DIMENSIONS OF SUPPORTING STRUCTURE AND ANY OPENINGS AT SITE OF INSTALLATION PRIOR TO FABRICATION.

A. INSTALLATION
1. Install in accordance with manufacturer's instructions and approved Shop Drawings.
2. Install components plumb and level, in proper plane, free from warp and twist.
3. Anchor system to building components; provide adequate clearance for movement caused by thermal expansion and contraction and wind loads.

B. ADJUSTING
1. Touch up minor scratches and abrasions on finished surfaces to match original finish.

END OF SECTION

SECTION 108213
EXTERIOR GRILLES AND SCREENS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Exterior aluminum grilles and screens attached to structure.

1.02 RELATED REQUIREMENTS

A. Section 051200 - Structural Steel Framing: Mounting substrates.

1.03 REFERENCE STANDARDS

A. AAMA 611 - Voluntary Specification for Anodized Architectural Aluminum; 2014 (2015 Errata).

B. AAMA 612 - Voluntary Specification, Performance Requirements, and Test Procedures for Combined Coatings of Anodic Oxide and Transparent Organic Coatings on Architectural Aluminum; 2017a.

C. AAMA 2604 - Voluntary Specification, Performance Requirements and Test Procedures for High Performance Organic Coatings on Aluminum Extrusions and Panels (with Coil Coating Appendix); 2017a.

D. AAMA 2605 - Voluntary Specification, Performance Requirements and Test Procedures for Superior Performing Organic Coatings on Aluminum Extrusions and Panels (with Coil Coating Appendix); 2017a.

E. ASTM A276/A276M - Standard Specification for Stainless Steel Bars and Shapes; 2017.

F. ASTM A307 - Standard Specification for Carbon Steel Bolts, Studs, and Threaded Rod 60 000 PSI Tensile Strength; 2014 (Editorial 2017).

G. ASTM A792/A792M - Standard Specification for Steel Sheet, 55% Aluminum-Zinc Alloy-Coated by the Hot-Dip Process; 2010 (Reapproved 2015).

H. ASTM B209/B209M - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate; 2021a.

I. ASTM B221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes; 2014.

J. ASTM B221M - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes (Metric); 2013.

K. ASTM D635 - Standard Test Method for Rate of Burning and/or Extent and Time of Burning of Plastics in a Horizontal Position; 2014.

L. ASTM D1187/D1187M - Standard Specification for Asphalt-Base Emulsions for Use as Protective Coatings for Metal; 1997 (Reapproved 2018).

M. ASTM D1929 - Standard Test Method for Determining Ignition Temperature of Plastics; 2016.

N. ASTM D2843 - Standard Test Method for Density of Smoke from the Burning or Decomposition of Plastics; 2022.

O. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2018.

P. ASTM F593 - Standard Specification for Stainless Steel Bolts, Hex Cap Screws, and Studs; 2022.

Q. NFPA 268 - Standard Test Method for Determining Ignitability of Exterior Wall Assemblies Using a Radiant Heat Energy Source; 2022.

R. NFPA 285 - Standard Fire Test Method for Evaluation of Fire Propagation Characteristics of Exterior Non-Load-Bearing Wall Assemblies Containing Combustible Components; 2012.

S. NFPA 701 - Standard Methods of Fire Tests for Flame Propagation of Textiles and Films; 2023, with Errata.

1.04 SUBMITTALS

A. See Section 013000 - Administrative Requirements, for submittal procedures.

B. Shop Drawings: Submit detailed shop drawings, indicating component profiles, sections, finishes, fastening details, special details, and manufacturer's technical and descriptive data.

C. Samples: Submit samples for color verification, 10 inches by 10 inches minimum.

D. Design Data: Submit comprehensive structural analysis of design for the specified loads. Stamp and sign calculations by professional engineer.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials to project site in manufacturer's original, unopened packaging, with labels clearly identifying manufacturer and material.

B. Store materials indoors, protected from moisture, humidity, and extreme temperature fluctuations.

1.06 WARRANTY

A. See Section 017800 - Closeout Submittals, for additional warranty requirements.

B. Correct defective work within a one year period after Date of Substantial Completion.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Exterior Aluminum Grilles and Screens:
1. Architectural Grilles & Sunshades, Inc: www.agsshade.com/#sle.
2. Construction Specialties, Inc: www.c-sgroup.com/#sle.
3. DAMS Incorporated: www.damsinc.com/#sle.
4. Industrial Louvers, Inc: www.industriallouvers.com/#sle.
5. Metalwerks: www.metalwerksusa.com/#sle.
6. Nelson Industrial, Inc: www.nelsonii.com/arch/#sle.
7. Patriot Custom Metals DBA PalmSHIELD: www.palmshieldlouvers.com/#sle.
8. Ruskin Company: www.ruskin.com/#sle.
9. _____.
10. Substitutions: See Section 016000 - Product Requirements.

2.02 SCREENS

A. Aluminum Screens: Provide shop fabricated, shop finished screens assembled into panels.
1. Panel Size and Configuration: As indicated on drawings.
2. Frame/Support: Extruded aluminum tube or flat aluminum bar.

2.03 FABRICATION

A. Shop fabricate grilles and screens to the greatest extent possible.

B. Disassemble as necessary for shipping and handling, clearly mark units for proper reassembly.

C. Provide supports, anchorages, and accessories as required for complete assembled system.

D. Provide inserts as required for installation into concrete or masonry based support materials.

2.04 FINISHES

A. Finish Color: As selected by Architect from manufacturer's standard color range.

2.05 ACCESSORIES

A. Fasteners: ASTM F593 stainless steel or ASTM A307 carbon steel, sizes to suit installation conditions.

B. Anchors and Inserts: Corrosion resistant; type, size, and material required for loading and installation as indicated.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify dimensions, tolerances, and method of attachment with other work.

B. Verify that painting, roofing, masonry work, and other adjacent work that might damage grille finish have been completed prior to start of installation.

C. Verify that anchorage devices have been properly installed and located.

3.02 INSTALLATION

A. Install in accordance with manufacturer's written installation instructions.

B. Set grilles level, plumb, with uniform joints, and in alignment with adjacent work as indicated.

C. Mechanically secure grilles to supporting structure.

D. Do not cut or trim aluminum members without approval of manufacturer; do not install damaged members.

3.03 CLEANING

A. Clean finished surfaces as recommended by manufacturer and maintain clean condition until Date of Substantial Completion.

B. Touch-up damaged finish coating using material provided by manufacturer to match original coating.

3.04 PROTECTION

A. Protect installed grilles to ensure grilles are without damage until Date of Substantial Completion.

END OF SECTION

SECTION 124813
ENTRANCE FLOOR MATS AND FRAMES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Carpet mat.

B. Recessed mat frames.

1.02 SUBMITTALS

A. See Section 013000 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide data indicating properties of walk-off surface, component dimensions and recessed frame characteristics.

C. Shop Drawings: Indicate dimensions and details for recessed frame.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Floor Mats:
   1. Activar Construction Products Group - JL Industries; _____: www.activarcpg.com/#sle.
   2. American Floor Products Company, Inc; _____: www.afco-usa.com/#sle.
   3. Babcock-Davis; _____: www.babcockdavis.com/#sle.
   4. Construction Specialties, Inc; Entrance Mats: www.c-sgroup.com/#sle.
   5. Nystrom, Inc; MATrac: www.nystrom.com/#sle.
   6. R.C. Musson Rubber Co; _____: www.mussonrubber.com/#sle.
   7. Pawling Corporation; _____: www.pawling.com/#sle.
   8. Reese Enterprises, Inc; _____: www.reeseusa.com/#sle.

2.02 MATS

A. Carpet Mat: Cut nylon pile permanently bonded to rubber backing:
   1. Color: As selected by Architect.
   2. Size and locations as shown on drawings.
      a. Recessed Frame: 1/4 inch thick zinc exposed top strip, zinc coated steel concealed bottom strip, Coordinate with recess in slab and mat. inch deep, with anchoring features.

2.03 FABRICATION

A. Construct recessed mat frames square, tight joints at corners, rigid. Coat surfaces with protective coating where in contact with cementitious materials.

B. Fabricate mats in single unit sizes; fabricate multiple mats where indicated on drawings.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that floor opening for mats are ready to receive work.

3.02 PREPARATION

A. Mats: Verify size of floor recess before fabricating mats.

B. Vacuum clean floor recess.

3.03 INSTALLATION

A. Install frames to achieve flush plane with finished floor surface.

B. Install walk-off surface in floor recess flush with finish floor after cleaning of finish flooring.

3.04 TOLERANCES

A. Maximum Gap Formed at Recessed Frame From Mat Size: 1/4 inch.

END OF SECTION

SECTION 129313
BICYCLE RACKS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Indoor bicycle racks.

B. Indoor bicycle accessories.

1.02 REFERENCE STANDARDS

A. ASTM A36/A36M - Standard Specification for Carbon Structural Steel; 2014.

B. ASTM A53/A53M - Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless; 2018.

C. ICC-ES AC308 - Acceptance Criteria for Post-Installed Adhesive Anchors in Concrete Elements; 2023.

1.03 SUBMITTALS

A. See Section 013000 - Administrative Requirements, for submittal procedures.

B. Product Data: Manufacturer's data sheets on each product to be used, including:
   1. Preparation instructions and recommendations.
   2. Storage and handling requirements and recommendations.
   3. Installation methods.

C. Shop Drawings: Indicate size, shape, and dimensions, including clearances from adjacent walls, doors, and obstructions.

D. Selection Samples: For each finish product specified, color chips representing manufacturer's full range of available colors and patterns.

1.04 DELIVERY, STORAGE, AND HANDLING

A. Store products in manufacturer's unopened packaging until ready for installation.

B. Handle racks and accessories with sufficient care to prevent scratches and other damage to the finish.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Indoor Bicycle Racks:
   1. Bike Security Racks Company, Inc: www.bikeracks.com/#sle.
   2. CycleSafe, Inc: www.cyclesafe.com/#sle.
   3. Highland Products Group, LLC: www.theparkcatalog.com/#sle.
   4. Saris Infrastructure; Vertical Bike Rack: www.sarisinfrastructure.com/#sle.

B. Indoor Bicycle Accessories:
   1. Saris Infrastructure; Deluxe Public Work Stand: www.sarisinfrastructure.com/#sle.
   2. Saris Infrastructure; Electric Public Bike Pump (Guaged): www.sarisinfrastructure.com/#sle.
   3. Substitutions: See Section 016000 - Product Requirements.

2.02 BICYCLE RACKS AND ACCESSORIES

A. Indoor Bicycle Racks: Device designed for indoor storage of bicycles; allows user-provided lock to simultaneously secure one wheel and part of the frame on each bicycle parked or racked.
   1. Style: Indoor, wall mounted, single level, vertical, single-sided storage rack with fixed arms and locking loops.
   2. Finish: Satin brushed.
   3. Color: As selected by Architect from manufacturer's standard range.

B. Indoor Bicycle Accessories:
   1. Public Work Stand: Floor-mounted bicycle work stand with 9 bicycle specific tools secured with fixed stainless steel cables.
      a. Finish: Galvanized steel.
   2. Public Tool Box: Wall-mounted housing with 9 bicycle specific tools secured with stainless steel cables.
   3. Manual Bike Pump: Floor-mounted powder-coated steel manual bike pump with solid stainless steel piston rod, alloy handle, and braided steel wire core rubber hose with dual pump head (Presta/Schrader).
      a. Hose Length: 18 inches.
   4. Color: As selected by Architect from manufacturer's standard range.

PART 3 EXECUTION

3.01 EXAMINATION

A. Examine surfaces to receive bicycle racks and accessories..

B. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

C. Do not begin installation until unsatisfactory substrates have been properly repaired.

D. Confirm that the required facility services have been provided and correctly installed before proceeding with installation of accessories.

3.02 PREPARATION

A. Ensure surfaces to receive bicycle racks and accessories are clean, flat, and level.

3.03 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Install bicycle racks and accessories level, plumb, square, and correctly located as indicated on drawings.

C. Coordinate installation of accessories with plumbing and electrical work by other trades.

D. Post-Installed Anchors: Comply with ICC-ES AC308.

3.04 CLEANING

A. Clean installed work to like-new condition. Do not use cleaning materials or methods that could damage finish.

3.05 PROTECTION

A. Protect installed products until completion of project.

B. Touch-up, repair or replace damaged products before Date of Substantial Completion.

END OF SECTION

SECTION 142100
ELECTRIC TRACTION ELEVATORS

PART 1 GENERAL

1.01 REFERENCE STANDARDS

A. ADA Standards - Americans with Disabilities Act (ADA) Standards for Accessible Design; 2010.

B. AISC 360 - Specification for Structural Steel Buildings; 2016.

C. ASME A17.1 - Safety Code for Elevators and Escalators; 2016.

D. ASME A17.2 - Guide for Inspection of Elevators, Escalators, and Moving Walks Includes Inspection Procedures for Electric Traction and Winding Drum Elevators, Hydraulic Elevators, Inclined Elevators, Limited-Use/Limited-Application Elevators, Private Residence Elevators, Escalators, Moving Walks, and Dumbwaiters; 2020.

E. ASME QEI-1 - Standard for the Qualification of Elevator Inspectors; 2018.

F. AWS D1.1/D1.1M - Structural Welding Code - Steel; 2015, with Errata (2016).

G. ITS (DIR) - Directory of Listed Products; current edition.

H. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

I. NFPA 80 - Standard for Fire Doors and Other Opening Protectives; 2019.

J. UL (DIR) - Online Certifications Directory; Current Edition.

1.02 ADMINISTRATIVE REQUIREMENTS

A. Coordination:
   1. Coordinate work with other installers to provide necessary conduits for proper installation of wiring, including but not limited to, the following:
      a. Elevator equipment devices remote from elevator machine room or hoistway.
      b. Telephone service for machine room.
      c. Elevator pit for lighting and sump pump.
      d. Automatic transfer switch from controller cabinet.
      e. Fire alarm panel from controller cabinet.

B. Preinstallation Meeting: Convene meeting at least one week prior to start of this work.
   1. Review schedule of installation, proper procedures and conditions, and coordination with related work.
   2. Review use of elevator for construction purposes, hours of use, scheduling of use, cleanliness of car, employment of operator, and maintenance of system.

1.03 SUBMITTALS

A. See Section 013000 - Administrative Requirements for submittal procedures.

B. Product Data: Submit data on following items:
   1. Signal and operating fixtures, operating panels, and indicators.
   2. Car design, dimensions, layout, and components.
   3. Car and hoistway door and frame details.
   4. Electrical characteristics and connection requirements.

C. Shop Drawings: Include appropriate plans, elevations, sections, diagrams, and details on following items:
   1. Elevator Equipment and Machines: Size and location of driving machines, power units, controllers, governors, and other components.
   2. Hoistway Components: Size and location of car machine beams, guide rails, buffers, ropes, and other components.
   3. Rail bracket spacing; maximum loads imposed on guide rails requiring load transfer to building structural framing.

4. Clearances and over-travel of car and counterweight.
5. Locations in hoistway and machine room of traveling cables and connections for car lighting, telephone, and _____.
6. Location and sizes of hoistway and car doors and frames.
7. Electrical characteristics and connection requirements.
8. Indicate arrangement of elevator equipment and allow for clear passage of equipment through access openings.

D. Samples: Submit samples illustrating car floor material, car interior finishes, car and hoistway door and frame finishes, and handrail material and finish in the form of cut sheets or finish color selection brochures.

E. Warranty Documentation: Submit manufacturer warranty and ensure that forms have been completed in Owner's name and registered with manufacturer.

F. Initial Maintenance Contract.

G. Maintenance Contract: Submit proposal to Owner for standard one year continuing maintenance contract agreement in accordance with ASME A17.1 and requirements as indicated, starting on date initial maintenance contract is scheduled to expire.
1. Indicate in proposal the services, obligations, conditions, and terms for agreement period and for renewal options.

H. Operation and Maintenance Data:
1. Parts catalog with complete list of equipment replacement parts; identify each entry with equipment description and identifying code.
2. Operation and maintenance manual.
3. Schematic drawings of equipment, and wiring diagrams of installed electrical equipment with list of corresponding symbols to identify markings on machine room and hoistway apparatus.

1.04 QUALITY ASSURANCE

A. Maintain one copy of each quality standard document on site.

B. Testing Agency Qualifications: Independent firm specializing in performing testing and inspections of type specified in this section.

C. Products Requiring Fire Resistance Rating: Listed and classified by ITS (DIR), UL (DIR), or testing agency acceptable to authorities having jurisdiction.

D. Products Requiring Electrical Connection: Listed and classified by UL (DIR) or testing agency acceptable to authorities having jurisdiction as suitable for the purpose indicated in construction documents.

1.05 WARRANTY

A. See Section 017800 - Closeout Submittals for additional warranty requirements.

B. Provide manufacturer's warranty for elevator operating equipment and devices for one year from Date of Substantial Completion.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Electric Traction Elevators:
1. Schindler Elevator Corporation; Schindler 3100: www.us.schindler.com/#sle.

B. Substitutions: See Section 016000 - Product Requirements.

2.02 ELECTRIC TRACTION ELEVATORS

A. Electric Traction Passenger Elevator: See basis of design.
1. Electric Traction Elevator Equipment:
a. Gearless Traction Machine: Single wrapped traction driving sheave, with dual brake.
2. Operation Control Type:

a. Selective Collective Automatic Operation Control.

3. Service Control Type:
   a. Standard service control only.
4. Interior Car Height: 93 inch.
5. Electrical Power: 480 volts; alternating current (AC); three phase; 60 Hz.
6. Rated Net Capacity: 3500 pounds.
7. Rated Speed: 100 feet per minute.
8. Hoistway Size: As indicated on drawings.
9. Elevator Pit Depth: Per Manufacturer.
10. Overhead Clearance at Top Floor: Per Manufacturer.
11. Travel Distance: As indicated on drawings.
12. Number of Stops: As indicated on drawings.
13. Number of Openings: 3 Front.

2.03 COMPONENTS

A. Elevator Equipment:
   1. Motors, Controllers, Controls, Buttons, Wiring, Devices, and Indicators: Comply with NFPA 70 requirements, and see Section 260583 for additional information.
   2. Guide Rails, Cables, Counterweights, Sheaves, Buffers, Attachment Brackets and Anchors: Design criteria for components includes safety factors in accordance with applicable requirements of Elevator Code, ASME A17.1.
   3. Buffers:
   4. Lubrication Equipment:
      a. Provide grease fittings for periodic lubrication of bearings.
      b. Grease Cups: Automatic feed type.
      c. Lubrication Points: Visible and easily accessible.

2.04 PERFORMANCE REQUIREMENTS

A. Regulatory Requirements: Comply with ASME A17.1, applicable local codes, and authorities having jurisdiction (AHJ).

B. Accessibility Requirements: Comply with ADA Standards.

C. Perform structural steel design, fabrication, and installation in accordance with AISC 360.

D. Perform welding of steel in accordance with AWS D1.1/D1.1M.

E. Fabricate and install door and frame assemblies in accordance with NFPA 80 and complying with requirements of authorities having jurisdiction (AHJ).

F. Perform electrical work in accordance with NFPA 70.

2.05 OPERATION CONTROLS

A. Elevator Controls: Provide landing operating panels and landing indicator panels.
   1. Landing Operating Panels: Metallic type, one for originating "Up" and one for originating "Down" calls, one button only at terminating landings; with illuminating indicators.
   2. Landing Indicator Panels: Illuminating.
   3. Comply with ADA Standards for elevator controls.

B. Interconnect elevator control system with building security, fire alarm, card access, smoke alarm, and building management control systems.

C. Door Operation Controls:
   1. Program door control to open doors automatically when car arrives at floor landing.
   2. Render "Door Close" button inoperative when car is standing at dispatch landing with doors open.
   3. Door Safety Devices: Moveable, retractable safety edges, quiet in operation; equipped with photo-electric light rays.

2.06 OPERATION CONTROL TYPE

A. Single Automatic (Push Button) Operation Control: Applies to car in single elevator shaft.
   1. Refer to description provided in ASME A17.1.
   2. Set system operation so that momentary pressure of landing button dispatches car from other landing to that landing.
   3. Allow call registered by momentary pressure of landing button at any time to remain registered until car stops in response to that landing call.
   4. If elevator car door is not opened within predetermined period of time after car has stopped at terminal landing allow car to respond to call registered from other landing.

B. Selective Collective Automatic Operation Control: Applies to car in single elevator shaft.
   1. Refer to description provided in ASME A17.1.
   2. Automatic operation by means of one button in the car for each landing served and by "UP" and "DOWN" buttons at the landings.
   3. Stops are registered by momentary actuation of landing car buttons without consideration of the number of buttons actuated or the sequence buttons are actuated, but the stops are made in the order that landings are reached in each direction of travel.
   4. All "UP" landing calls are made when car is traveling in the up direction.
   5. All "DOWN" landing calls are made when car is traveling in the down direction.
   6. Uppermost and lowermost calls are answered as soon as they are reached without consideration of the car travel direction.

2.07 MATERIALS

2.08 CAR AND HOISTWAY ENTRANCES

A. Elevator, No. 1: See basis of design.
   1. Car and Hoistway Entrances, Main Elevator Lobby:
   2. Provide smoke control curtain per drawings and building code.

2.09 CAR EQUIPMENT AND MATERIALS

A. Elevator Car, No. 1: See basis of design.

2.10 FINISHES

A. As selected by Architect.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify existing conditions before starting this work.

B. Verify that hoistway, pit, machine room, and _____ are ready for work of this section.

C. Verify hoistway shaft and openings are of correct size and within tolerance.

D. Verify location and size of machine foundation and position of machine foundation bolts.

E. Verify that electrical power is available and of correct characteristics.

3.02 PREPARATION

A. Arrange for temporary electrical power for installation work and testing of elevator components. See Section 015000 - Temporary Facilities and Controls for additional requirements.

B. Maintain elevator pit excavation free of water.

3.03 INSTALLATION

A. Coordinate this work with installation of hoistway wall construction.

B. Install system components, and connect equipment to building utilities.

C. Provide conduit, electrical boxes, wiring, and accessories; see Sections 260533.13 and 260583.

D. Mount machines and motors on vibration and acoustic isolators.

1. Place on structural supports and bearing plates.
2. Securely fasten to building supports.
3. Prevent lateral displacement.

E. Install hoistway, elevator equipment, and components in accordance with approved shop drawings.

F. Install guide rails to allow for expansion and contraction movement of guide rails.

G. Accurately machine and align guide rails, forming smooth joints with machined splice plates.

H. Install hoistway door sills, frames, and headers in hoistway walls; grout sills in place, set hoistway floor entrances in alignment with car openings, and align plumb with hoistway.

I. Structural Metal Surfaces: Clean surfaces of rust, oil or grease; wipe clean with solvent; prime with two coats.

J. Wood Surfaces not Exposed to Public View: Finish with one coat primer; one coat enamel.

K. Adjust equipment for smooth and quiet operation.

3.04 FIELD QUALITY CONTROL

A. See Section 014000 - Quality Requirements for additional requirements.

B. Testing and inspection by regulatory agencies certified in accordance with ASME QEI 1 will be performed at their discretion.
1. Schedule tests with agencies and notify Owner and Architect.
2. Obtain permits as required to perform tests.
3. Document regulatory agency tests and inspections in accordance with requirements.
4. Perform tests required by regulatory agencies.
5. Furnish test and approval certificates issued by authorities having jurisdiction (AHJ).

C. Perform testing and inspection in accordance with requirements.
1. Inspectors shall be certified in accordance with ASME QEI-1.
2. Perform tests in accordance with ASME A17.2.
3. Provide at least two weeks written notice of date and time of tests and inspections.
4. Supply instruments and execute specific tests.

3.05 ADJUSTING

A. Adjust for smooth acceleration and deceleration of car to minimize passenger discomfort.

B. Adjust with automatic floor leveling feature at each floor landing to reach 1/4 inch maximum from flush with sill.

3.06 CLEANING

A. See Section 017000 - Execution and Closeout Requirements for additional requirements.

B. Remove protective coverings from finished surfaces.

C. Clean surfaces and components in accordance with manufacturers written instructions.

3.07 CLOSEOUT ACTIVITIES

A. Demonstrate proper operation of equipment to Owner's designated representative.

B. Demonstration: Demonstrate operation of system to Owner's personnel.
1. Use operation and maintenance data as reference during demonstration.
2. Briefly describe function, operation, cleaning and maintenance of each component.

C. Training: Train Owner's personnel on cleaning and operation and maintenance of system.
1. Use operation and maintenance manual as training reference, supplemented with additional training materials as required.
2. Provide minimum of two hours of training.

3.08 PROTECTION

A. Do not permit construction traffic within car after cleaning.

B. Protect installed products until Date of Substantial Completion.

C. Touch-up, repair, or replace damaged products and materials before Date of Substantial Completion.

3.09 MAINTENANCE

A. Include systematic examination, adjustment, and lubrication of elevator equipment.

B. Perform work without removing cars from use during peak traffic periods.

END OF SECTION

SECTION 312113
RADON MITIGATION

PART 1 GENERAL

1.01 SUMMARY

A. Provide all work necessary to reduce and maintain radon concentration levels below 4.0 PicoCuries per liter (pCi/L) in various buildings specified herein. Perform pre-mitigation diagnostic testing and analysis, provide mitigation system design and installation, and perform post-mitigation testing and monitoring for radon.

1.02 REFERENCES

A. The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.
   1. ACI INTERNATIONAL (ACI)
      a. ACI 301(2005; Errata 2008) Specifications for Structural Concrete
   2. AIR MOVEMENT AND CONTROL ASSOCIATION INTERNATIONAL (AMCA)
      a. AMCA 210(2007) Laboratory Methods of Testing Fans for Aerodynamic Performance Rating
   3. ASTM INTERNATIONAL (ASTM)
      a. ASTM B 209(2007) Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate
      b. ASTM B 209M(2007) Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate (Metric)
      c. ASTM C 1002(2007) Standard Specification for Steel Self-Piercing Tapping Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Wood Studs or Steel Studs
      d. ASTM C 1047(2010) Standard Specification for Accessories for Gypsum Wallboard and Gypsum Veneer Base
      e. ASTM C 36/C 36M(2003e1) Gypsum Wallboard
      f. ASTM C 475/C 475M(2002; R 2007) Joint Compound and Joint Tape for Finishing Gypsum Board
      g. ASTM C 514(2004; R 2009e1) Standard Specification for Nails for the Application of Gypsum Board
      h. ASTM C 645(2009a) Nonstructural Steel Framing Members
      i. ASTM C 834(2010) Latex Sealants
      j. ASTM C 840(2008) Application and Finishing of Gypsum Board
      k. ASTM C 920(2010) Standard Specification for Elastomeric Joint Sealants
      l. ASTM D 2665(2009) Standard Specification for Poly(Vinyl Chloride) (PVC) Plastic Drain, Waste, and Vent Pipe and Fittings
   4. GYPSUM ASSOCIATION (GA)
      a. GA 216(2010) Application and Finishing of Gypsum Panel Products
   5. INTERNATIONAL CODE COUNCIL (ICC)
      a. ICC IMC(2009) International Mechanical Code
      b. ICC UMC(1997; Errata 2 & 3 1997) Uniform Mechanical Code
   6. NATIONAL ELECTRICAL MANUFACTURERS ASSOCIATION (NEMA)
      a. NEMA MG 1(2009) Motors and Generators
   7. NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)
      a. NFPA 70(2011) National Electrical Code
   8. NORTHEASTERN LUMBER MANUFACTURERS ASSOCIATION (NELMA)
      a. NELMA Grading Rules(2006) Standard Grading Rules for Northeastern Lumber
   9. SHEET METAL AND AIR CONDITIONING CONTRACTORS' NATIONAL ASSOCIATION (SMACNA)
      a. SMACNA 1378(1995) Thermoplastic Duct (PVC) Construction Manual, 2nd Edition
   10. SOUTHERN PINE INSPECTION BUREAU (SPIB)

a. SPIB 1003(2002) Standard Grading Rules for Southern Pine Lumber

11. U.S. ENVIRONMENTAL PROTECTION AGENCY (EPA)
    a. EPA 402-R-92-004(1992) Indoor Radon and Radon Decay Product Measurement Device Protocols
    b. EPA 402-R-92-014(1993) Radon Measurement in Schools
    c. EPA 402-R-93-003(1993) Protocols for Radon and Radon Decay Product Measurements in Homes
    d. EPA 402-R-93-078(1993; R 1994) Radon Mitigation Standards
    e. EPA 625-R-92-016(1993; Am 1994) Radon Prevention in Design and Construction of Schools and Other Large Buildings
    f. EPA 625-R-93-011(1993) Radon Reduction Technique for Existing Detached Houses: Technical Guidance for Active Soil Depressurization Systems
12. U.S. GENERAL SERVICES ADMINISTRATION (GSA)
    a. CID A-A-2246(Rev B) paint, Latex
    b. FS TT-P-650(Rev D) Primer Coating, Latex Base, Interior, White (for Gypsum Wallboard, or Plaster)
13. WEST COAST LUMBER INSPECTION BUREAU (WCLIB)
    a. WCLIB 17(2000) Standard Grading Rules
14. WESTERN WOOD PRODUCTS ASSOCIATION (WWPA)
    a. WWPA G-5(1998) Western Lumber Grading Rules

1.03 DEFINITIONS

A. Design
   1. Contractor responsibility.

B. Design Drawings
   1. Documentation showing in graphic and quantitative form the extent, design, arrangement, location, relationships, and dimensions of the construction to be provided by the Contractor.

C. Designer
   1. USEPA RCP listed mitigation contractor associated with the Contractor who is responsible for the design and has the qualifications and experience specified.

D. Contract Documents
   1. Documents furnished to prospective bidders/proposers containing information and specifying criteria and project requirements for diagnostic testing, design, construction and monitoring of multiple radon mitigation systems. The documents include this specification and the drawings listed in and accompanying this specification.

E. Long Term Radon Detectors
   1. Alpha track, electretion chamber, or approved equivalent. Devices capable of sensing and recording the presences of radon during a time period of 91 days to 12 months which when analyzed provide a numeric value, measured in pCi/L, for radon concentrations during the time exposed.

F. Short Term Radon Detectors
   1. Charcoal, electretion chamber, or approved equivalent. Devices capable of sensing and recording the presences of radon during a time period of 48 hours to 90 days which when analyzed provide a numeric value, measured in pCi/L, for radon concentrations during the time exposed.

G. Suction Hole
   1. Location at which vacuum is created for sub-slab communication testing.

H. Suction Point
   1. Vertical standpipe penetrating into the soil gas environment containing radon and serving as the conduit to exhaust radon gas to the atmosphere.

I. Test Hole

1. Location at which pressure readings are taken during sub-slab communication testing. Readings are used to evaluate potential effectiveness of a sub-slab depressurization system.

1.04 SYSTEM DESCRIPTION AND REQUIREMENTS

A. Performance Requirements
   1. Radon mitigation systems shall reduce and maintain radon concentration levels below 4.0 pCi/L in various buildings specified herein. Test, design and construct radon mitigation systems in accordance with EPA 402-R-93-078, EPA 402-R-93-003, and EPA 402-R-92-004 and as specified herein. Additional guidance for testing, designing and constructing radon mitigation systems is contained in EPA 625-R-92-016 and EPA 625-R-93-011.

B. Criteria for Diagnostic Testing and Suction Points
   1. Test locations, suction point locations, pipe sizes, number of fans and discharge points to the building exterior, routing of the radon mitigation systems piping, provision of associated enclosures, and all other work necessary to achieve the desired results specified are the Contractor's responsibility and shall be based on the requirements and restrictions, if any, specified herein.

1.05 SUBMITTALS

A. Shop Drawings
   1. Radon mitigation
   2. Radon mitigation systems enclosures

B. Product Data
   1. Radon mitigation systems components
   2. Radon mitigation systems enclosure components
   3. Radon diagnostic testing devices

C. Design Data
   1. Radon mitigation systems design narrative

D. Test Reports
   1. Pre-mitigation testing
   2. Post mitigation testing

E. Certificates
   1. Contractor qualifications
   2. Contractor experience
   3. Worker protection plan

F. Manufacturer's Instructions
   1. Radon mitigation systems components
   2. Radon mitigation systems enclosure components

G. Operation and Maintenance Data
   1. Radon Mitigation Systems, Data Package 2

H. Closeout Submittals
   1. Radon Detector Location Log
   2. Testing laboratory certification
   3. Proof of current calibration for testing devices

1.06 DESIGN REQUIREMENTS

A. Prepare designs in accordance with the requirements of EPA 402-R-93-078 except that when the contract specification requirements are more stringent, the contract specification shall take precedence. The Contractor shall:
   1. Prepare design drawings and assemble and provide product data for construction of multiple radon mitigation systems;
   2. Prepare design narrative supporting the design shown;

3. Coordinate all elements of the design to ensure there are no conflicts;
4. For each building, present information 100 percent complete in a single submission and in sufficient detail to permit a complete review by the Architect. The Architect's review is to check the design for conformance with the requirements contained in the contract documents. Design review shall not be construed as a waiver from performing requirements contained in the contract which may have been omitted from the Contractor prepared design documents.
5. Provide three copies of the complete design documents.

B. Design Drawing Requirements
1. Prepare, organize, and present drawings in the format considered standard industry practice for radon mitigation work and as described herein. Provide drawings complete, accurate and explicit enough to show compliance with the contract requirements and to permit construction. Drawings illustrating systems proposed to meet the requirements of the contract specification shall reflect proper detailing for each system to assure appropriate use, proper fit, compatibility of components and coordination with the design narrative and the contract specification. Coordinate drawings to ensure there are no conflicts between design disciplines and between drawings and the contract specification. Each Contractor prepared drawing shall bear the certification number and signature of the RCP listed individual responsible for the work portrayed on that drawing and proposed to meet the contract requirements.
   a. Radon Mitigation Systems(Format and Content)
      1) On copies of the building floor plans, locate and identify each diagnostic test performed using alpha numeric designations. Prepare a separate drawing for each type of diagnostic test performed in each building. Provide grab sample (GS) data. Provide sub-slab communication (SSC) test data on. Provide short term detector (STD) data on copies of the "Device Placement Log" contained in EPA 402-R-92-014.
      2) On copies of the building floor plans, show suction point(s) and routing of the radon mitigation system(s) piping to the building exterior. Indicate pipe size, length of piping in the network, number and nature of flow obstructions, such as fittings, and fan characteristics for each system. Supplement the floor plan information with additional drawings keyed to each floor plan location showing riser diagrams, utility connections and routing, component installations, elevations, sections and details of the radon mitigation system(s). Also, provide construction and installation details such as supporting systems, attachment methods and surface penetration and sealing methods.
      3) Drawings shall not be smaller than A4 - 8 1/2 by 11 inch.
   b. Radon Mitigation Systems Enclosures(Format and Content)
      1) Prepare drawings not smaller than A4 - 8 1/2 by 11 inch portraying the proposed method for enclosing each radon mitigation system in occupied spaces. All spaces shall be considered to be occupied spaces except for mechanical and electrical rooms, warehouses, storerooms, janitor closets, crawl spaces, and attic spaces. Enclosures are not required for portions of systems installed above suspended acoustical ceilings.
      2) Drawings shall indicate methods and materials to be used in constructing the enclosures and accesses for all operating components. Drawings showing typical enclosures and installations are acceptable (i.e. corner installation, mid-wall installation, etc.).

C. Design Narrative
1. Format
   a. The design narrative shall include a cover page indicating the project title, location, construction contract number and preparer, a table of contents and tabbed or colored page separations for quick reference. Submit design narrative prepared on A4 - 8 1/2 by 11 inch white paper. The design narrative shall be bound in one volume.

2. Content
   a. The design narrative shall include a basis of design and calculations. Specific requirements relative to the technical content to be provided are specified in this specification section. The design narrative shall be a presentation of facts to demonstrate that the project requirements are fully understood and that the design is based on sound engineering. The design narrative shall include and address the following:
      1) Executive summary.
      2) Scope of work.
      3) Building description.
      4) Diagnostic testing performed and results of the testing (include Attachments C and D and the Device Placement Logs for the short-term detectors).
      5) Diagnostic test devices and equipment used.
      6) Locations where readings were recorded (include floor plans).
      7) Suspected or confirmed entry points of radon into the buildings (narrative or show on floor plans).
      8) Potential problems which may be caused by active (fan-powered) radon mitigation systems, if any.
      9) Conclusions and recommendations.
      10) Radon mitigation method chosen to reduce radon concentrations levels below 4.0 pCi/L and reasons for choosing the method.
      11) Data and calculations to verify negative pressure exists throughout the soil gas environment containing radon sufficient to exhaust the soil gas to the atmosphere under all weather and building operating conditions.
      12) Statement of compliance with applicable laws, ordinances, criteria, rules, and regulations of Federal, State, regional and local authorities regarding radon mitigation.
      13) Appendices (to include design drawings, forms and logs, laboratory analysis sheets, etc.).

D. Design Review and Approval
   1. The design will be reviewed by the Architect prior to start of construction. The Architect's review is to check the design for conformance with the contract requirements. Design review does not relieve the Contractor of the responsibility of meeting the requirements of the contract and providing radon mitigation systems which, while active, reduce and maintain radon concentration levels below 4.0 pCi/L. The design of the radon mitigation systems and enclosures shall be approved prior to submission of construction submittals for the materials to be used in the construction of the systems and enclosures.

1.07 RADON DETECTOR LOCATION LOG

A. Prepare and provide to the Owner a Radon Detector Location Log for each building detailing the identity and location of each short-term radon detector. Prepare the log using copies of the "Device Placement Log" contained in EPA 402-R-92-014 and provide the appropriate information as line items. In addition to the log, on a copy of the building floor plans, locate and identify each short-term detector.

1.08 WORKER HEALTH AND SAFETY

A. Provide in accordance with EPA 402-R-93-078. Prepare a worker protection plan in accordance with EPA 402-R-93-078.

1.09 QUALITY ASSURANCE

A. Contractor Qualifications and Experience
   1. Within 15 days after award, submit written evidence or data demonstrating that the Contractor and/or one or more subcontractors employed by the Contractor possess the qualifications and experience specified below.

B. Contractor Qualifications

1. The person responsible for diagnostic testing, design, construction and on-site supervision, as required by the specifications, shall have successfully completed the requirements of and shall be maintaining a current listing in the USEPA RCP Program. Alternatively, in a State with legislation requiring mandatory credentialing for this work, compliance with the State legislation is acceptable. Evidence showing successful completion of the requirements of the USEPA National RCP Program shall include copy of current, valid USEPA RCP photo identification card or equivalent documentation issued by the State.
2. Contractor Experience
    a. Submit written evidence demonstrating that the Contractor has successfully designed and installed at least two radon mitigation systems of the same or similar to the type required herein. Experience proof shall include but not be limited to:
        1) The contract name and number, completion dates of the project and the total cost of the project;
        2) The names, telephone numbers and fax number of the facility or installation for whom the radon mitigation system design, construction and/or testing were performed;
        3) The name, telephone number and fax number of a supervisory level point of contact at each facility or installation who has knowledge of the Contractor's performance.

C. Testing Laboratory
1. Submit testing laboratory certification as proof that the testing laboratory performing radon detector analysis has successfully completed the requirements of the USEPA Radon Measurement Proficiency (RMP) Program and is qualified and authorized to perform such analysis. Alternatively, in a State with legislation requiring mandatory credentialing for this work, compliance with the State legislation is acceptable.

D. Diagnostic Testing Equipment
1. Submit proof of current calibration for testing devices used in performing diagnostic testing.

E. On-Site Supervision
1. No work at the site will be permitted without the presence of a person possessing the qualifications specified elsewhere in this section, namely USEPA RCP listing or the State equivalent, where applicable.

1.10 DELIVERY, STORAGE AND HANDLING

A. Delivery of Products
1. Deliver materials to the site in an undamaged condition. Deliver proprietary items in manufacture's original unopened and undamaged containers of packages with manufacture's name and brand and other pertinent data such as specification number, type, and class, date of manufacture. Schedule deliveries of materials to coincide with scheduled installation.

B. Storage and Handling
1. Carefully store materials off the ground to provide proper ventilation, drainage and protection against weather and dampness. Protect materials from marring, staining, rust, damage and overload and from contaminants such as grease, oil and dirt. Store materials at temperatures recommended by the manufacturer. Handle material to avoid damage such as chipping and breaking. Replace damaged material.

PART 2 PRODUCTS

2.01 RADON MITIGATION SYSTEMS

A. System Performance
1. Radon mitigation systems shall reduce and maintain radon concentration levels below 4.0 pCi/L after activation of the mitigation systems.
    a. System Piping

1) Route radon mitigation systems piping so as not to interfere with the daily operations and functions of the building occupants. Keep visibility of the systems to a minimum. Enclose each radon mitigation system in occupied spaces, however, all operating components shall be accessible for maintenance and repair. All spaces shall be considered to be occupied spaces except for mechanical and electrical rooms, warehouses, storerooms, janitor closets, crawl spaces, and attic spaces. Enclosures are not required for portions of systems installed above suspended acoustical ceilings.

b. System Outlet Location
   1) Mitigation system discharge points shall be as specified in EPA 402-R-93-078. Prevent foreign objects from entering the outlet. Maintain water tight seal through all penetrations to the building exterior.

c. System Failure Warning Monitor
   1) Provide a means to detect and announce each radon mitigation system failure. System failure is defined as:
      (a) System blockage: foreign debris.
      (b) Mechanical failure: fan or other mechanical failure.
      (c) System leakage: pipe breakage or crack.
   2) Provide an audio or visual annunciator device to indicate system failure and locate the annunciator device in an occupied space. Conform to the requirements of EPA 402-R-93-078.

d. Air Cleaners
   1) Air cleaners shall NOT be used as a radon reduction method.

e. Ventilation Devices
   1) Devices which reduce radon solely by increasing ventilation to the occupied space shall NOT be used.

f. Back Drafting
   1) Radon mitigation system shall NOT cause back drafting of building chimneys.

B. Radon Mitigation Systems Components
   1. Mechanical and electrical materials, fabrication, construction and installation shall conform to the following industry standards:
      a. Poly(vinyl chloride) (PVC) Piping: ASTM D 2665, Schedule 40.
      b. In-line Tubular Centrifugal Fans: AMCA 210and UL listed.
      c. Electrical Work: NFPA 70, NEMA MG 1 and EPA 402-R-93-078, No. 12 AWG minimum wire size, solid copper installed in EMT or surface metal raceway.
      d. Mechanical Work: ICC IMC, ICC UMC, SMACNA 1378 and EPA 402-R-93-078.
      e. Sealants: ASTM C 920, polyurethane, Type S, Grade P for horizontal application, Grade NS for vertical application, Class 25, Use T.
      f. Crawl space soil-gas retarder membrane shall be minimum 40 mils thick.

2.02 RADON MITIGATION SYSTEMS ENCLOSURES

A. Radon mitigation systems enclosure components, materials, fabrication, construction and installation for concrete, wood studs and furring, metal studs and furring, gypsum wallboard, sealants and painting shall conform to the requirements specified in the respective specification sections addressing this work contained in the project specification.

PART 3 EXECUTION

3.01 RADON TESTING

A. Perform radon testing in accordance with EPA 402-R-93-003 and EPA 402-R-92-004. The Contractor shall arrange that all laboratory test results are sent from the testing laboratory directly to the Owner with one copy to the Contractor.

B. Site investigation data and results obtained from diagnostic testing shall be used to design the radon mitigation systems.

C. Each sub-slab communication test shall include a suction hole and at least four test holes. Use non-shrink grout to repair all holes resulting from diagnostic testing and restore floor and wall finishes to match existing adjacent surfaces.

3.02 DESIGN RADON MITIGATION SYSTEMS AND SYSTEMS ENCLOSURES

A. Design radon mitigation systems as required to achieve radon detection test results below 4.0 pCi/L based on radon diagnostic test results, EPA 402-R-93-078 and the information provided herein. Design the systems enclosures to accommodate the radon mitigation systems configurations and the adjacent or surrounding walls, partitions, ceilings and roof construction.

3.03 RADON MITIGATION SYSTEMS INSTALLATION

A. Installation
   1. Provide radon mitigation systems as indicated in the approved design drawings, as specified in EPA 402-R-93-078 and as required by the specifications and standards referenced herein for the respective materials using workmen skilled in the trades involved. Install piping plumb and parallel to existing walls, partitions and ceilings as appropriate, slope horizontal runs to drain, and secure in place in a rigid and substantial manner.
   2. Seal new and existing floor slab penetrations in accordance with EPA 402-R-93-078 and as specified herein. Prevent entry of soil gas into the building and exhausting of conditioned air via the radon mitigation system. Seal cracks and openings around floor slab penetrations with polyurethane sealant. Provide backer rod or comparable filler material as required. Insure that all penetrations to the building exterior are weathertight.
   3. Lay work out in advance. Exercise care where cutting, channeling, chasing or drilling floors, walls, partitions, ceilings or other surfaces as necessary for proper installation, support or anchorage. Patch and repair damage to buildings, piping and equipment using workmen skilled in the trades involved.
   4. As part of the site investigation, the Contractor shall identify furniture, carpeting or other portable materials and equipment which must be relocated to provide for the installation of the radon mitigation systems, if any. The Owner will work with the Contractor to coordinate relocations.
   5. Coordinate all work with the Owner.

B. Supervision
   1. Installation of the radon mitigation systems shall be supervised by the RCP listed individual responsible for the design of the systems.

C. Electrical Work
   1. NFPA 70 and EPA 402-R-93-078, No. 12 AWG minimum wire size, solid copper installed in EMT or surface metal raceway. A source of electric power should be available within 50 feet of each fan installation.

D. Mechanical Work
   1. ICC IMC, ICC UMC, SMACNA 1378 and EPA 402-R-93-078.

E. System Identification
   1. Label all components of the radon mitigation systems including, but not limited to, piping (every ten feet), enclosures, fans, electrical conduit (every ten feet) and circuit breakers. Labels shall read:
      a. Radon Reduction System. Do Not Turn Off.

3.04 RADON MITIGATION SYSTEM ENCLOSURES INSTALLATION

A. Provide enclosures as indicated in the approved design drawings and as required by the specifications and standards referenced herein for the respective materials using workmen skilled in the trades involved. Install enclosures plumb, level and parallel to existing walls, partitions and ceilings as appropriate, and secure in place in a rigid and substantial manner.

3.05 FIELD QUALITY CONTROL

A. Radon Mitigation System Inspection
   1. Each system shall be inspected and approved in writing by the RCP listed individual responsible for the design of the system. Verify the presence of fire stops. Deficiencies shall be corrected by the Contractor at no additional cost to the Owner.

B. Post Mitigation Testing and Monitoring
   1. Perform post mitigation radon testing in the buildings as specified in EPA 402-R-93-078 and herein.
      a. Short Term
         1) Test each radon mitigation system for effectiveness no sooner than 24 hours nor later than 15 days after activation of the radon mitigation system. Provide short term radon detectors (charcoal, electret ion chamber or approved equivalent) at the rate of one detector per 2,000 square feet but not less than one detector per enclosed space, except for closets. On copies of the building floor plans, locate and identify each short-term detector and provide short term detector data on copies of the "Device Placement Log" contained in EPA 402-R-92-014.
         2) At the end of the testing period, the Contractor shall collect the detectors and send the detectors to the testing laboratory for analysis. Provide radon test results of the effectiveness of the mitigation systems not later than 30 days after collecting the detectors. Radon test results shall be sent from the testing laboratory directly to the Owner with one copy to the Contractor. Complete the line item information on the "Device Placement Log."
         3) Radon test results above 4.0 pCi/L shall require system redesign and installation modifications as necessary to achieve radon test results below 4.0 pCi/L. Submit design modifications to the Government for review and approval. After approval of the design modifications, provide installation modifications to the radon mitigation system and retest for effectiveness. Repeat this short-term test procedure until test results below 4.0 pCi/L are achieved.
         4) System modifications (as-built systems installations) shall be reflected in the Contractor's design documents (drawings and design narrative).

END OF SECTION 312113

SECTION 313116
TERMITE CONTROL

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes:
   1. Soil treatment with termiticide.

1.02 ACTION SUBMITTALS

A. Product Data: For each type of termite control product.
   1. Include the EPA-Registered Label for termiticide products.

1.03 INFORMATIONAL SUBMITTALS

A. Soil Treatment Application Report: After application of termiticide is completed, submit report for Owner's records and include the following:
   1. Date and time of application.
   2. Moisture content of soil before application.
   3. Termiticide brand name and manufacturer.
   4. Quantity of undiluted termiticide used.
   5. Dilutions, methods, volumes used, and rates of application.
   6. Areas of application.
   7. Water source for application.

1.04 QUALITY ASSURANCE

A. Installer Qualifications: A specialist who is licensed according to regulations of authorities having jurisdiction to apply termite control treatment and products in jurisdiction where Project is located.

B. Regulatory Requirements: Formulate and apply termiticides and termiticide devices according to the EPA-Registered Label.

1.05 PROJECT CONDITIONS

A. Environmental Limitations: To ensure penetration, do not treat soil that is water saturated or frozen. Do not treat soil while precipitation is occurring. Comply with requirements of the EPA-Registered Label and requirements of authorities having jurisdiction.

B. Coordinate soil treatment application with excavating, filling, grading, and concreting operations. Treat soil under footings, grade beams, and ground-supported slabs before construction.

PART 2 PRODUCTS

2.01 SOIL TREATMENT

A. Termiticide: Provide an EPA-Registered termiticide, complying with requirements of authorities having jurisdiction, in an aqueous solution formulated to prevent termite infestation. Provide quantity required for application at the label volume and rate for the maximum termiticide concentration allowed for each specific use, according to product's EPA-Registered Label.
   1. Service Life of Treatment: Soil treatment termiticide that is effective for not less than five years against infestation of subterranean termites.

PART 3 EXECUTION

3.01 EXAMINATION

A. Examine substrates, areas, and conditions, with Applicator present, for compliance with requirements for moisture content of soil per termiticide label requirements, interfaces with earthwork, slab and foundation work, landscaping, utility installation, and other conditions affecting performance of termite control.

B. Proceed with application only after unsatisfactory conditions have been corrected.

3.02 PREPARATION

A. General: Comply with the most stringent requirements of authorities having jurisdiction and with manufacturer's written instructions for preparation before beginning application of termite control treatment. Remove all extraneous sources of wood cellulose and other edible materials such as wood debris, tree stumps and roots, stakes, formwork, and construction waste wood from soil within and around foundations.

B. Soil Treatment Preparation: Remove foreign matter and impermeable soil materials that could decrease treatment effectiveness on areas to be treated. Loosen, rake, and level soil to be treated except previously compacted areas under slabs and footings. Termiticides may be applied before placing compacted fill under slabs if recommended in writing by termiticide manufacturer.
   1. Fit filling hose connected to water source at the site with a backflow preventer, complying with requirements of authorities having jurisdiction.

3.03 APPLICATION, GENERAL

A. General: Comply with the most stringent requirements of authorities having jurisdiction and with manufacturer's EPA-Registered Label for products.

3.04 APPLYING SOIL TREATMENT

A. Application: Mix soil treatment termiticide solution to a uniform consistency. Provide quantity required for application at the label volume and rate for the maximum specified concentration of termiticide, according to manufacturer's EPA-Registered Label, to the following so that a continuous horizontal and vertical termiticidal barrier or treated zone is established around and under building construction. Distribute treatment evenly.
   1. Slabs-on-Grade Slabs: Under ground-supported slab construction, including footings, building slabs, and attached slabs as an overall treatment. Treat soil materials before concrete footings and slabs are placed.
   2. Penetrations: At expansion joints, control joints, and areas where slabs will be penetrated.

B. Avoid disturbance of treated soil after application. Keep off treated areas until completely dry.

C. Protect termiticide solution, dispersed in treated soils and fills, from being diluted until ground-supported slabs are installed. Use waterproof barrier according to EPA-Registered Label instructions.

D. Post warning signs in areas of application.

E. Reapply soil treatment solution to areas disturbed by subsequent excavation, grading, landscaping, or other construction activities following application.

END OF SECTION