Williston Parks & Recreation District

Williston Ice & Turf Facility

PROJECT MANUAL
Volume 1 of 2: Divisions 00-14

PROJECT NUMBER: 24-096
408 Airport Rd.
Williston, ND 58801

ISSUE DATE: August 28, 2026

ISSUED BY:
ICON ARCHITECTURAL GROUP
222 East Main Street, Suite B
Mandan, ND 58554

ICONARCHITECTS.COM | (701) 751-0430

SECTION 00 0107
SEALS PAGE

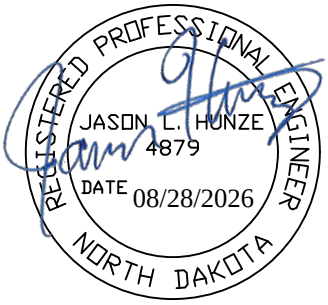
1.01 DESIGN PROFESSIONALS OF RECORD

A. Architect:
1. Heidi Brenna, AIA, NCARB
2. ICON Architectural Group

B. Landscape Architect:
1. Gordon Lemmel, PLA, ASLA
2. Interstate Engineering

C. Mechanical Engineer:
1. Josh D. Lunski, PE, FPE, HFDP
2. Martin Mechanical Design Inc

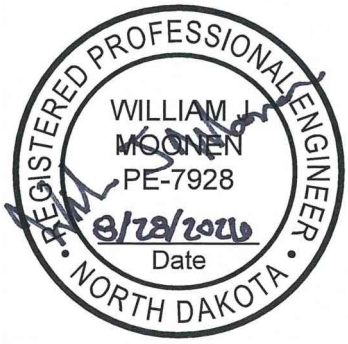
D. Electrical Engineer:
   1. Jason Hunze, PE
   2. Prairie Engineering, PC



E. Ice Engineer
   1. ScottA. Ward, PE
   2. B32 Engineering Group, Inc.

F. StructuralEngineer
   1. Michael Jochim, PE
   2. ICON Architectural Group

G. Civil Engineer
   1. William J. Moonen, PE
   2. AE2S



END OF SECTION

SECTION 00 0110
TABLE OF CONTENTS

PROCUREMENT AND CONTRACTING REQUIREMENTS
DIVISION 00 -- PROCUREMENT AND CONTRACTING REQUIREMENTS (BY ARCHITECT)

00 0107	Seals & Signatures	A
00 0110	Table of Contents	A
00 3100	Available Project Information	A
	Geotechnical Report – New Building	
	Addendum #1 to Geotechnical Report	
	Soil Borings Revised Map	
	Geotechnical Report – Existing Hangar Building	

DIVISION 00 -- PROCUREMENT AND CONTRACTING REQUIREMENTS (BY CM)
*provided under separate cover

SPECIFICATIONS
DIVISION 01 -- GENERAL REQUIREMENTS

01 1000	Summary	A
01 2000	Payment Procedures	A
01 2300	Alternates	A
01 3000	Administrative Requirements	A
01 4000	Quality Requirements	A
01 4533	Code-Required Special Inspections	A
01 5600	Traffic Control (BP#1)	C
01 6000	Product Requirements	A
01 6010	Substitution Procedures	A
01 6010.01	Substitution Request Form	A
01 6116	Volatile Organic Compound (VOC) Content Restrictions	A
01 7000	Execution and Closeout Requirements	A
01 7419	Construction Waste Management and Disposal	A
01 7800	Closeout Submittals	A

DIVISION 02 -- EXISTING CONDITIONS

02 4100	Selective Demolition	A

DIVISION 03 -- CONCRETE

03 0516	Underslab Vapor Barrier (BP#2)	A
03 1000	Concrete Forming & Accessories (BP#2)	S
03 2000	Concrete Reinforcing (BP#2)	S
03 3000	Cast-in-Place Concrete (BP#2)	S
03 3511	Concrete Floor Finishes	A
03 3536	Polished Concrete Floor Finishing	A
03 4100	Precast Structural Concrete (BP#2)	S

DIVISION 04 -- MASONRY

04 2000	Unit Masonry	S

DIVISION 05 -- METALS

05 1200	Structural Steel	S
05 3100	Steel Decking (BP#1)	S
05 4000	Cold-Formed Steel Framing	S
05 5000	Metal Fabrications	A
05 5100	Metal Stairs	A
05 5133	Metal Ladders	A
05 5213	Pipe and Tube Railings	A

05 7300 Decorative Metal Railings A

DIVISION 06 -- WOOD, PLASTICS, AND COMPOSITES
06 1000 Rough Carpentry A
06 1600 Sheathing A
06 20 00 Finish Carpentry A
06 4100 Architectural Wood Casework A
06 8316 Fiberglass Reinforced Paneling A

DIVISION 07 -- THERMAL AND MOISTURE PROTECTION
07 0553 Fire and Smoke Assembly Identification (BP#2) A
07 1400 Fluid-Applied Waterproofing (BP#2) A
07 1613 Cementitious Waterproofing (BP#2) A
07 2100.01 Thermal Insulation – Foundations (BP#2) A
07 2100.02 Thermal Insulation A
07 2119 Foamed-in-Place Insulation A
07 2600 Vapor Retarders A
07 2700 Air Barriers A
07 4113 Metal Roof Panels (BP#1) A
07 4213 Metal Wall Panels A
07 4213.19 Insulated Metal Wall Panels (BP#1) A
07 5400 Thermoplastic Membrane Roofing (BP#1) A
07 6200 Sheet Metal Flashing and Trim A
07 72 00 Roof Accessories A
07 8400 Firestopping A
07 9200 Joint Sealants A
07 9513 Expansion Joint Cover Assemblies A

DIVISION 08 -- OPENINGS
08 1113 Hollow Metal Doors and Frames A
08 3100 Access Doors and Panels A
08 3313 Coiling Counter Doors A
08 3613 Sectional Doors A
08 4313 Aluminum-Framed Storefronts A
08 5655 Security Window Screens A
08 7100 Door Hardware A
08 8000 Glazing A

DIVISION 09 -- FINISHES
09 0561 Common Work Results for Flooring Preparation A
09 2116 Gypsum Board Assemblies A
09 3000 Tiling A
09 5100 Acoustical Ceilings A
09 5426 Suspended Wood Ceilings A
09 6253 Synthetic Turf Flooring A
09 6500 Resilient Base A
09 6566 Resilient Athletic Flooring A
09 6813 Tile Carpeting A
09 7200 Wall Coverings A
09 7700 Interior Wall Paneling A
09 8400 Acoustical Decorative Panels A
09 9123 Interior Painting A
09 9600 High-Performance Coatings A

DIVISION 10 -- SPECIALTIES
10 1100 Visual Display Units A

10 2113.19	Plastic Toilet Compartments	A
10 2600	Wall and Door Protection	A
10 2800	Toilet Accessories	A
10 4400	Fire Protection Specialties	A
10 4433	Emergency Key Cabinets	A
10 5126	Plastic Lockers	A
10 7516	Ground-Set Flagpoles	L
DIVISION 11 -- EQUIPMENT		
11 1313	Loading Dock Bumpers	A
11 4000	Foodservice Equipment	F
11 6623	Gymnasium Equipment	A
11 6643	Electronic Scoreboards	A
DIVISION 12 -- FURNISHINGS		
12 2400	Window Shades	A
12 3600	Countertops	A
12 6100	Fixed Audience Seating	A
12 6723	Benches	A
DIVISION 13 -- SPECIAL CONSTRUCTION		
13 1811	Ice Rink General Requirements	I
13 1812	Ice Rink Refrigeration System	I
13 1813	Ice Rink Floor System	I
13 1814	Ice Rink Piping, Valves and Accessories	I
13 1815	Ice Rink Waste Heat Recovery System	I
13 1816	Ice Rink Dasher Board System and Accessories	I
13 1817	Ice Rink Central Control System	I
13 3419	PEMB (BP#1)	S
DIVISION 14 -- CONVEYING EQUIPMENT		
14 2400	Hydraulic Elevators	A
DIVISION 21 -- 33: SEE VOLUME 2		

END OF SECTION

Legend:

Architect	ICON Architectural Group (A)
Structural Engineers	ICON Architectural Group (S)
Mechanical Engineers	Martin Mechanical (M)
Electrical Engineers	Prairie Engineering (E)
Ice Consultant	B32 Engineering Group (I)
Food Consultant	Foodservice Concept Design (F)
Landscape Architect	Interstate Engineering (L)
Civil Engineer	AE2S (C)
Construction Manager	JE Dunn (CM)

SECTION 00 3100
AVAILABLE PROJECT INFORMATION

PART 1 GENERAL

1.01 EXISTING CONDITIONS

A. Certain information relating to existing surface and subsurface conditions and structures is available to bidders, as follows:

B. Geotechnical Report(s):
   1. Entitled "Exploration of Geotechnical Exploration Program", dated December 31, 2025, prepared by Material Testing Services, LLC., MTS No. G25-068.
      a. with Addendum 1 dated March 25, 2026.
      b. and Soil Borings Revised Map by ICON Architectural Group, dated January 27, 2026.
   2. Entitled "Report of Geotechnical Exploration - Proposed Hangars Sloulin Field International Airport", dated August 4, 2010, prepared by Materials Testing Services, LLC, Laboratory Number 10-204.
   3. Copies immeditely following this section.
   4. Electronic copies are available upon request.
   5. This report identifies properties of below grade conditions and offers recommendations for the design of foundations, prepared primarily for the use of Architect.
   6. The recommendations described shall not be construed as a requirement of this Contract, unless specifically referenced in Contract Documents.
   7. This report, by its nature, cannot reveal all conditions that exist on the site. Should subsurface conditions be found to vary substantially from this report, changes in the design and construction of foundations will be made, with resulting credits or expenditures to the Contract Sum accruing to Owner.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.01 HAZARDOUS MATERIALS

A. Per the North Dakota Department of Environmental Quality (NDDEQ), before any facility may be renovated, the affected part of the facility must be inspected for the presence of asbestos. Asbestos inspection may only be conducted by North Dakota-certified asbestos inspectors.

B. The testing shall be provided by the Owner.

C. The Demolition Contractor or Owner shall notify the NDDEQ at least 10 days prior to work commencing and shall coordinate the required NDDEQ notifications with the Owner and Project Coordinator (CM or GC).

D. The building Owner and Contractor(s) are directly responsible for compliance with State and Federal asbestos requirements during demolition and renovation projects. Architect shall not be responsible for any discovery, presence, handling, removal, disposal, or exposure of persons to, hazardous materials on this project site.

3.02 OBTAINMENT OF PERMITS

A. Project Coordinator to obtain the following required permits, at no cost to Owner:
   1. Building Permit for all trades.

B. Building Permit Procedures: When required to obtain this permit:
   1. Complete and file permit application(s) with appropriate agency.
   2. Pay required fees.
   3. Provide expediting services, either directly or by hiring a firm specializing in these kind of services.
   4. Advise Architect if submission of modified documents is necessary to have the authorities having jurisdiction complete the plan review and approval process. Submit modified documents expeditiously.

5. Do not commence execution of any item of work for which a permit has not been obtained.

END OF SECTION

Report of Geotechnical Exploration Program

Proposed Williston Ice and Turf Facility
Williston, North Dakota
MTS No. G25-068

For

Williston Parks and Recreation Department

December 31, 2025

MATERIAL TESTING SERVICES, LLC

MATERIAL TESTING SERVICES, LLC

December 31, 2025

Attn: Joe Barsh
Williston Parks and Recreation Department
822 18th Street East
Williston, ND 58801

ref: **Geotechnical Exploration Program**
Proposed Williston Ice and Turf Facility
Williston, North Dakota
MTS No. G25-068

Enclosed is the geotechnical exploration report for the proposed project. We are transmitting this report as an electronic file in pdf format. If you require a hard copy, please contact us. The work was conducted in general accordance with our proposal dated October 15, 2025.

Approximately 50 percent of the soil samples will be stored at the laboratory for approximately 30 days from the date of this report. The samples will then be discarded unless we are requested to store them for longer.

We appreciate the opportunity to be of service to you on this project. If there are questions about the data or our recommendations, please contact us at 701-852-5553. Also, please contact us when you are ready for excavation observations and compaction test of controlled fill.

Sincerely,
MATERIAL TESTING SERVICES, LLC

Steven Wald, PE
President

TABLE OF CONTENTS

Proposed Williston Ice and Turf Facility
Williston, North Dakota
MTS No. G25-068

Page

1. INTRODUCTION 1
1.1. Authorization 1
1.2. Scope of Services 1
2. ENGINEERING REVIEW 2
2.1. Project Data 2
2.2. Special Concerns and Constructability 2
2.3. Excavation and Site Preparation 3
2.3.1. Building 3
2.3.2. Parking and Driveways 5
2.4. Frost Considerations 5
2.5. Foundation Recommendations 6
2.5.1. Footing Depths 6
2.5.2. Bearing Capacity and Settlement 6
2.5.3. Lateral Earth Pressures 6
2.5.4. Methods of Analysis 7
2.6. Floor Slabs 7
2.7. Exterior Foundation Backfill 8
2.8. Surface Drainage 8
2.9. Exterior Slabs 8
2.10. Flexible Pavement Design 9
2.11. Rigid Pavement Design 10
2.12. Site Classification for Seismic Design 11
2.13. Excavation Slopes 11
3. CONSTRUCTION OBSERVATION AND TESTING 11
3.1. Excavation Observations 12
3.2. Placement of Fill 12
4. EXPLORATION LIMITATIONS 12

APPENDICES

APPENDIX A – FIELD EXPLORATION PROGRAM

A.1 Exploration Scope
A.2 Surface Observations
A.3 Subsurface Conditions
A.4 Water Levels
A.5 Soil Sampling
A.6 Soil Classification Procedure

Attachments to Appendix A

Site Drawing
Boring Profile Drawings
Boring Logs
Symbols & Descriptive Terminology on Test Boring Logs
Soil Classification Sheet

APPENDIX B – LABORATORY TEST PROGRAM

B.1 Testing Scope
B.2 Test Methods

Attachments to Appendix B

Unconfined Compression
Mechanical Sieve Analysis
CBR
Moisture-density Relationship

APPENDIX C

Precautions for Excavating & Refilling During Cold Weather

Report of Geotechnical Exploration

Proposed Williston Ice and Turf Facility
Williston, North Dakota
MTS #G25-068

1. INTRODUCTION

1.1. Authorization

The work was conducted in general accordance with our proposal dated October 24, 2025.

1.2. Scope of Services

The authorized scope of services included soil borings, laboratory testing and an engineering report.

Authorized drilling included seventeen soil borings drilled to nominal depths of 15 to 40 feet. Soil sampling was to be performed using standard penetration test (SPT) procedures. Laboratory tests in the proposal included moisture content, dry density, gradation through a #200 sieve, Atterberg limits (liquid & plastic limits) and unconfined compression testing. If soft cohesive soils were encountered undisturbed 3-inch diameter thin-walled Shelby tubes were to be taken.

The authorized engineering report includes the results of the field and laboratory testing as well as engineering recommendations regarding:

a. Site preparation
b. Foundation types and depths
c. Allowable bearing capacity and estimated potential foundation settlement
d. Potential construction difficulties
e. Potential expansive or compressible soils
f. Site drainage
g. Exterior backfill
h. Floor slabs
i. Frost considerations
j. Lateral earth pressures
k. Pavements
l. Excavation slopes
m. Construction monitoring

Determining if there is potential on-site contamination is not included in the scope of services.

2. ENGINEERING REVIEW

2.1. Project Data

If the project information presented below is not correct or has been changed, it is necessary that the correct project data be presented to us for further review.

We understand the proposed project will consist of the construction of a 191,000 square foot building with associated parking lots and drive lanes. The new building will be attached to the west side of an existing building (old airport hangar). We understand the building will be a single-story, slab-on-grade structure founded on standard shallow frost footings with above steel framing.

We understand that strip footing loads will be up to 10 kips per foot and maximum column loads will be 250 kips. We understand the finished floor elevation be at or near the floor elevation of the existing building. We assume the maximum settlement under working load is 1 inch and a maximum differential settlement of ½ inch.

2.2. Special Concerns and Constructability

Topsoil and fill were encountered to depths of approximately 0.2 to 2 feet below existing grade in the building area. Topsoil and fill depths ranged from 0.3 to 7 feet deep in the parking lot borings. The topsoil and any fill should be removed below the building pad prior to the placement of concrete or controlled fill or backfill.

Based on the N values, the fill encountered in the parking lot (at borings 7 and 12) appeared to have been placed with some compactive effort. We assume it would not be feasible to remove the fill in the parking areas and therefore, will be left in-place. The owner will be assuming risk of detrimental settlement but in our opinion the risk is low.

A couple cobbles were encountered during drilling. Cobbles and boulders are common within glacial till deposits and they will likely be encountered during excavations.

Care must be taken during construction so that existing footings are not undermined or disturbed during construction. The existing footings should be provided with a slope of at least 1:1 (horizontal:vertical) outward and downward from the outer edge of the existing footings plus 3 feet.

If deemed necessary by the structural engineer, we recommend that a properly designed vertical expansion joint capable of handling up to ½" of differential settlement be provided between the addition and the existing building.

The existing clays are susceptible to frost heave. Therefore, seasonal frost movement of pavement, sidewalks and miscellaneous structures supported above the frost depth can be expected.

2.3. Excavation and Site Preparation

2.3.1. Building

The topsoil and fill should be removed from below the building pad. Fill was only encountered at boring 6 to 2' feet deep at an existing pavement area in front of the existing hangar building. It is possible deeper topsoil and/or fill depths will be encountered in areas away from the boring locations.

Where excavations extend below the bottom of the footings, we recommend providing a lateral excavation oversize of 1 foot for each 1 foot of fill required below the bottom of the new foundations. The over-size should be measured from the bottom and outside edge of the foundations.

We recommend that the excavated areas be observed by the geotechnical engineer of record or their representative prior to the placement of concrete or controlled, compacted fill. The

purpose of the observations would be to make sure that no existing fill or soft natural soil is left in place and that the exposed natural soils can support the proposed fill and structural loads. We wish to point out that there could be deeper excavations required away from the boring locations.

We recommend that a hydraulic excavator be used for foundation excavation. It should have a smooth cutting edge on the bucket. Clay soil should be left undisturbed. Any loose clay soil should be removed. If sands are exposed, we recommend making at least three passes with heavy vibratory compactor on the footing subgrade.

After the excavations are complete, backfill should be placed as soon as possible. Also, care should be taken so that the grades slope away from the excavations in the event it rains. Although it is impossible to completely keep rainwater from the site, provisions must be made to protect the excavations as much as possible from the influx of rainwater or surface runoff both during and after construction. Water and any soft/saturated soils should be removed as soon as possible.

The on-site soil that is free of organic material may be used as controlled, compacted fill or backfill. Any import fill needed for the building pad can consist of non-expansive, non-organic lean clay, or pit-run sand or sand with gravel. Any gravel in the fill should have 100 percent passing the 2-inch sieve. Any imported lean clay used should have a liquid limit of 40 or less. We would not recommend using fat clay (CH) for fill below the building. All clays should be placed at a moisture content of minus 2 to plus 3 percent of optimum moisture content. Sand should be moisture conditioned as necessary to facilitate compaction. Where clay is used, it should be limited to no more than approximately 6 feet in total thickness below any foundations or floor slabs to aid in reducing settlement.

Loose lift thicknesses of new fill should be no more than 8 inches. Any fill that is to support footings should be compacted to at least 98 percent of the maximum dry density and any fill below the floor slabs, including the fill to raise grades, should be compacted to at least 95

percent of maximum dry density as determined according to ASTM D 698 (standard Proctor).

If earthwork is done during periods of freezing temperatures, we recommend protecting the fill from freezing once it has been placed. No frozen soils should be used as fill and fill should not be placed on frozen ground. Earthwork could be difficult in the spring or late fall when conditions are often cool and wet.

2.3.2. Parking and Driveways

The existing non-organic soils at the site are considered poor to fair as subgrade soils for pavements. The subgrade soils are frost susceptible; therefore, some frost movement and/or frost damage can be expected during the life of the pavement.

Any vegetation and organic soils should be removed, and the pavement areas should be cut, as necessary, to the proposed subgrade elevation. The exposed subgrade soils should be scarified a minimum of twelve inches, moisture conditioned to within three percent of optimum and re-compacted to a minimum of 98 percent of the standard Proctor density. Additional fill should also be compacted to a minimum of 98%. Any soft spots should be stabilized prior to placing base course.

Any off-site fill material can consist of a pit-run sand or sand with gravel, or a non-expansive, non-organic lean clay as described in ***Section 2.3.1***. Clayey or cohesive soils should be placed within a moisture content range of minus 3 to plus 3 percent of optimum moisture content.

2.4. Frost Considerations

Footings should be carried to frost depth as indicated in the following sections. Also, no frozen soils should be used as fill and no fill should be placed on frozen ground. Furthermore, the soils should be protected from freezing once they have been placed and compacted and until the building can be heated. Please note the attached information sheet "***Precautions for Excavating and Refilling During Cold Weather***" in Appendix C.

2.5. Foundation Recommendations

2.5.1. Footing Depths

Perimeter footings for heated buildings should be carried to a frost depth of 5 feet. The frost depth should be considered from final grade to the bottom of the footing. Interior footings can be placed at a convenient depth below the floor slab. A frost depth of 7 feet should be used for footings which will be in an unheated environment.

2.5.2. Bearing Capacity and Settlement

With the recommended site preparation, on-site observations by the geotechnical engineer and adequate compaction testing of the new fill, it is our opinion that continuous strip and column footings can be proportioned for a net allowable soil bearing capacity of up to 3500 and 4000 psf, respectively. This loading should provide a theoretical safety factor of 3 or more with respect to punching shear failure.

Our calculations suggest that total settlements should be 1 inch or less and that the differential settlement should be ½ inch or less.

2.5.3. Lateral Earth Pressures

Walls that must retain earth should be designed for the at-rest lateral earth pressure. we recommend that the at-rest pressure be considered equivalent to that generated by a fluid with a total unit weight of 65 pcf for clays and 45 pcf for sand above groundwater levels.

To resist lateral loads, we recommend assuming the natural undisturbed soils have an ultimate passive pressure equivalent to that generated by a fluid having a total unit weight of 375 pcf for clay and 280 pcf for sand. For compacted sand, we recommend using an ultimate passive pressure of 425 pcf. If compacted fill is placed on the passive side next to the foundation resisting lateral loads, it should be compacted to at least 95 percent of maximum density as determined by ASTM D 698. In addition, those portions of the foundations within five feet of final grade in unheated areas should be ignored when calculating passive resistance due to frost softening. An ultimate friction factor of 0.30 can be used between the

bottom of the footing and the foundation soils. We wish to point out that these values will give the ultimate resistance to lateral loads. We recommend that a theoretical safety factor of 2.0 be applied for a safe design.

2.5.4. Methods of Analysis

The allowable foundation loading recommended was arrived at using the Terzaghi-Meyerhof bearing capacity equation with estimates using empirical correlations with the "N" values, as well as our experience with similar site and soil conditions.

Settlements were estimated using empirical correlations between the "N" values and the pressuremeter modulus, with consideration given to soil type. The pressuremeter modulus is determined with in-situ pressuremeter testing. The pressuremeter method of analysis was then used.

The equivalent passive, at-rest and active earth pressures were calculated using estimated unit weights and estimated angles of internal friction based on our experience, the laboratory testing and correlations with the Atterberg limits and soil type.

2.6. Floor Slabs

We recommend that the site be prepared as stated in ***Section 2.3***. We recommend that slabs-on-grade be constructed structurally independent of foundation walls and columns. We also recommend a minimum 6-inch layer of free draining sand be placed directly below the slabs. The sand should have less than seven percent passing the #200 sieve by weight. If it contains gravel, the gravel should have a maximum size of one inch. The sandy layer will be used to provide a working surface for concrete placement and serve as a capillary break.

With the site prepared as recommended, it is our opinion that the subgrade modulus of 200 pci can be used if a minimum of 18 inches of granular fill is used below the slab. A subgrade modulus of 100 pci can be used if clay fill is used to within 6 inches of the bottom of the slab.

2.7. Exterior Foundation Backfill

The exterior foundation backfill above the footings could consist of the on-site non-organic sandy lean clay or off-site lean clay or pit-run sand and gravel. The exterior backfill should be placed in loose lift thicknesses not to exceed 8 inches and may have to be less depending on the compaction equipment used. Compaction should be to a minimum of 92 percent of the standard Proctor density in lawn areas. For sidewalks or lightly loaded structures such as air conditioning units, the compaction should be increased to 95 percent. If there are driveways or parking areas within the backfill zone, the backfill 1 foot or more below the bottom of pavements should be compacted to at least 95 percent and backfill within 1 foot should be compacted to at least 98 percent. Sand fill should be moisture conditioned as required to facilitate compaction. Clayey or cohesive soils should be placed at within a moisture content range of minus 3 to plus 3 percent of optimum moisture content.

2.8. Surface Drainage

We advise that adequate drainage be maintained during and after construction. Unless roof drainage is internal, we also recommend that downspouts and gutters or an appropriate closed conduit system be used to control roof drainage. Downspouts should have extensions that carry roof water well past the backfill line. Splash pads should also be provided at the end of the extensions, if applicable.

If sand is used as exterior backfill, we recommend providing at least a 2-foot-thick clay cap in green areas at the surface to divert surface water away from the building.

The exterior clay backfill should slope away from the buildings at a rate of 1 inch per foot or greater for a distance of at least 10 feet from the building in lawn areas. In parking areas much positive surface drainage should be provided as practical.

2.9. Exterior Slabs

Due to the potential for frost movement for exterior slabs where clay soils are present, precautions should be taken to minimize future post construction movement of sensitive

slabs due to frost action. Options available include excavating frost susceptible soils to a depth of 5 feet below the slabs and replacing them with non-frost susceptible sand containing less than 5 percent passing the #200 sieve by weight. Another option would be to place at least 4 inches of extruded polystyrene foam insulation below the slabs and extend it at least 8 feet laterally past the edge of the slabs. Typically, 6 to 12 inches of sand is placed above the insulation for protection. A third option is to support the slabs or steps on foundations taken to frost depth. At least a 4-inch void should be provided below the slabs if this option is used.

Sensitive slabs are slabs that cannot tolerate much movement without causing some difficulties. An example would be the sidewalk or steps in front of a doorway. It is ***not*** intended to include all exterior sidewalks and driveways, etc.

2.10. Flexible Pavement Design

Flexible pavement design was based on our experience and in accordance with the "AASHTO Guide of Design of Pavement Structures 1993". No traffic volumes for the parking lot or driveway were given. For our analysis, we assumed a traffic loading between 50,000 and 100,000 equivalent 18-kip axle loads (ESAL's) over a 20-year design life for the pavements. A CBR test was conducted on subgrade soil from the site. Based on the test result and our experience, a CBR value of 5 was used for our analysis. The subgrade should be prepared as described in previous sections. Parameters used in design are as follows:

Table 2 – Pavement Design Parameters

Parameter	Value
Reliability	85%
Standard Deviation	0.45
Initial Serviceability	4.2
Terminal Serviceability	2.2
Estimated Subgrade CBR	5
Resilient Modulus	7500
HBP Layer Coefficient	0.4
Aggregate Base Layer Coefficient	0.1
Drainage Factor of Base and Subbase	1.0

The granular base course should meet the specifications as outlined in Section 816 of the North Dakota Department of Transportation's (NDDOT) "Standard Specifications for Road and Bridge Construction" for Class 5 aggregate, or equivalent. The base material should be compacted to at least 100 percent of the standard Proctor density at a moisture content that facilitates compaction.

For a light duty, we recommend that the minimum section consists of 4 inches of hot bituminous pavement (HBP) over 8 inches of granular base course. For heavy duty pavements, we recommend that the minimum section consist of 5 inches of hot mix bituminous pavement over 12 inches of granular base. We also recommend a separation fabric be placed between the subgrade soils and the aggregate base section.

Adequate drainage should be considered imperative to prolong the life of the pavement. The pavement should be properly sloped to catch basins or appropriate inlets, as necessary. We recommend a minimum slope of 1 percent and preferably 2 percent.

The bituminous pavement should be composed of a quality mix such as FAA 42 as outlined in Section 430 of the NDDOT's "Standard Specifications for Road and Bridge Construction".

2.11. Rigid Pavement Design

We recommend that light duty rigid pavement consist of a minimum of 5.0 inches of unreinforced concrete pavement on a minimum of 6 inches of NDDOT Class 5 base course. For heavy duty pavement, we recommend a minimum of 6 inches of unreinforced concrete pavement on a minimum of 8 inches of NDDOT Class 5 base course. Depending on the actual traffic loads, a thicker concrete section may be necessary.

The concrete mix should have proven success, or a mix design should be established for proper proportions of aggregate, cement, water, and any admixtures. The concrete should be handled, placed, and cured according to current ACI guidelines and specifications for exterior concrete. The concrete should have a minimum compressive strength of 4000 psi.

The concrete should be placed with a maximum water/cement ratio of 0.45 and should have air entrainment between 5 and 7 percent.

Maintenance should be performed on all pavements on a regular basis. Cracks should be properly sealed as soon as they are observed. Again, adequate drainage should be considered imperative to prolong the life of the pavement.

2.12. Site Classification for Seismic Design

The 2018 IBC manual indicates that the Site Class is based on soil parameters of the upper 100 feet of soil in accordance with Chapter 20 of ASCE 7. Parameters which can be used include soil shear wave velocity, standard penetration resistance and soil undrained shear strength. Table 20.3-1 of ASCE 7 presents the Site Class Definitions. If soil data to a depth of 100 feet is not available in sufficient detail to use Table 20.3-1, Site Class D shall be used unless the building official or geotechnical data determines that Site Class E or F soil is likely to be present at the site. Based on the available test data, we have no indication that either Site Class E or F soils are present. Therefore, we recommend that Site Class D be assumed. If the Site Class for this project must be determined using subsurface data to 100 feet, it is necessary that you contact us for additional drilling services.

2.13. Excavation Slopes

Safe excavations must always be maintained. The excavation contractor is responsible for the safety of the excavations. Current OSHA requirements should be carefully followed when excavating the back slope. The OSHA soil type and excavation requirements must be verified by a competent person for the contractor at the time of construction. MTS does not assume responsibility for site safety or the contractors' activities.

3. CONSTRUCTION OBSERVATION AND TESTING

The recommendations contained in this report have been made based on the subsurface conditions found at the boring locations. It is possible that there are soil conditions on site

that were not represented by the borings. Therefore, we presumed that close construction monitoring during excavation and backfilling would be authorized. Consequently, on-site observation during construction is considered integral to the successful implementation of the recommendations.

It is imperative that the geotechnical engineer be on site at the following times to observe the site conditions and effectiveness of the construction. We recommend that the testing be performed by the geotechnical engineer as the **Owner's** representative during construction.

3.1. Excavation Observations

The geotechnical engineer should observe the entire excavation bottom prior to the placement of engineered fill and/or concrete. He would also be available for additional consultation and recommendations if necessary.

3.2. Placement of Fill

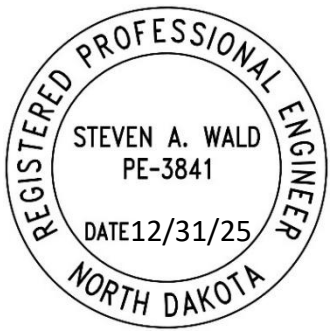
It will also be necessary to perform a representative number of compaction tests during placement of engineered fill. The tests should be performed to determine if the required compaction was achieved. As a general guideline, tests should be taken for each 2,500 square feet embankment fill for structures, every 5000 square feet for parking areas, every 75 to 100 feet in trench fill, and for each 2-foot thickness of fill. The actual number of tests should be left to the discretion of the geotechnical engineer.

4. EXPLORATION LIMITATIONS

The recommendations contained in this report represent our professional opinions. These opinions were arrived at in accordance with currently accepted engineering practices at this time. Other than this, no warranty is intended or implied.

This report is written by:

Steve Wald, PE
President



APPENDIX A – FIELD EXPLORATION PROGRAM

A.1 Exploration Scope
A.2 Surface Observations
A.3 Subsurface Conditions
A.4 Water Levels
A.5 Soil Sampling
A.6 Soil Classification Procedure

Attachments to Appendix A

Site Drawing
Boring Profile Drawings
Boring Logs
Symbols & Descriptive Terminology on Test Boring Logs
Soil Classification Sheet

A. FIELD EXPLORATION PROGRAM

A.1 Exploration Scope

Eight borings were drilled to a nominal depth of 25 feet, two borings to a nominal depth of 40 feet, and seven borings to a nominal depth of 15 feet were drilled for the project on November 17, 18, and 19, 2025. The boring locations are illustrated on the attached drawing at the back of this Appendix.

The borings were backfilled with the auger cuttings from the borings. Some settlement of these materials can be expected to occur. The final closure of the hole is the responsibility of the client or property owner.

A.2 Surface Observations

The site is located at the southwest corner of 38th Street and 6th Avenue West in Williston, ND. An existing hangar building exists in the NE corner of the site. Most of the area was green space; however, some pavement (concrete and asphalt) existed round the existing hangar.

Elevations in reference to the floor slab of the hangar (temporary benchmark, TBM) were recorded by the drill crew. The TBM was assigned an elevation of 100.0 feet. The elevations at the boreholes ranged from 108.5 feet at B-16 to 97.2 feet at B-17. The property generally appeared to slope to the east/southeast.

A.3 Subsurface Conditions

The subsurface conditions encountered at the test locations are illustrated by means of the attached boring logs. We wish to point out that the subsurface conditions at other times and locations at the site may differ from those found at our test boring locations. If different conditions are encountered during construction, it is necessary that you contact us so that our recommendations can be reviewed. The test boring log also shows the possible geologic origin of the materials encountered.

Topsoil and fill were encountered at boring locations to depths of up to approximately eight feet below existing grade. Below the topsoil and fill, naturally deposited sandy lean clay, sandy silt, and lean clay were encountered to the termination depths.

Based on the standard penetration resistance ("N" values), the clayey soil was soft to very hard in consistency. The sandy silt was medium dense.

A.4 Water Levels

Groundwater measurements were made in the test borings during drilling and at completion of drilling before the borings were backfilled. This information is shown at bottom of the attached boring logs.

Measurable groundwater was not observed in the boreholes prior to backfilling.

Water levels should be expected to fluctuate seasonally and annually. The water levels at the time of construction could be significantly different than what was recorded on the boring logs. The time of year the bores were drilled and the history of precipitation prior to drilling should be known when using the groundwater readings on the boring logs to extrapolate water levels at other points in time.

A.5 Soil Sampling

Soil sampling was done according to the procedures described by ASTM D1586. Using this procedure, a 2-inch O.D. split barrel sampler is driven into the soil by a 140-lb weight falling 30 inches. After an initial set of 6 inches, the number of blows required to drive the sampler an additional 12 inches is known as penetration resistance or "N" value. The "N" value is an index of the relative density of cohesionless soils and the consistency of cohesive soils.

We will retain representative samples of the soil obtained during our field operations for approximately one month. We will then discard them unless we are otherwise notified.

A.6 Soil Classification Procedure

As the samples were obtained in the field they were visually and manually classified by the crew chief according to ASTM D 2488. Representative portions of all samples were then sealed and returned to the laboratory for further examination and for verification of the field classification. In addition, selected samples were then submitted to a program of laboratory tests. Logs of the borings indicating the depth and identification of the various strata, the "N" value, the laboratory test data, water level information and pertinent information regarding the method of maintaining and advancing the drill holes are also attached. Charts illustrating the soil classification procedures, the descriptive terminology and symbols used on the boring logs are also attached.

1 SD002 **Overall Site**
1" = 80'-0"

0' 150' 300' 450' 600'

PARKING REQUIREMENTS

INSTITUTIONAL USES: ASSEMBLY/EXHIBITION HALLS/SPORTS ARENAS/ THEATERS AND AUDITORIUMS - 1.00/5 OCCUPANTS AT MAXIMUM CAPACITY

ARENA #1 = 1,200 SEATS
ARENA #2 = 250 SEATS
ARENA #3 = 250 SEATS
B.O.H. & COMMONS - 250 OCC. (ROUGH ESTIMATE)
TOTAL = 2,500 OCCUPANTS
500 PARKING STALLS

COMMERCIAL USES: HEALTH CLUB - 1.00/300 SF

TURF W/ UPPER TRACK - 40,000 SF
134 PARKING STALLS

TOTAL REQUIRED: 634 PARKING STALLS

PARKING COUNT

PROPOSED 699

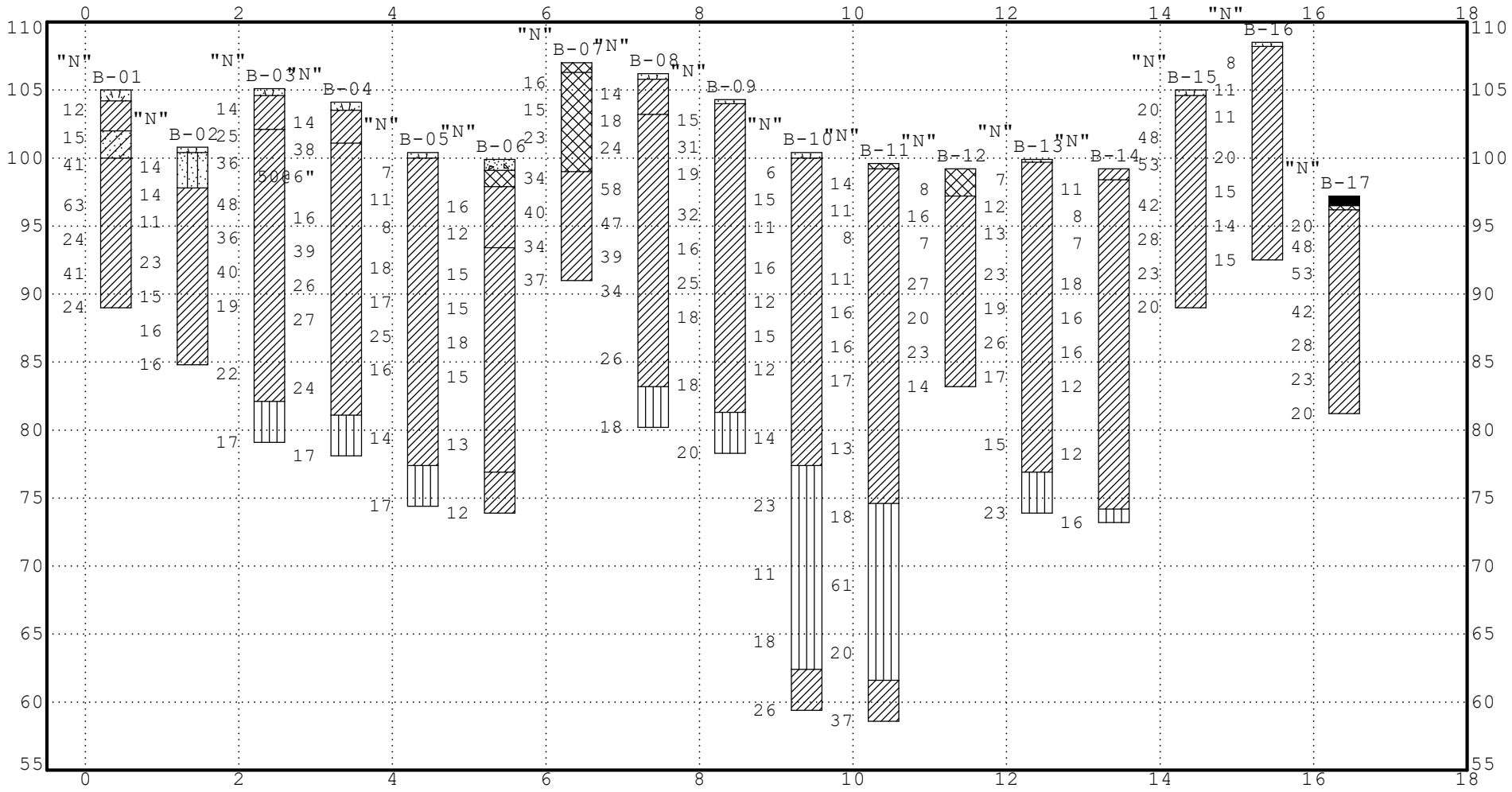
Williston Parks & Recreation District

Williston Ice & Turf Project

Site Plan

ICON ARCHITECTURAL GROUP

WWW.ICONARCHITECTS.COM
JOB NO. 24-096 | 10/06/2025
© 2025

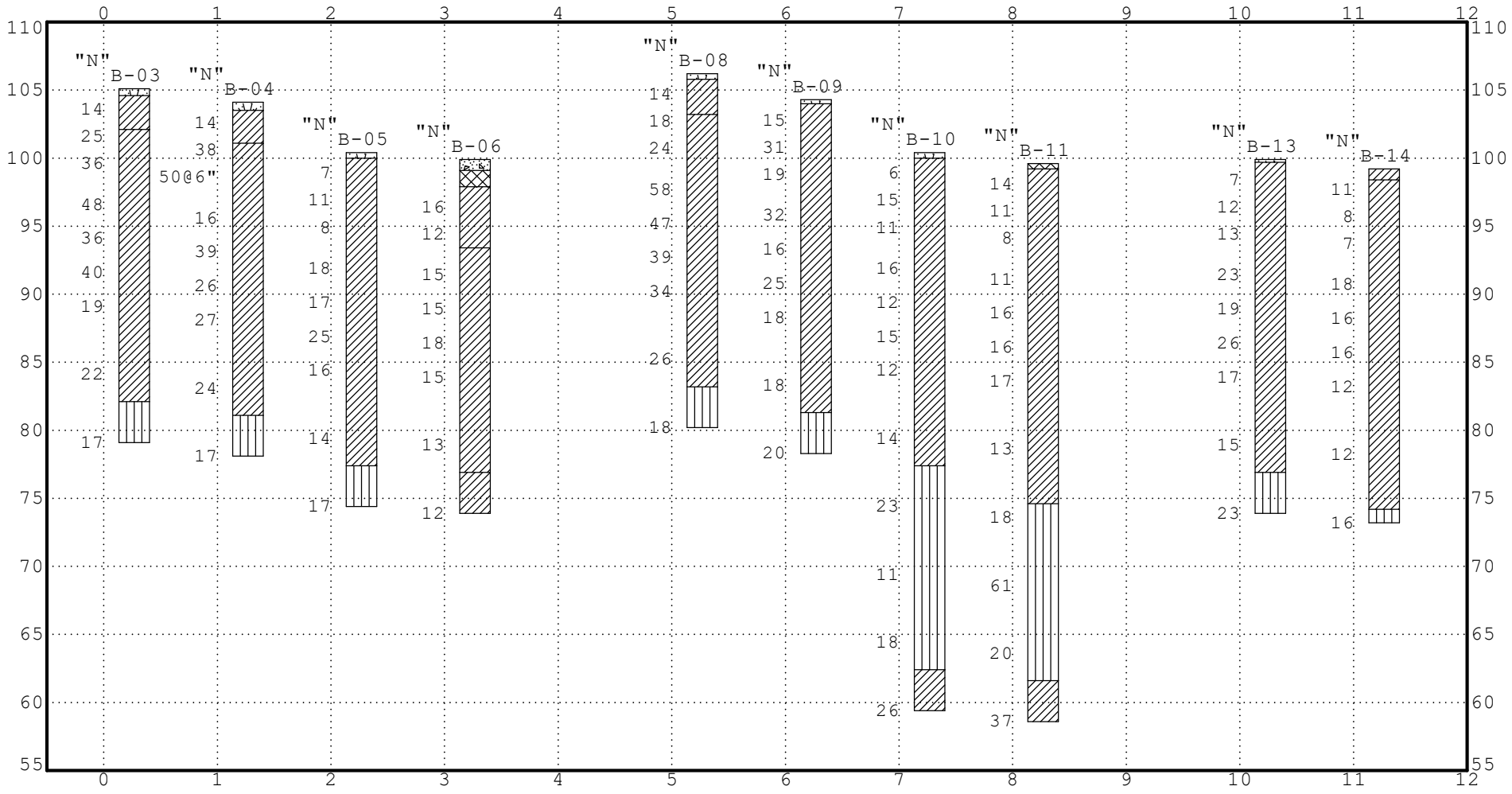


SOIL PROFILE DIAGRAM

Ice And Turf Facility

Williston, ND

PROJECT #	DATE	PLATE
G25-068	Dec 25	1



SOIL PROFILE DIAGRAM BUILDING BOREHOLES		
Ice And Turf Facility Williston, ND		
PROJECT #	DATE	PLATE
G25-068	Dec 25	1

MATERIAL TESTING SERVICES, LLC
Box 634
Minot, North Dakota 58702
(701) 852-5553

SOIL BORING RECORD

BORING NUMBER	**B-01**	SHEET **1** OF **1**	
PROJECT	**Ice And Turf Facility**		
PROJECT LOCATION	**Williston, ND**		
PROJECT NUMBER	**G25-068**		
START DATE	**11/17/25**	FINISH DATE	**11/17/25**

LAYER DEPTH/ ELEVATION (FT)	SOIL DESCRIPTION	SYMBOLIC LOG	ELEVATION/ DEPTH (FT)	GEOLOGY	SAMPLE TYPE	SAMPLE LEGEND	SAMPLE D (pcf)	SAMPLE N VALUES BLOWS/FT	SAMPLE WATER LEVEL	TEST RESULTS MOISTURE CONTENT (%)	TEST RESULTS LIQUID LIMIT (%)	TEST RESULTS PLASTIC LIMIT (%)	TEST RESULTS Qu (psf)
0.8 104.2	**Topsoil, Organic Sandy Lean Clay,** dark brown (OL)		0 105.0	Topsoil	SB			12					
	Sandy Lean Clay, light brown, trace gravel, appeared dry, firm, (CL)			Glacial Till	SB			15					
3.0 102.0	**Clayey Sand,** light brown, trace gravel, appeared dry, very hard, (SC)				SB			41					
5.0 100.0	**Sandy Lean Clay,** brown, trace gravel, apeared dry to 14', hard to very hard, (CL)		5 100.0		SB			63					
			10 95.0		SB			24					
					SB			41					
16.0			15 90.0		SB			24					
89.0	End of Boring NM = None Measured												

DRILLER	**RB**
METHOD	**4" FA from 0-14.5'**
LOGGER	**JF**
REVIEWER	**AF**
DRILL RIG	**CME 45**

WATER LEVEL MEASUREMENTS

DATE	TIME	SAMPLED DEPTH	CASING DEPTH	CAVE-IN DEPTH	DRILLING MUD LEVEL	WATER LEVEL
11/17/25	1550	16		14.3		NM

MATERIAL TESTING SERVICES, LLC
Box 634
Minot, North Dakota 58702
(701) 852-5553

SOIL BORING RECORD

BORING NUMBER	**B-02**	SHEET **1** OF **1**	
PROJECT	**Ice And Turf Facility**		
PROJECT LOCATION	**Williston, ND**		
PROJECT NUMBER	**G25-068**		
START DATE	**11/17/25**	FINISH DATE	**11/17/25**

LAYER DEPTH/ ELEVATION (FT)	SOIL DESCRIPTION	SYMBOLIC LOG	ELEVATION/ DEPTH (FT)	GEOLOGY	SAMPLE TYPE	SAMPLE LEGEND	SAMPLE D (pcf)	SAMPLE N VALUES BLOWS/FT	SAMPLE WATER LEVEL	TEST RESULTS MOISTURE CONTENT (%)	TEST RESULTS LIQUID LIMIT (%)	TEST RESULTS PLASTIC LIMIT (%)	TEST RESULTS Qu (psf)
0.4 100.4	**Topsoil, Organic Sandy Lean Clay,** dark brown (OL)		0 100.8	Topsoil	SB			14					
	Silty Sand, brown, some gravel, medium dense, (CL)			Coarse Alluvium	SB			14					
3.0 97.8	**Sandy Lean Clay,** brown, trace gravel and lignite, firm to hard, (CL)			Glacial Till	SB			11					
			5 95.8		SB			23					
			10 90.8		SB			15					
					SB			16					
16.0 84.8			15 85.8		SB			16					
	End of Boring NM = None Measured												

DRILLER	**RB**
METHOD	**4" FA from 0-14.5'**
LOGGER	**JF**
REVIEWER	**SW**
DRILL RIG	**CME 45**

WATER LEVEL MEASUREMENTS

DATE	TIME	SAMPLED DEPTH	CASING DEPTH	CAVE-IN DEPTH	DRILLING MUD LEVEL	WATER LEVEL
11/18/25	1050	16		15.0		NM

MATERIAL TESTING SERVICES, LLC
Box 634
Minot, North Dakota 58702
(701) 852-5553

SOIL BORING RECORD

BORING NUMBER	**B-03**	SHEET **1** OF **1**	
PROJECT	**Ice And Turf Facility**		
PROJECT LOCATION	**Williston, ND**		
PROJECT NUMBER	**G25-068**		
START DATE	**11/17/25**	FINISH DATE	**11/17/25**

LAYER DEPTH/ ELEVATION (FT)	SOIL DESCRIPTION	SYMBOLIC LOG	ELEVATION/ DEPTH (FT)	GEOLOGY	SAMPLE TYPE	SAMPLE LEGEND	SAMPLE D (pcf)	SAMPLE N VALUES BLOWS/FT	SAMPLE WATER LEVEL	TEST RESULTS MOISTURE CONTENT (%)	TEST RESULTS LIQUID LIMIT (%)	TEST RESULTS PLASTIC LIMIT (%)	TEST RESULTS Qu (psf)
0.5 / 104.6	**Topsoil, Organic Sandy Lean Clay,** dark brown (OL)		0 / 105.1	Topsoil	SB			14					
	Sandy Lean Clay, dark brown, weathered, appeared dry, trace gravel, firm to hard, (CL)			Glacial Till	SB			25					
3.0 / 102.1	**Sandy Lean Clay/Clayey Sand,** brown, trace gravel, appeared dry to 14', hard to very hard, (CL/SC)				SB			36		8	38	17	
			5 / 100.1		SB			48		4			
			10 / 95.1		SB			36					
					SB			40					
			15 / 90.1		SB			19					
					SB			22					
23.0 / 82.1	**Sandy Silt,** light brown, medium dense, (ML)		20 / 85.1	Fine Alluvium									
26.0 / 79.1	End of Boring NM = None Measured		25 / 80.1		SB			17		8			

DRILLER	**RB**
METHOD	**4" FA from 0-24.5'**
LOGGER	**JF**
REVIEWER	**SW**
DRILL RIG	**CME 45**

WATER LEVEL MEASUREMENTS

DATE	TIME	SAMPLED DEPTH	CASING DEPTH	CAVE-IN DEPTH	DRILLING MUD LEVEL	WATER LEVEL
11/17/25	1505	26		24.8		NM

MATERIAL TESTING SERVICES, LLC
Box 634
Minot, North Dakota 58702
(701) 852-5553

SOIL BORING RECORD

BORING NUMBER	**B-04**	SHEET **1** OF **1**	
PROJECT	**Ice And Turf Facility**		
PROJECT LOCATION	**Williston, ND**		
PROJECT NUMBER	**G25-068**		
START DATE	**11/18/25**	FINISH DATE	**11/18/25**

LAYER DEPTH/ ELEVATION (FT)	SOIL DESCRIPTION	SYMBOLIC LOG	ELEVATION/ DEPTH (FT)	GEOLOGY	SAMPLE TYPE	SAMPLE LEGEND	SAMPLE D (pcf)	SAMPLE N VALUES BLOWS/FT	SAMPLE WATER LEVEL	TEST RESULTS MOISTURE CONTENT (%)	TEST RESULTS LIQUID LIMIT (%)	TEST RESULTS PLASTIC LIMIT (%)	TEST RESULTS Qu (psf)
0.6 103.5	**Topsoil, Organic Sandy Lean Clay,** dark brown (OL)		0 104.1	Topsoil Glacial Till	SB			14					
	Sandy Lean Clay, dark brown, weathered, appeared dry, trace organics, firm to very hard, (CL)				SB			38		8			
3.0 101.1	**Sandy Lean Clay,** brown, trace gravel, appeared dry to 9', hard to very hard, (CL) hit rock at 5'		5 99.1		SB cobble			50@6"					
					SB			16					
			10 94.1		SB			39					
					SB			26					
			15 89.1		SB			27					
			20 84.1		SB			24					
23.0 81.1	**Sandy Silt,** light brown, medium dense, (ML)			Fine Alluvium									
			25 79.1		SB			17					
26.0 78.1	End of Boring NM = None Measured												

DRILLER	**RB**
METHOD	**4" FA from 0-24.5'**
LOGGER	**JF**
REVIEWER	**SW**
DRILL RIG	**CME 45**

WATER LEVEL MEASUREMENTS

DATE	TIME	SAMPLED DEPTH	CASING DEPTH	CAVE-IN DEPTH	DRILLING MUD LEVEL	WATER LEVEL
11/18/25	1015	26		24.0		NM

MATERIAL TESTING SERVICES, LLC
Box 634
Minot, North Dakota 58702
(701) 852-5553

SOIL BORING RECORD

BORING NUMBER	**B-05**	SHEET **1** OF **1**	
PROJECT	**Ice And Turf Facility**		
PROJECT LOCATION	**Williston, ND**		
PROJECT NUMBER	**G25-068**		
START DATE	**11/18/25**	FINISH DATE	**11/18/25**

LAYER DEPTH/ ELEVATION (FT)	SOIL DESCRIPTION	SYMBOLIC LOG	ELEVATION/ DEPTH (FT)	GEOLOGY	SAMPLE TYPE	SAMPLE LEGEND	SAMPLE D (pcf)	SAMPLE N VALUES BLOWS/FT	SAMPLE WATER LEVEL	TEST RESULTS MOISTURE CONTENT (%)	TEST RESULTS LIQUID LIMIT (%)	TEST RESULTS PLASTIC LIMIT (%)	TEST RESULTS Qu (psf)
0.4 / 100.0	**Topsoil, Organic Sandy Lean Clay,** dark brown (OL)		0 / 100.4	Topsoil	SB			7					
	Sandy Lean Clay, brown, trace gravel, sand lenses, soft to hard, (CL)			Glacial Till	SB			11					
					SB			8		15			
			5 / 95.4		SB			18					
					SB			17					
			10 / 90.4		SB			25					
					SB			16					
			15 / 85.4										
					SB			14					
23.0 / 77.4	**Sandy Silt,** light brown, medium dense, (ML)		20 / 80.4	Fine Alluvium									
					SB			17					
26.0 / 74.4	End of Boring NM = None Measured		25 / 75.4										

DRILLER	**RB**
METHOD	**4" FA from 0-24.5'**
LOGGER	**JF**
REVIEWER	**SW**
DRILL RIG	**CME 45**

WATER LEVEL MEASUREMENTS

DATE	TIME	SAMPLED DEPTH	CASING DEPTH	CAVE-IN DEPTH	DRILLING MUD LEVEL	WATER LEVEL
11/18/25	915	26		24.6		NM

MATERIAL TESTING SERVICES, LLC
Box 634
Minot, North Dakota 58702
(701) 852-5553

SOIL BORING RECORD

BORING NUMBER	**B-06**	SHEET **1** OF **1**	
PROJECT	**Ice And Turf Facility**		
PROJECT LOCATION	**Williston, ND**		
PROJECT NUMBER	**G25-068**		
START DATE	**11/18/25**	FINISH DATE	**11/18/25**

LAYER DEPTH/ ELEVATION (FT)	SOIL DESCRIPTION	SYMBOLIC LOG	ELEVATION/ DEPTH (FT)	GEOLOGY	SAMPLE TYPE	SAMPLE LEGEND	SAMPLE D (pcf)	SAMPLE N VALUES BLOWS/FT	SAMPLE WATER LEVEL	TEST RESULTS MOISTURE CONTENT (%)	TEST RESULTS LIQUID LIMIT (%)	TEST RESULTS PLASTIC LIMIT (%)	TEST RESULTS Qu (psf)
0.8	**Approximately 10" of Concrete**		0 / 99.9	Filll									
99.1	**Fill, base course, sand with silt and gravel,**				SB								
2.0	dark brown												
97.9	**Sandy Lean Clay,** dark brown, trace gravel, firm to hard, (CL)			Glacial Till	SB			16					
					SB			12		12	36	15	
			5 / 94.9										
6.5													
93.4	**Sandy Lean Clay,** brown, trace gravel and lignite, firm to hard, (CL)				SB			15					
			10 / 89.9		SB			15					
					SB			18					
			15 / 84.9		SB			15					
			20 / 79.9		SB			13					
23.0													
76.9	**Lean Clay,** brown, trace lignite, firm, (CL)			Fine Alluvium									
			25 / 74.9		SB			12					
26.0													
73.9	End of Boring NM = None Measured												

DRILLER	**RB**
METHOD	**4" FA from 0-24.5'**
LOGGER	**JF**
REVIEWER	**SW**
DRILL RIG	**CME 45**

WATER LEVEL MEASUREMENTS

DATE	TIME	SAMPLED DEPTH	CASING DEPTH	CAVE-IN DEPTH	DRILLING MUD LEVEL	WATER LEVEL
11/18/25	1505	26		24.4		NM

MATERIAL TESTING SERVICES, LLC
Box 634
Minot, North Dakota 58702
(701) 852-5553

SOIL BORING RECORD

BORING NUMBER	**B-07**	SHEET **1** OF **1**	
PROJECT	**Ice And Turf Facility**		
PROJECT LOCATION	**Williston, ND**		
PROJECT NUMBER	**G25-068**		
START DATE	**11/17/25**	FINISH DATE	**11/17/25**

LAYER DEPTH/ ELEVATION (FT)	SOIL DESCRIPTION	SYMBOLIC LOG	ELEVATION/ DEPTH (FT)	GEOLOGY	SAMPLE TYPE	SAMPLE LEGEND	SAMPLE D (pcf)	SAMPLE N VALUES BLOWS/FT	SAMPLE WATER LEVEL	TEST RESULTS MOISTURE CONTENT (%)	TEST RESULTS LIQUID LIMIT (%)	TEST RESULTS PLASTIC LIMIT (%)	TEST RESULTS Qu (psf)
0.7	**Topsoil, Organic Lean Clay,** dark brown, (OL)		0 107.0	Fill	SB			16					
106.3	**Fill, sandy lean clay,** brown, trace gravel, trace organics, (CL)				SB			15		10			
					SB			23					
			5 102.0										
	hit rock/cobble at 6'												
8.0					SB			34					
99.0	**Sandy Lean Clay,** brown, trace gravel, very hard, (CL)			Glacial Till									
			10 97.0		SB			40					
					SB			34					
			15 92.0		SB			37					
16.0													
91.0	End of Boring NM = None Measured												

DRILLER	**RB**
METHOD	**4" FA from 0-14.5'**
LOGGER	**JF**
REVIEWER	**SW**
DRILL RIG	**CME 45**

WATER LEVEL MEASUREMENTS

DATE	TIME	SAMPLED DEPTH	CASING DEPTH	CAVE-IN DEPTH	DRILLING MUD LEVEL	WATER LEVEL
11/17/25	1630	16		14.2		NM

MATERIAL TESTING SERVICES, LLC
Box 634
Minot, North Dakota 58702
(701) 852-5553

SOIL BORING RECORD

BORING NUMBER	**B-08**	SHEET **1** OF **1**	
PROJECT	**Ice And Turf Facility**		
PROJECT LOCATION	**Williston, ND**		
PROJECT NUMBER	**G25-068**		
START DATE	**11/17/25**	FINISH DATE	**11/17/25**

LAYER DEPTH/ ELEVATION (FT)	SOIL DESCRIPTION	SYMBOLIC LOG	ELEVATION/ DEPTH (FT)	GEOLOGY	SAMPLE TYPE	SAMPLE LEGEND	SAMPLE D (pcf)	SAMPLE N VALUES BLOWS/FT	SAMPLE WATER LEVEL	TEST RESULTS MOISTURE CONTENT (%)	TEST RESULTS LIQUID LIMIT (%)	TEST RESULTS PLASTIC LIMIT (%)	TEST RESULTS Qu (psf)
0.4 / 105.8	**Topsoil, Organic Sandy Lean Clay,** dark brown, (OL)		0 / 106.2	Topsoil	SB			14					
	Sandy Lean Clay, dark brown, weathered, appeared dry, trace organics, firm, (CL)			Glacial Till	SB			18		11			
3.0 / 103.2	**Sandy Lean Clay,** brown, trace gravel and lignite, appeared dry to 11', hard to very hard, (CL)		5 / 101.2		SB			24					
					SB			58					
			10 / 96.2		SB			47					
					SB			39					
			15 / 91.2		SB			34					
			20 / 86.2		SB			26					
23.0 / 83.2	**Sandy Silt,** brown, medium dense, (ML)			Fine Alluvium									
			25 / 81.2		SB			18					
26.0 / 80.2	End of Boring NM = None Measured												

DRILLER	**RB**
METHOD	**4" FA from 0-24.5'**
LOGGER	**JF**
REVIEWER	**SW**
DRILL RIG	**CME 45**

WATER LEVEL MEASUREMENTS

DATE	TIME	SAMPLED DEPTH	CASING DEPTH	CAVE-IN DEPTH	DRILLING MUD LEVEL	WATER LEVEL
11/17/25	1400	26		23.5		NM

MATERIAL TESTING SERVICES, LLC
Box 634
Minot, North Dakota 58702
(701) 852-5553

SOIL BORING RECORD

BORING NUMBER	**B-09**	SHEET **1** OF **1**	
PROJECT	**Ice And Turf Facility**		
PROJECT LOCATION	**Williston, ND**		
PROJECT NUMBER	**G25-068**		
START DATE	**11/17/25**	FINISH DATE	**11/17/25**

LAYER DEPTH/ ELEVATION (FT)	SOIL DESCRIPTION	SYMBOLIC LOG	ELEVATION/ DEPTH (FT)	GEOLOGY	SAMPLE TYPE	SAMPLE LEGEND	SAMPLE D (pcf)	SAMPLE N VALUES BLOWS/FT	SAMPLE WATER LEVEL	TEST RESULTS MOISTURE CONTENT (%)	TEST RESULTS LIQUID LIMIT (%)	TEST RESULTS PLASTIC LIMIT (%)	TEST RESULTS Qu (psf)
0.3			0										
104.0	**Topsoil, Organic Sandy Lean Clay,** dark brown, (OL)		104.3	Topsoil	SB			15					
				Glacial Till									
	Sandy Lean Clay, brown, trace gravel and lignite, appeared dry to 8', hard to very hard, (CL)				SB			31					
					SB			19		7	26	13	
			5 99.3										
					SB			32					
					SB			16					
			10 94.3										
					SB			25					
					SB			18					
			15 89.3										
					SB			18					
			20 84.3										
23.0													
81.3	**Sandy Silt,** brown, trace lignite, medium dense, (ML)			Fine Alluvium									
					SB			20					
			25 79.3										
26.0													
78.3	End of Boring NM = None Measured												

DRILLER	**RB**
METHOD	**4" FA from 0-24.5'**
LOGGER	**JF**
REVIEWER	**SW**
DRILL RIG	**CME 45**

WATER LEVEL MEASUREMENTS

DATE	TIME	SAMPLED DEPTH	CASING DEPTH	CAVE-IN DEPTH	DRILLING MUD LEVEL	WATER LEVEL
11/17/25	1250	26		24.2		NM

MATERIAL TESTING SERVICES, LLC
Box 634
Minot, North Dakota 58702
(701) 852-5553

SOIL BORING RECORD

BORING NUMBER	**B-10**	SHEET **1** OF **1**	
PROJECT	**Ice And Turf Facility**		
PROJECT LOCATION	**Williston, ND**		
PROJECT NUMBER	**G25-068**		
START DATE	**11/18/25**	FINISH DATE	**11/18/25**

LAYER DEPTH/ ELEVATION (FT)	SOIL DESCRIPTION	SYMBOLIC LOG	ELEVATION/ DEPTH (FT)	GEOLOGY	SAMPLE TYPE	SAMPLE LEGEND	SAMPLE D (pcf)	SAMPLE N VALUES BLOWS/FT	SAMPLE WATER LEVEL	TEST RESULTS MOISTURE CONTENT (%)	TEST RESULTS LIQUID LIMIT (%)	TEST RESULTS PLASTIC LIMIT (%)	TEST RESULTS Qu (psf)
0.4 100.0	**Topsoil, Organic Sandy Lean Clay,** dark brown, (OL)		0 100.4	Topsoil Glacial Till	SB			6					
	Sandy Lean Clay, brown, trace gravel and lignite, sand lenses, firm to hard, (CL)				SB			15					
			5 95.4		SB			11		17			
					SB			16					
			10 90.4		SB			12					
					SB			15					
			15 85.4		SB			12					
			20 80.4		SB			14					
23.0 77.4	**Sandy Silt,** brown, trace lignite, medium dense, (ML)			Fine Alluvium									
			25 75.4		SB			23					
			30 70.4		SB			11					
			35 65.4		SB			18					
38.0 62.4	**Lean Clay,** grayish brown, hard, (CL)												
41.0			40 60.4		SB			26					
59.4	End of Boring NM = None Measured												

DRILLER	**RB**
METHOD	**4" FA from 0-39.5'**
LOGGER	**JF**
REVIEWER	**SW**
DRILL RIG	**CME 45**

WATER LEVEL MEASUREMENTS

DATE	TIME	SAMPLED DEPTH	CASING DEPTH	CAVE-IN DEPTH	DRILLING MUD LEVEL	WATER LEVEL
11/18/25	1100	41		23.3		NM
11/20/25	1645			29.6		NM

MATERIAL TESTING SERVICES, LLC
Box 634
Minot, North Dakota 58702
(701) 852-5553

SOIL BORING RECORD

BORING NUMBER	**B-11**	SHEET **1** OF **1**	
PROJECT	**Ice And Turf Facility**		
PROJECT LOCATION	**Williston, ND**		
PROJECT NUMBER	**G25-068**		
START DATE	**11/18/25**	FINISH DATE	**11/18/25**

LAYER DEPTH/ ELEVATION (FT)	SOIL DESCRIPTION	SYMBOLIC LOG	ELEVATION/ DEPTH (FT)	GEOLOGY	SAMPLE TYPE	SAMPLE LEGEND	SAMPLE D (pcf)	SAMPLE N VALUES BLOWS/FT	SAMPLE WATER LEVEL	TEST RESULTS MOISTURE CONTENT (%)	TEST RESULTS LIQUID LIMIT (%)	TEST RESULTS PLASTIC LIMIT (%)	TEST RESULTS Qu (psf)
0.4 / 99.2	**Fill, mostly sand with silt and gravel,** dark brown		0 / 99.6	Fill	SB			14					
	Sandy Lean Clay, dark brown to brown, trace gravel and lignite, soft to hard, (CL)			Glacial Till	SB			11					
			5 / 94.6		SB		128	8		12			1916
					SB			11					
			10 / 89.6		SB			16					
					SB			16					
			15 / 84.6		SB			17					
			20 / 79.6		SB			13					
25.0 / 74.6	**Sandy Silt,** brown, clay lenses, medium dense to very dense, (ML)		25 / 74.6	Fine Alluvium	SB			18					
			30 / 69.6		SB			61					
			35 / 64.6		SB			20					
38.0 / 61.6	**Lean Clay,** grayish brown, very hard, (CL)												
41.0 / 58.6	End of Boring NM = None Measured		40 / 59.6		SB			37					

DRILLER	**RB**
METHOD	**4" FA from 0-39.5'**
LOGGER	**JF**
REVIEWER	**SW**
DRILL RIG	**CME 45**

WATER LEVEL MEASUREMENTS

DATE	TIME	SAMPLED DEPTH	CASING DEPTH	CAVE-IN DEPTH	DRILLING MUD LEVEL	WATER LEVEL
11/18/25	1400	41		28.4		NM

MATERIAL TESTING SERVICES, LLC
Box 634
Minot, North Dakota 58702
(701) 852-5553

SOIL BORING RECORD

BORING NUMBER	**B-12**	SHEET **1** OF **1**	
PROJECT	**Ice And Turf Facility**		
PROJECT LOCATION	**Williston, ND**		
PROJECT NUMBER	**G25-068**		
START DATE	**11/18/25**	FINISH DATE	**11/18/25**

LAYER DEPTH/ ELEVATION (FT)	SOIL DESCRIPTION	SYMBOLIC LOG	ELEVATION/ DEPTH (FT)	GEOLOGY	SAMPLE TYPE	SAMPLE LEGEND	SAMPLE D (pcf)	SAMPLE N VALUES BLOWS/FT	SAMPLE WATER LEVEL	TEST RESULTS MOISTURE CONTENT (%)	TEST RESULTS LIQUID LIMIT (%)	TEST RESULTS PLASTIC LIMIT (%)	TEST RESULTS Qu (psf)
	Fill, mostly sandy lean clay, dark brown, trace organics, some topsoil mixed in		0 99.2	Fill	SB			8					
2.0 97.2	**Sandy Lean Clay,** brown, trace gravel, soft to hard, (CL)			Glacial Till	SB			16		12			
					SB			7					
			5 94.2		SB			27					
			10 89.2		SB			20					
					SB			23					
			15 84.2		SB			14					
16.0 83.2	End of Boring NM = None Measured												

DRILLER	**RB**
METHOD	**4" FA from 0-14.5'**
LOGGER	**JF**
REVIEWER	**SW**
DRILL RIG	**CME 45**

WATER LEVEL MEASUREMENTS

DATE	TIME	SAMPLED DEPTH	CASING DEPTH	CAVE-IN DEPTH	DRILLING MUD LEVEL	WATER LEVEL
11/18/25	1210	16		14.5		NM

MATERIAL TESTING SERVICES, LLC
Box 634
Minot, North Dakota 58702
(701) 852-5553

SOIL BORING RECORD

BORING NUMBER	**B-13**	SHEET **1** OF **1**	
PROJECT	**Ice And Turf Facility**		
PROJECT LOCATION	**Williston, ND**		
PROJECT NUMBER	**G25-068**		
START DATE	**11/17/25**	FINISH DATE	**11/17/25**

LAYER DEPTH/ ELEVATION (FT)	SOIL DESCRIPTION	SYMBOLIC LOG	ELEVATION/ DEPTH (FT)	GEOLOGY	SAMPLE TYPE	SAMPLE LEGEND	SAMPLE D (pcf)	SAMPLE N VALUES BLOWS/FT	SAMPLE WATER LEVEL	TEST RESULTS MOISTURE CONTENT (%)	TEST RESULTS LIQUID LIMIT (%)	TEST RESULTS PLASTIC LIMIT (%)	TEST RESULTS Qu (psf)
0.2 99.7	**Topsoil, Organic Sandy Lean Clay,** dark brown, (OL)		0 99.9	Topsoil Glacial Till	SB			7					
	Sandy Lean Clay, brown, trace gravel and lignite, sand lenses, soft to hard, (CL)				SB			12					
					SB			13					
			5 94.9										
					SB			23					
					SB			19					
			10 89.9										
					SB			26					
					SB			17					
			15 84.9										
			20 79.9		SB			15					
23.0 76.9	**Sandy Silt,** brown, medium dense, (ML)			Fine Alluvium									
			25 74.9		SB			23					
26.0 73.9	End of Boring NM = None Measured												

DRILLER	**RB**
METHOD	**4" FA from 0-24.5'**
LOGGER	**JF**
REVIEWER	**SW**
DRILL RIG	**CME 45**

WATER LEVEL MEASUREMENTS

DATE	TIME	SAMPLED DEPTH	CASING DEPTH	CAVE-IN DEPTH	DRILLING MUD LEVEL	WATER LEVEL
11/17/25	1150	26		24.8		NM

MATERIAL TESTING SERVICES, LLC
Box 634
Minot, North Dakota 58702
(701) 852-5553

SOIL BORING RECORD

BORING NUMBER	**B-14**	SHEET **1** OF **1**	
PROJECT	**Ice And Turf Facility**		
PROJECT LOCATION	**Williston, ND**		
PROJECT NUMBER	**G25-068**		
START DATE	**11/18/25**	FINISH DATE	**11/18/25**

LAYER DEPTH/ ELEVATION (FT)	SOIL DESCRIPTION	SYMBOLIC LOG	ELEVATION/ DEPTH (FT)	GEOLOGY	SAMPLE TYPE	SAMPLE LEGEND	SAMPLE D (pcf)	SAMPLE N VALUES BLOWS/FT	SAMPLE WATER LEVEL	TEST RESULTS MOISTURE CONTENT (%)	TEST RESULTS LIQUID LIMIT (%)	TEST RESULTS PLASTIC LIMIT (%)	TEST RESULTS Qu (psf)
0.8 / 98.4	**Sandy Lean Clay,** dark brown, trace organics, mottled, (CL)		0 / 99.2	Glacial Till	SB			11					
	Sandy Lean Clay, brown, trace gravel and lignite, silty sand lense at 3', soft to hard, (CL)				SB			8					
					SB			7		13			
			5 / 94.2										
					SB			18					
			10 / 89.2		SB			16					
					SB			16					
			15 / 84.2		SB			12					
			20 / 79.2		SB			12					
25.0 / 74.2			25 / 74.2		SB			16					
26.0 / 73.2	**Sandy Silt,** brown, medium dense, (ML)			Fine Alluvium									
	End of Boring NM = None Measured												

DRILLER	**RB**
METHOD	**4" FA from 0-24.5'**
LOGGER	**JF**
REVIEWER	**SW**
DRILL RIG	**CME 45**

WATER LEVEL MEASUREMENTS

DATE	TIME	SAMPLED DEPTH	CASING DEPTH	CAVE-IN DEPTH	DRILLING MUD LEVEL	WATER LEVEL
11/18/25	1125	26		23.8		NM

MATERIAL TESTING SERVICES, LLC
Box 634
Minot, North Dakota 58702
(701) 852-5553

SOIL BORING RECORD

BORING NUMBER	**B-15**	SHEET **1** OF **1**	
PROJECT	**Ice And Turf Facility**		
PROJECT LOCATION	**Williston, ND**		
PROJECT NUMBER	**G25-068**		
START DATE	**11/19/25**	FINISH DATE	**11/19/25**

LAYER DEPTH/ ELEVATION (FT)	SOIL DESCRIPTION	SYMBOLIC LOG	ELEVATION/ DEPTH (FT)	GEOLOGY	SAMPLE TYPE	SAMPLE LEGEND	SAMPLE D (pcf)	SAMPLE N VALUES BLOWS/FT	SAMPLE WATER LEVEL	TEST RESULTS MOISTURE CONTENT (%)	TEST RESULTS LIQUID LIMIT (%)	TEST RESULTS PLASTIC LIMIT (%)	TEST RESULTS Qu (psf)
0.4	**Topsoil, Organic Sandy Lean Clay,** dark brown, (OL)		0 105.0	Topsoil	SB			20					
104.6	**Sandy Lean Clay,** brown, trace gravel and lignite, appeared dry to 9', trace of organics to 6', hard to very hard, (CL)			Glacial Till	SB			48		6			
					SB			53					
			5 100.0										
					SB			42					
					SB			28					
			10 95.0										
					SB			23					
					SB			20					
16.0			15 90.0										
89.0	End of Boring NM = None Measured												

DRILLER	**RB**
METHOD	**4" FA from 0-14.5'**
LOGGER	**JF**
REVIEWER	**SW**
DRILL RIG	**CME 45**

WATER LEVEL MEASUREMENTS

DATE	TIME	SAMPLED DEPTH	CASING DEPTH	CAVE-IN DEPTH	DRILLING MUD LEVEL	WATER LEVEL
11/19/25	1010	16		14.2		NM

MATERIAL TESTING SERVICES, LLC
Box 634
Minot, North Dakota 58702
(701) 852-5553

SOIL BORING RECORD

BORING NUMBER	**B-16**	SHEET **1** OF **1**	
PROJECT	**Ice And Turf Facility**		
PROJECT LOCATION	**Williston, ND**		
PROJECT NUMBER	**G25-068**		
START DATE	**11/19/25**	FINISH DATE	**11/19/25**

LAYER DEPTH/ ELEVATION (FT)	SOIL DESCRIPTION	SYMBOLIC LOG	ELEVATION/ DEPTH (FT)	GEOLOGY	SAMPLE TYPE	SAMPLE LEGEND	SAMPLE D (pcf)	SAMPLE N VALUES BLOWS/FT	SAMPLE WATER LEVEL	TEST RESULTS MOISTURE CONTENT (%)	TEST RESULTS LIQUID LIMIT (%)	TEST RESULTS PLASTIC LIMIT (%)	TEST RESULTS Qu (psf)
0.3 108.2	**Topsoil, Organic Sandy Lean Clay,** dark brown, (OL)		0 108.5	Topsoil	SB			8					
	Sandy Lean Clay, brown, trace gravel and lignite, sand lenses, soft hard, (CL)			Glacial Till	SB			11		10			
					SB			11					
			5 103.5		SB			20					
			10 98.5		SB			15					
					SB			14					
16.0			15 93.5		SB			15					
92.5	End of Boring NM = None Measured												

DRILLER	**RB**
METHOD	**4" FA from 0-14.5'**
LOGGER	**JF**
REVIEWER	**SW**
DRILL RIG	**CME 45**

WATER LEVEL MEASUREMENTS

DATE	TIME	SAMPLED DEPTH	CASING DEPTH	CAVE-IN DEPTH	DRILLING MUD LEVEL	WATER LEVEL
11/19/25	925	16		15.2		NM

MATERIAL TESTING SERVICES, LLC
Box 634
Minot, North Dakota 58702
(701) 852-5553

SOIL BORING RECORD

BORING NUMBER	**B-17**	SHEET **1** OF **1**	
PROJECT	**Ice And Turf Facility**		
PROJECT LOCATION	**Williston, ND**		
PROJECT NUMBER	**G25-068**		
START DATE	**11/18/25**	FINISH DATE	**11/18/25**

LAYER DEPTH/ ELEVATION (FT)	SOIL DESCRIPTION	SYMBOLIC LOG	ELEVATION/ DEPTH (FT)	GEOLOGY	SAMPLE TYPE	SAMPLE LEGEND	SAMPLE D (pcf)	SAMPLE N VALUES BLOWS/FT	SAMPLE WATER LEVEL	TEST RESULTS MOISTURE CONTENT (%)	TEST RESULTS LIQUID LIMIT (%)	TEST RESULTS PLASTIC LIMIT (%)	TEST RESULTS Qu (psf)
0.7	**Approx. 8" of Asphalt**		0 97.2	Fill									
96.5	**Fill, base course, sand with silt and gravel,** brown, (SP-SM)				SB			20					
1.0 96.2	**Sandy Lean Clay,** brown, trace gravel, sand lense at 3', soft to hard, (CL)			Glacial Till	SB			48					
					SB			53		14			
			5 92.2										
					SB			42					
			10 87.2		SB			28					
					SB			23					
			15 82.2		SB			20					
16.0													
81.2	End of Boring NM = None Measured												

DRILLER	**RB**
METHOD	**4" FA from 0-14.5'**
LOGGER	**JF**
REVIEWER	**SW**
DRILL RIG	**CME 45**

WATER LEVEL MEASUREMENTS

DATE	TIME	SAMPLED DEPTH	CASING DEPTH	CAVE-IN DEPTH	DRILLING MUD LEVEL	WATER LEVEL
11/18/25	1555	16		15.2		NM

SYMBOLS AND DESCRIPTIVE TERMINOLOGY ON TEST BORING LOG

SYMBOLS FOR DRILLING AND SAMPLING

Symbol	Description
HSA	3 1/4" I.D. hollow stem auger
_FA	4", 6" or 10" diameter flight auger
_HA	2", 4" or 6" hand auger
_DC	2 1/2", 4", 5" or 6" steel drive casing
_RC	Size A, B or N rotary casing
PD	Pipe drill or cleanout tube
CS	Continuous split barrel sampling
DM	Drilling mud
JW	Jetting water
SB	2" O.D. split barrel sampling
_L	2 1/2" or 3 1/2" O.D. SB liner sample
_T	2" or 3" thin walled tube sample
3TP	3" thin walled tube using pitcher sampler
_TO	2" or 3" thin walled tube using Osterberg sampler
W	Wash sample
B	Bag sample
P	Test pit sample
_Q	BQ, NQ, or PQ wireline system
_X	AX, BX, or NX double tube barrel
N	Standard penetration test, blows per foot
CR	Core recovery, percent
WL	Water level
?	Water level
NMR	No measurement recorded, primarily due to presence of drilling or coring fluid

SYMBOLS FOR LABORATORY TESTS

Symbol	Description
W	Water content
D	Dry density - pounds per cubic foot
LL	Liquid limit - ASTM** D 4318
PL	Plastic limit - ASTM D 4318
	--- Inserts in Last Column (Qu or RQD) ---
Qu	Unconfined compressive strength, psf - ASTM D 2166
Pq	Penetrometer reading, tsf
Ts	Torvane reading, tsf
G	Specific gravity
SL	Shrinkage limits - ASTM D 427
OC	Organic content - Combustion method
SP	Swell pressure, tsf
PS	Percent swell under pressure
FS	Free swell, percent
SS	Shrink swell, percent
pH	Hydrogen ion content - Meter Method
SC	Sulfate content, parts/million or mg/l
CC	Chloride content, parts/million or mg/l
C*	One dimensional consolidation - ASTM D 2435
Qc*	Triaxial compression
D.S.*	Direct shear - ASTM D 3080
K*	Coefficient of permeability, cm/sec
DH*	Double hydrometer - ASTM D 4221
MA*	Particle size analysis - ASTM D 422
R	Laboratory electrical resistivity, ohm-cm - ASTM G 57
E*	Pressuremeter deformation modulus, tsf
PM*	Pressuremeter test
VS*	Field vane shear - ASTM D 2573
IR*	Infiltrometer test - ASTM D 3385
RQD	Rock quality designation, percent
*	Results shown on attached data sheet or graph
**	ASTM designates American Society for Testing and Materials

DESCRIPTIONS OF N-VALUES VS. SOIL PROPERTIES

N Value	Density	N Value	Consistency
0 - 4	Very loose	0 - 4	Very soft
5 - 10	Loose	5 - 8	Soft
11 - 30	Medium dense	9 - 15	Firm
31 - 50	Dense	16 - 30	Hard
Over 50	Very dense	Over 30	Very hard

DESCRIPTIONS OF SOIL CONDITIONS

Condition	Description
Lamination	Up to 1/2" thick stratum
Layer	1/2" to 6" thick stratum
Dry	Powdery, no noticeable water
Moist	Below saturation
Wet	Saturated, above liquid limit
Waterbearing	Pervious soil below water
Varved	Alternating laminations of any combinations of clay, silt and fine grained sand

DESCRIPTIONS OF GRAVEL PROPORTIONS IN SOILS

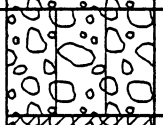
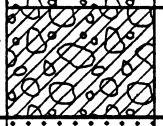
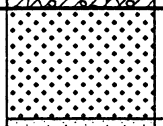
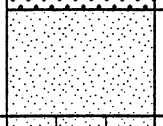
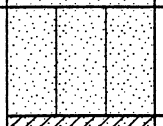
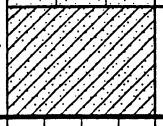
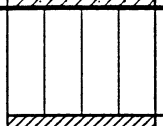
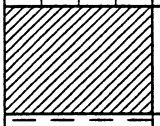
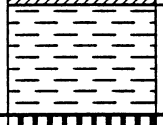
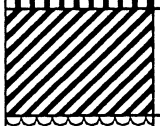
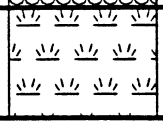
Soil Type	Description	Range, %
Coarse grained soils	A little gravel	2 - 14
Coarse grained soils	With gravel	15 - 49
Fine grained soils:		
71-85% passing #200 sieve	A little gravel	2 - 7
71-85% passing #200 sieve	With gravel	8 - 29
70% passing #200 sieve	A little gravel	2 - 14
70% passing #200 sieve	With gravel	15 - 24
70% passing #200 sieve	Gravelly	16 - 49

DESCRIPTIONS OF PARTICLE SIZES

Material Type	Size
Boulders	Over 12"
Cobbles	3" - 12"
Coarse gravel	3/4" - 3"
Fine gravel	#4 sieve - 3/4"
Coarse sand	#4 - #10 sieve
Medium sand	#10 - #40 sieve
Fine sand	#40 - #200 sieve
Silt	100% passing #200 sieve and > 0.002mm
Clay	100% passing #200 sieve and < 0.002mm

c:\wpwin\forms\desc

SOIL CLASSIFICATION CHART

MAJOR DIVISIONS			SYMBOLS		TYPICAL DESCRIPTIONS
			GRAPH	LETTER	
COARSE GRAINED SOILS MORE THAN 50% OF MATERIAL IS LARGER THAN NO. 200 SIEVE SIZE	GRAVEL AND GRAVELLY SOILS MORE THAN 50% OF COARSE FRACTION RETAINED ON NO. 4 SIEVE	CLEAN GRAVELS (LITTLE OR NO FINES)		GW	WELL-GRADED GRAVELS, GRAVEL - SAND MIXTURES, LITTLE OR NO FINES
				GP	POORLY-GRADED GRAVELS, GRAVEL - SAND MIXTURES, LITTLE OR NO FINES
		GRAVELS WITH FINES (APPRECIABLE AMOUNT OF FINES)		GM	SILTY GRAVELS, GRAVEL - SAND - SILT MIXTURES
				GC	CLAYEY GRAVELS, GRAVEL - SAND - CLAY MIXTURES
	SAND AND SANDY SOILS MORE THAN 50% OF COARSE FRACTION PASSING ON NO. 4 SIEVE	CLEAN SANDS (LITTLE OR NO FINES)		SW	WELL-GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES
				SP	POORLY-GRADED SANDS, GRAVELLY SAND, LITTLE OR NO FINES
		SANDS WITH FINES (APPRECIABLE AMOUNT OF FINES)		SM	SILTY SANDS, SAND - SILT MIXTURES
				SC	CLAYEY SANDS, SAND - CLAY MIXTURES
FINE GRAINED SOILS MORE THAN 50% OF MATERIAL IS SMALLER THAN NO. 200 SIEVE SIZE	SILTS AND CLAYS	LIQUID LIMIT LESS THAN 50		ML	INORGANIC SILTS AND VERY FINE SANDS, ROCK FLOUR, SILTY OR CLAYEY FINE SANDS OR CLAYEY SILTS WITH SLIGHT PLASTICITY
				CL	INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY, GRAVELLY CLAYS, SANDY CLAYS, SILTY CLAYS, LEAN CLAYS
				OL	ORGANIC SILTS AND ORGANIC SILTY CLAYS OF LOW PLASTICITY
	SILTS AND CLAYS	LIQUID LIMIT GREATER THAN 50		MH	INORGANIC SILTS, MICACEOUS OR DIATOMACEOUS FINE SAND OR SILTY SOILS
				CH	INORGANIC CLAYS OF HIGH PLASTICITY
				OH	ORGANIC CLAYS OF MEDIUM TO HIGH PLASTICITY, ORGANIC SILTS
HIGHLY ORGANIC SOILS				PT	PEAT, HUMUS, SWAMP SOILS WITH HIGH ORGANIC CONTENTS

NOTE: DUAL SYMBOLS ARE USED TO INDICATE BORDERLINE SOIL CLASSIFICATIONS

<<TemplateID>> <<Format(<<Now>>,<<fdNumSlash>>)>>

APPENDIX B – LABORATORY TEST PROGRAM

B.1 Testing Scope
B.2 Test Methods

Attachments to Appendix B

Unconfined Compression
Mechanical Sieve Analysis
CBR
Moisture-density Relationship

B. LABORATORY TEST RESULTS

B.1. Testing Scope

Laboratory testing was conducted to characterize soil properties including Atterberg limits (liquid and plastic limits), mechanical sieve analysis, in-situ moisture contents, unconfined compression, moisture-density relationship, and CBR. Results are listed on the boring logs or attached test reports.

B.2. Test Methods

Testing and classification of soils was performed in accordance with the following standards as applicable:

Description	ASTM Method
Unified soil classification system	D 2487
Atterberg limits	D 4318
In-situ moisture content	D 2216
Sieve analysis	D 422, C 117, C 136
Moisture-density relationship	D 698 or D 1557
In-situ dry density	Direct measurement
Unconfined compression, Qu	D 2166
California Bearing Ratio - CBR	D 1883

MATERIAL TESTING SERVICES, LLC

PO Box 634
Minot, ND 58702
(701) 852-5553

7101 W 2nd Ave
Williston, ND 58801
(701) 572-4226

UNCONFINED COMPRESSIVE STRENGTH
ASTM D 2166

PROJECT: ICE AND TURF FACILITY
WILLISTON, ND

DATE: 30-Dec-25

COPIES TO:

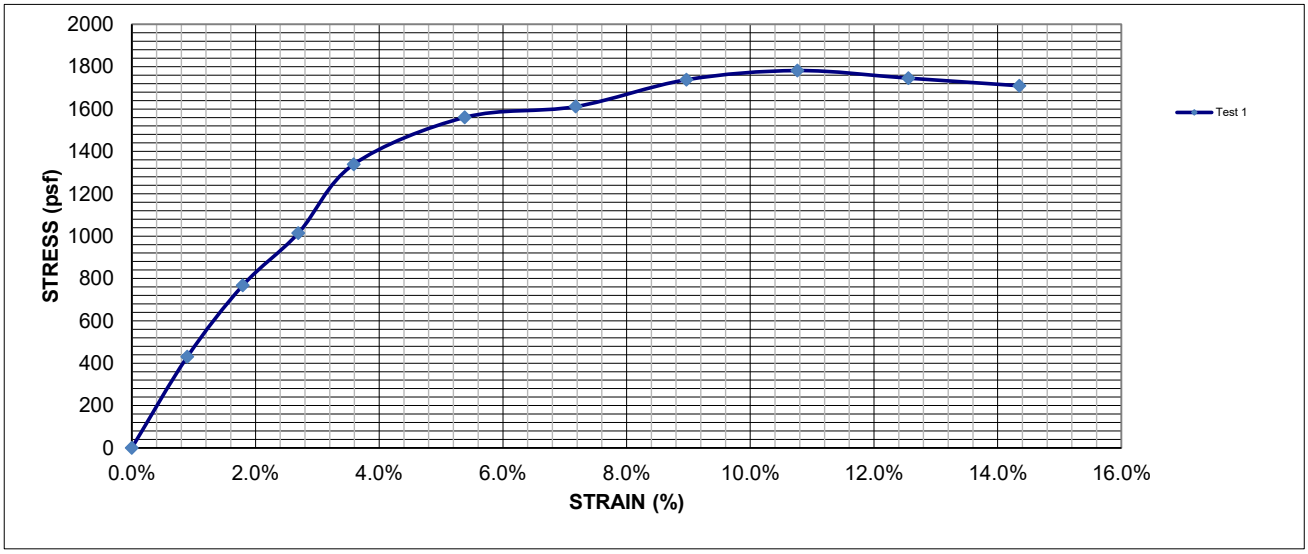
REPORTED TO: Williston Parks and Recreation District
822 18th Street East
Williston, ND 58801

MTS No. G25-067

Specimen ID: **Test 1**
Boring B-11
SS, 4-5 feet

Soil Class: Sandy Lean Clay (CL)

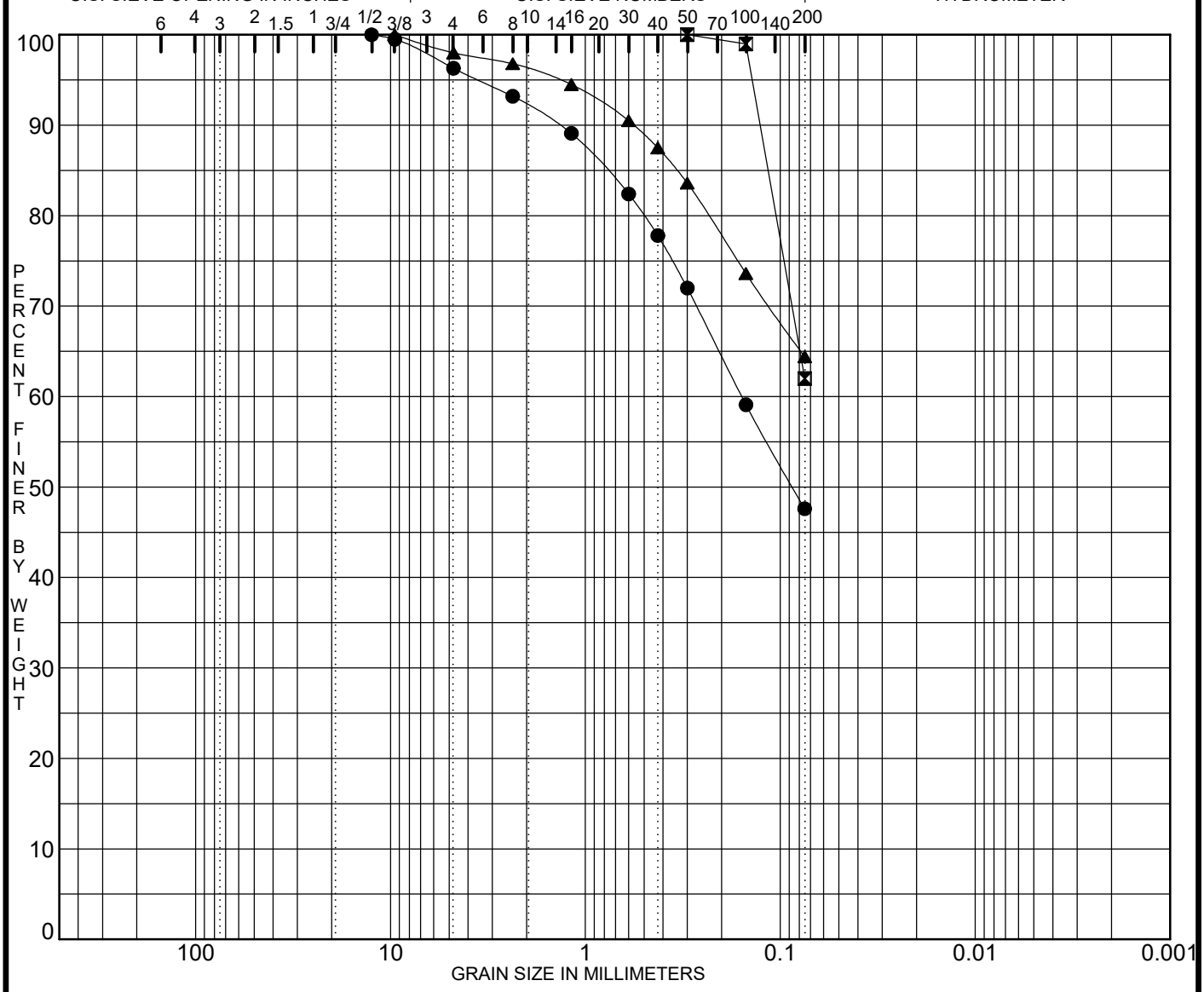
Dry Density (pcf):	128.0
Water Content:	11.8%
Sample Dia. (mm):	35.6
Sample Ht (mm):	70.8
Height/Diameter:	1.99
Unc. Strength (psf):	**1916**
Strain at Failure (%):	10.8



AS A MUTUAL PROTECTION TO CLIENTS, THE PUBLIC AND OURSELVES, ALL REPORTS ARE SUBMITTED AS THE CONFIDENTIAL PROPERTY OF CLIENTS, AND AUTHORIZATION FOR PUBLICATION OF STATEMENTS, CONCLUSIONS OR EXTRACTS FROM OR REGARDING OUR REPORTS IS RESERVED PENDING OUR WRITTEN APPROVAL.

Material Testing Services, LLC

by



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	Boring No.	Depth (ft)	Classification	MC%	LL	PL	PI	Cc	Cu
●	**B-03**	**7.0**	**Clayey Sand (CL)**	**4**					
⊠	**B-03**	**24.5**	**Sandy Silt (ML)**	**8**					
▲	**Bulk 1**	**0.0**	**SANDY LEAN CLAY CL**		**34**	**13**	**21**		

	Boring No.	Depth (ft)	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	**B-03**	**7.0**	**12.50**	**0.16**			**3.7**	**48.7**	**47.6**	
⊠	**B-03**	**24.5**	**0.30**				**0.0**	**38.0**	**62.0**	
▲	**Bulk 1**	**0.0**	**9.50**				**2.0**	**33.6**	**64.4**	

PROJECT **Ice And Turf Facility, Williston, ND**

JOB NO. **G25-068**

DATE **12/30/25**

PARTICLE SIZE ANALYSIS

PO Box 634 Material Testing Services, LLC Minot, ND 58702

MATERIAL TESTING SERVICES, LLC

PO Box 634
Minot, ND 58702
(701) 852-5553

7101 W 2nd Ave
Williston, ND 58801
(701) 572-4226

CALIFORNIA BEARING RATIO - ASTM 1883

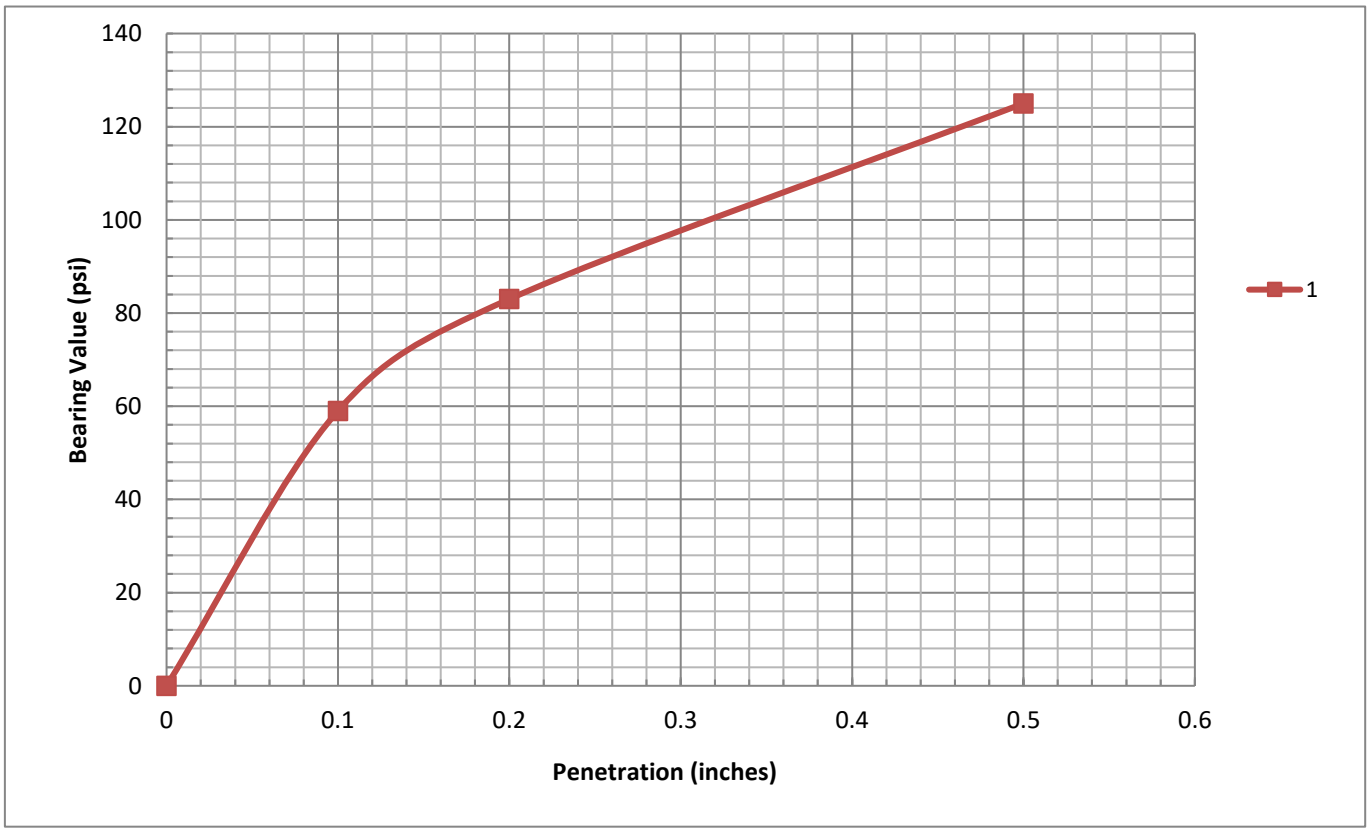
PROJECT: WILLISTON ICE AND TURF FACILITY
WILLISTON, ND

DATE: 31-Dec-25

REPORTED TO: Williston Parks and Recreation Department

Laboratory Number G25-068

SAMPLE IDENTIFICATION:		Bulk 1 Boring 16
SOIL DESCRIPTION:		CL
MOISTURE-DENSITY RELATION: (ASTM D 698)	Max Dry Density (pcf)	119.1
	Optimum Moisture %	12.3
TEST TRIAL:		**1**
Dry Density, at molding		113.2
Moisture Content, at molding		12.3
% of Maximum Dry Density		95.0
Moisture Content after soaking		18.1
CORRECTED BEARING RATIO:		
at 0.1" penetration		5.9
at 0.2" penetration		5.6
SWELL, % of initial heights		1.07
SURCHARGE WEIGHT (pounds):		10.00



MATERIAL TESTING SERVICES, LLC

P.O. Box 634
Minot, ND 58702
(701) 852-5553

7101 W 2nd Avenue
Williston, ND 58801
(701) 572-4226

MOISTURE-DENSITY RELATIONSHIP

PROJECT: WILLISTON ICE AND TURF FACILITY
WILLISTON, ND

DATE: 31-Dec-25

COPIES TO:

REPORTED TO: Williston Parks and Recreation Department

MTS No. G25-068

Sample Number: Bulk 1

Sample ID: subgrade, auger cuttings, boring B-16

Sampled 11/19/25
Tested 11/25/25

Soil Description: Brown SANDY LEAN CLAY

Unified Soil Classification: CL

Results:

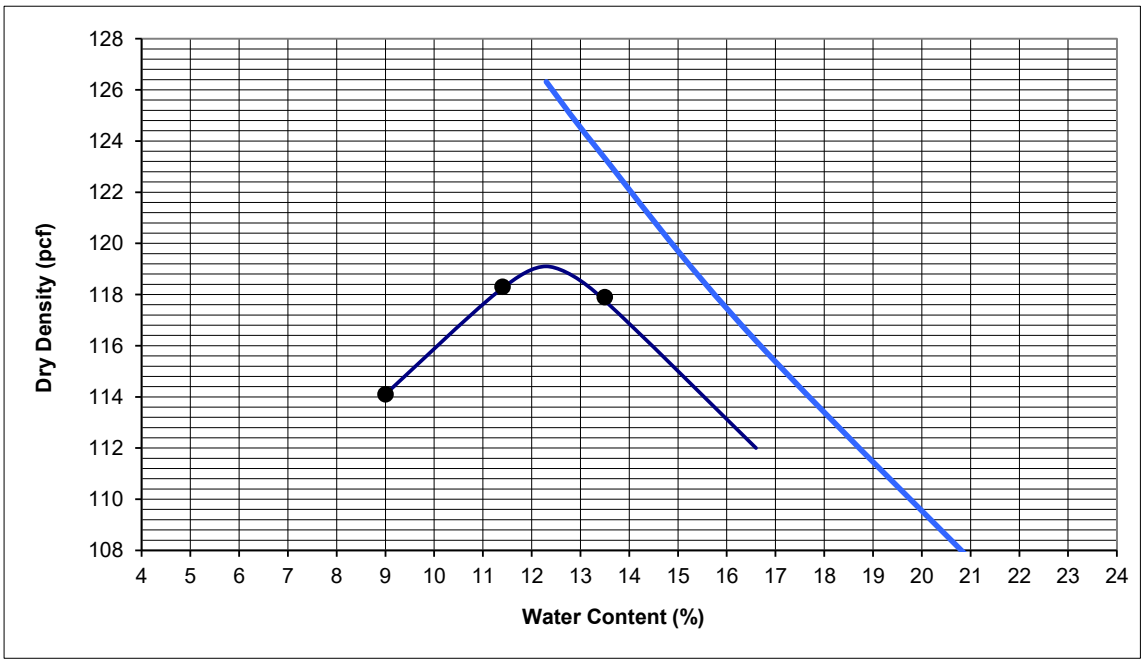
Method	**ASTM D698, Method B (manual)**	
Maximum Dry Density	**119.1**	pcf
Optimum Moisture Content	**12.3**	%
ZAV Specific Gravity (est.):	2.70	

Sieve Analysis
ASTM D422, D1140

	% Passing
3/4"	100
3/8"	100
#4	98
#8	97
#16	95
#30	91
#50	84
#100	74
#200	64

Atterberg limits
ASTM D4318, dry prep

LL	34
PL	13
PI	21



AS A MUTUAL PROTECTION TO CLIENTS, THE PUBLIC AND OURSELVES, ALL REPORTS ARE SUBMITTED AS THE CONFIDENTIAL PROPERTY OF CLIENTS, AND AUTHORIZATION FOR PUBLICATION OF STATEMENTS, CONCLUSIONS OR EXTRACTS FROM OR REGARDING OUR REPORTS IS RESERVED PENDING OUR WRITTEN APPROVAL.

Material Testing Services, LLC

by

APPENDIX C

Precautions for Excavating & Refilling During Cold Weather

PRECAUTIONS FOR EXCAVATING AND REFILLING DURING COLD WEATHER

The winter in North Dakota presents specific problems for foundation construction. Soils which are allowed to freeze undergo a moisture volume expansion, resulting in a loss of density. These frost-expanded soils will consolidate upon thawing, causing settlement of any structure supported on them. To prevent this settlement, frost should not be allowed to penetrate the soil below any proposed structure.

Ideally, winter excavation should be limited to areas small enough to be refilled to a grade higher than footing grade on the same day. Typically, these areas should be filled to floor grade. Trenching back down to unfrozen soils for foundation construction can then be performed just prior to footing placement. The excavated trenches should be protected from freezing by means of insulating or heating during foundation construction. Backfilling of the foundation trenches should be performed immediately after the below-grade foundation construction is finished. In addition, any interior footings, or footings designed without frost protection should be extended below frost depth, unless adequate precautions are taken to prevent frost intrusion until the building can be enclosed and heated.

In many cases, final grade cannot be attained in one day's time, even though small areas are worked. In the event final grade cannot be attained in one day's time, frost can be expected to develop overnight. The depth of frost penetration can be minimized by leaving a layer of loose soil on top of the compacted material overnight. However, any frost which forms in this loose layer, or snow, should never be used as fill material.

After the structure has been enclosed, all floor slab areas should be subjected to ample periods of heating to allow thawing of the soil system. Alternatively, the frozen soil can be completely removed and be replaced with an engineered fill. The floor slab areas should be checked at random and representative locations for remnant areas of frost, and density tests should be performed to document fill compaction prior to slab placement.

Due to the potential problems associated with fill placement during cold weather, any filling operations should be monitored by a full-time, on-site soils technician. Full-time monitoring aids in detecting areas of frozen material, or potential problems with frozen material within the fill, so that appropriate measures can be taken. The choice of fill material is particularly important during cold weather, since clean granular fill materials can be placed and compacted more efficiently than silty or clayey soils. In addition, greater magnitudes of heaving can be expected with freezing of the more frost susceptible silts and clays.

If more specific frost information or cold weather data concerning other construction materials is required, please contact us.

March 25, 2026

Attn: Joe Barsh
Williston Parks and Recreation Department
822 18th Street East
Williston, ND 58801

PROJECT: ADDENDUM 1
PROPOSED WILLISTON ICE AND TURF FACILITY
WILLISTON, ND
G25-068

Dear Mr. Barsh:

This addendum addresses the recommendations for the subbase material beneath the ice rink. The ice rink floor section ICE/2 was provided to us for review.

The ice rink subgrade has two main areas of concern: capillary rise from the underlying clay soils and the potential for frost heave. While the design includes heating of the subbase to address frost heave, the heat piping and insulation alone will likely not completely stop the subsoil from freezing over longer time periods. Therefore, we recommend placing 42 inches (3.5 feet) of free draining, non-frost susceptible subbase material beneath the insulation. The subbase material should meet the grading specifications shown in table 1 below. This gradation should prevent frost heave beneath the floor and serve as a capillary break. We recommend providing us with the gradation of the material prior to order and delivery to the site.

Table 1 – Ice Rink Subbase

Sieve	Percent Passing
1”	100
#50	5-30
#200	Less than 5

The subbase material should be compacted in maximum 6” lifts and be compacted to a minimum of 100% of the maximum density as determined by ASTM D 698. The higher compaction level is to help reduce settlement of the subbase. With the 42-inch subbase layer it appears the subgrade will be all cut. Based on the borings, the subgrade soils appear to be quite competent to carry the floor loads. However, we recommend the subgrade be proof rolled with a loaded dump or water truck prior to placing subbase material to identify soft spots. Any soft spots should be stabilized prior to placing the subbase.

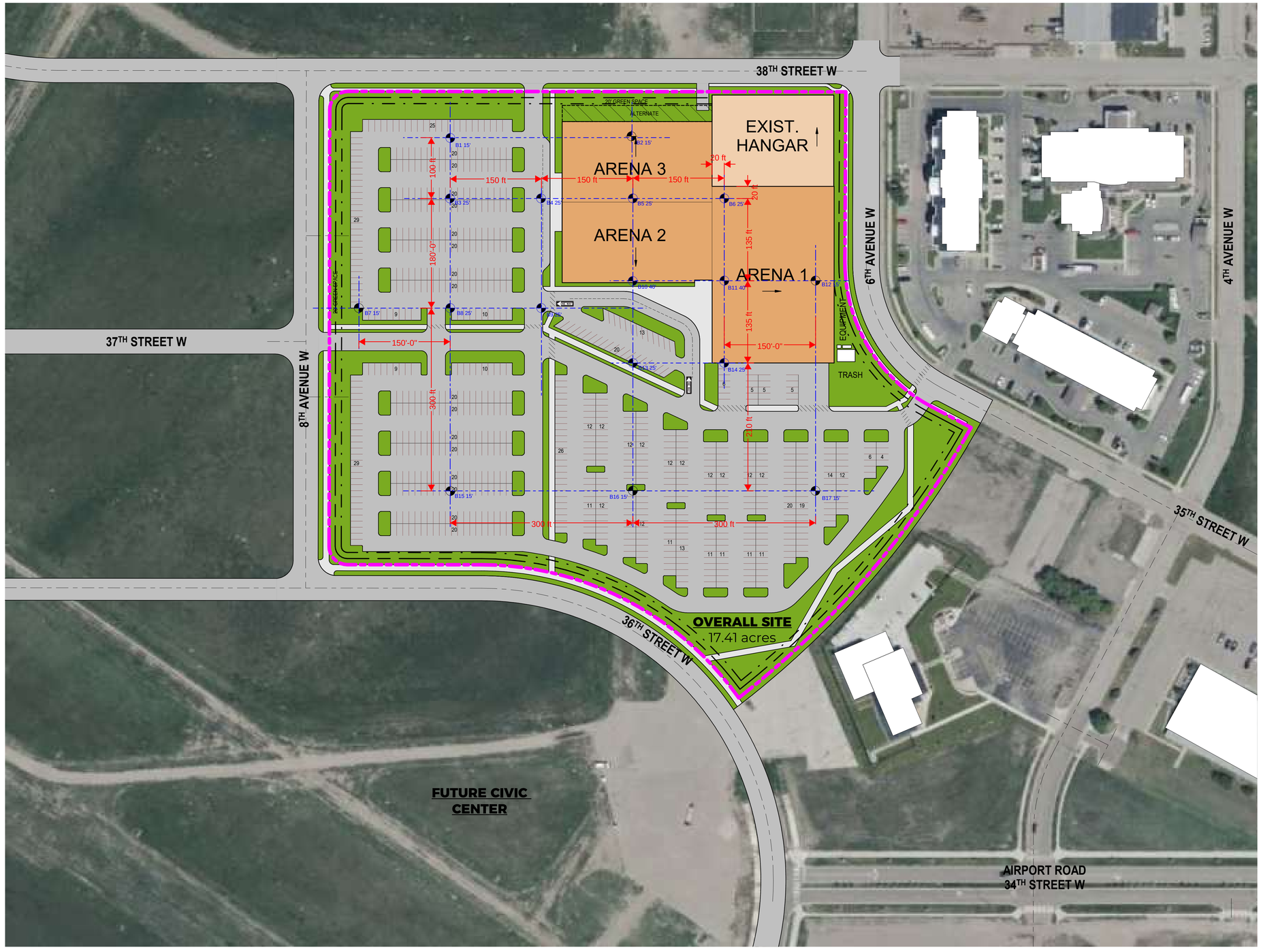
A draintile system should be placed at the bottom of the subbase layer to collect subsurface water to remove it from beneath the slab. It should either be sloped to a collection point where water can be removed, or the drain tile should be daylighted outside the building footprint or tied into the storm sewer system. If the drain tile is daylighted, the pipe at the location of the discharge should be protected so that the pipe is not damaged or clogged. A proper sand filter and/or geotextile filter sock should be placed around the tile to prevent clogging.

With the recommended site preparation and proper construction techniques, the floor settlement should be within tolerable limits.

Please contact us if you have any questions.

Sincerely,
MATERIAL TESTING SERVICES, LLC

Steven Wald, PE
President



PARKING COUNT

LOT 1	33
LOT 2	233
LOT 3	208
LOT 4	335
LOT 5	21
TOTAL	830

1 SD001 **Ground Level Plan**
1" = 80'-0"

0' 150' 300' 450' 600'

NORTH

Williston Parks & Recreation District

Williston Ice

Site Plan

ICON ARCHITECTURAL GROUP

WWW.ICONARCHITECTS.COM
JOB NO. 24-096|01/27/26
© 2025

REPORT OF
GEOTECHNICAL EXPLORATION

Proposed Hangars
Sloulin Field International Airport
Williston, North Dakota

For

Attn: Mr. Rick Marburger
City of Williston
PO Box 1306
Williston, ND 58802

Laboratory Number 10-204

August 4, 2010

August 4, 2010

Attn: Mr. Rick Marburger
City of Williston
PO Box 1306
Williston, ND 58802

ref: **Geotechnical Exploration Report**
Proposed Hangars
Sloulin Field International Airport
Williston, North Dakota
Laboratory Number 10-204

Dear Mr. Marburger:

As requested, enclosed is a geotechnical report for the proposed hangars. Information contained in the report will be used for the design and construction of foundations and floor slabs.

The analysis was based on the ten foot deep borings that were drilled for the preliminary soil testing services for the pavement areas. Therefore, we strongly recommend that at least four borings be extended to 25 feet below existing grade to verify our assumptions.

The soil samples will be stored at the laboratory for a period of fourteen days from the date of this report. The samples will then be discarded unless we are requested to store them for a longer period of time.

Please call if you have any questions or comments concerning this report.

Sincerely,
MATERIALS TESTING SERVICES, LLC

Steven A. Wald, PE
Managing Partner

TABLE OF CONTENTS

Proposed Hangars
Sloulin Field International Airport
Williston, North Dakota

INTRODUCTION	Page 1
PROCEDURES	Page 1
SURFACE OBSERVATIONS	Page 1
SUBSURFACE CONDITIONS	Page 2
BACKGROUND INFORMATION	Page 3
CONCLUSIONS AND RECOMMENDATIONS	Page 4
Discussion	Page 4
Excavation and Site Preparation	Page 5
Foundations	Page 5
Floor Slabs	Page 6
Foundation Backfill	Page 7
Site Drainage	Page 7
Exterior Slabs	Page 7
Excavation Slopes	Page 8
CONSTRUCTION TESTING AND OBSERVATIONS	Page 8
APPENDIX A	Site Sketch, Profile, Boring Logs, Terminology Used on Logs Soil Classification Chart
APPENDIX B	Laboratory Reports

Report of Geotechnical Exploration Program

Proposed Hangars
Sloulin Field International Airport
Williston, North Dakota

Laboratory Number 10-204

INTRODUCTION

The purpose of this exploration was to give recommendations on the suitability of the existing soils for the proposed construction. It is our understanding that only the north hangar is to be constructed at this time.

PROCEDURES

Five borings were drilled for the project. The borings were drilled with standard penetration-split spoon methods, in accordance with ASTM D 1586. Soils were classified in accordance with ASTM Visual-Manual methods (ASTM D 2488). Additional information regarding drilling procedures and soils classification is given on the sheets included in appendix A.

The approximate location of each boring is shown on the site sketch included in appendix A. The ground level elevation of each boring was referenced to the existing shop floor (TBM) at the northwest overhead door. The TBM was assigned an elevation of 100.0 feet.

SURFACE OBSERVATIONS

The surface of the site was covered with grass and gravel. The site appeared to be fairly flat with general drainage to the east. The elevations of the borings ranged from 1902 feet at boring 1 to 1898.6 feet at boring 10.

SUBSURFACE CONDITIONS

Information on the subsurface conditions is given on the attached boring logs. The logs include: descriptions and classifications of soils encountered, the depths to noted soil changes, water level measurements, and soil test results. Standard penetration resistance values are given in the N columns of the logs. A sheet included in appendix A describes symbols and descriptive terminology used on the boring logs. Also included in appendix A is a soil classification chart.

Soils

Existing fill soils consisting mostly of brown to dark brown sandy lean clay (CL) were encountered at each boring. In borings 10 and 11 the fill extended to the depth of the boring or 11 feet. The following table lists the fill depths encountered at the borings.

Boring	Fill (feet)
1	3
2	4
3	9
4	6.5
5	6.5
6	2.5
7	3
8	1
9	1
10	11+
11	11+

The naturally deposited soils beneath the fill and were predominately sandy lean clay (CL). However, a layer of sand (SP) was encountered in boring 6 from 2.5 to 4 feet deep. Judging from the N values, the naturally deposited cohesive soils ranged from soft to very hard in consistency. The sandy layer in boring 4 was loose in consistency.

No cobbles or boulders were encountered during drilling; however; boulders and cobbles are common within glacial till soils and may be encountered during excavations.

Groundwater

Groundwater was measured in boring 10 only at 8.5 feet below the surface. The boreholes were backfilled on the day of drilling. Therefore, it is possible that the upper most static water level was not measured at the time of drilling.

It should be noted that groundwater levels can be expected to fluctuate both yearly and seasonally. The water levels may change significantly from the time of the investigation to the time of construction. Also, in relatively impervious soils, such as the clayey soils encountered at this site, the groundwater must be monitored for an extended time to accurately determine the upper static water level. Long term monitoring of the groundwater was not part of our scope of services.

BACKGROUND INFORMATION

The following represents our understanding of the project. If there are changes to the project data, or if some of the information is not correct, it is necessary that we be provided with the additional or correct information for further review.

The proposed hangars will be rectangular in shape and approximately 100’ x 200’ in plan dimension. The hangars will be a free span. The finish floor elevation will be 1901 feet.

The following building loads were provided to us for the north hangar. Wall loadings will not exceed 7 kips per lineal foot and column loadings along the front doorway will range from 225 to 450 kips.

CONCLUSIONS AND RECOMMENDATIONS

The recommendations contained in this report represent our professional opinions. These opinions were arrived at in accordance with currently accepted engineering practices. Other than this, no warranty is intended or implied.

Discussion

The main concern at the site is the presence of fill. The N values in the fill indicate that some compaction control was probably used during its placement. However, without quality control records including compaction tests, the fill should be considered uncontrolled and therefore should be removed and replaced with controlled, compacted fill. **The fill could be left in place beneath the floor area if the owner is willing to assume the risk of detrimental settlement and possible repair in the future. However, it should be considered imperative to remove and replace the fill beneath the footings.**

Several test pits could be dug and density tests could be taken in the fill to help aid the owner in making a decision on whether or not to leave the fill in-place. This would not, however, totally eliminate the risk of detrimental settlement.

Excavation and Site Preparation

We recommend that all existing fill be removed from the building footprint prior to placing any new fill. Any disturbed soils should be removed or re-compacted prior to placing additional fill. The excavation should be oversized if it extends beneath the footing elevation one foot horizontally for every foot of fill vertically.

Structural fill beneath the floors should consist of non expansive, non organic lean clay, sand or sand with gravel. Sand fill that contains gravel should have 100 percent passing the 2-inch sieve. Sand fill should be classified as an SP, SW, SW-

SM, or SP-SM based on the Unified Soil Classification System. If lean clay is used it should have a liquid limit of 40 or less. We would not recommend using fat clay (CH) for fill below the building. All clays, whether on-site or off-site clays, should be placed at a moisture content of minus 1 to plus 3 percent of optimum moisture content unless laboratory swell tests indicate that the clay would not be expansive at lower moisture contents. Structural fill beneath footings should consist of a granular material as stated above.

The existing fill soils appear to be reusable beneath the floor areas but should be determined by the geotechnical engineer or his representative at the time of excavation.

Loose lift thicknesses should be no more than 8 inches. Vibratory rollers should be used to compact sands and sheepsfoot type compactors should be used on clays. Any fill that is to support floor slabs should be compacted to at least 95 percent of maximum dry density as determined according to ASTM D 698 (standard Proctor). Structural fill that will support footings should be compacted to 98%.

If earthwork is done during periods of freezing temperatures, we recommend protecting the fill from freezing once it has been placed. No frozen soils should be used as fill and fill should not be placed on frozen ground. Earthwork could be difficult in the spring or late fall when conditions are often cool and wet.

Foundations

Foundation excavations should be performed with a backhoe that has a smooth cutting edge to reduce the disturbance of the excavation bottom. Any soils that are disturbed will need to be removed or re-compacted prior to placing concrete. If groundwater is encountered it will need to be controlled with surface or sump pumps during construction.

In our opinion, the natural, undisturbed soils or controlled, compacted fill are capable of supporting a maximum net allowable soil bearing capacity of 4000 psf for continuous footings. Isolated square column pads can be designed using a maximum net allowable bearing capacity of 4500 psf. In our opinion, these loadings should result in a theoretical safety factor of 3 or more with respect to a punching shear failure. Total and differential settlements should not exceed 1 inch and ¾ inches, respectively.

In order to calculate settlement we assumed that the natural soils would be consistent with what was encountered for approximately 20 feet below footing grade. Therefore, we strongly recommend that at least four borings be extended to 25 feet below existing grade to verify our assumptions.

We recommend that perimeter footings in heated buildings be provided with at least 5 feet of final cover for frost protection. Unheated structures should have 7 feet of final cover for frost protection.

Floor Slabs

We recommend that the existing fill be removed and replaced beneath the floor slab as stated in the "Excavation and Site Preparation" section above. We recommend that slabs on grade be constructed structurally independent of foundation walls and columns. We also recommend a 6-inch layer of free draining sand be placed directly below the slabs. The sand should have less than seven percent passing the #200 sieve by weight. If it contains gravel, the gravel should have a maximum size of one inch. The sandy layer will be used to provide a working surface for concrete placement and serve as a capillary break.

If there will be glued surfacing or other surfacing that is moisture sensitive on the floor slabs, we recommend placing a vapor barrier below the slabs. The vapor

barrier should consist of suitable polyethylene sheeting to minimize moisture migration to the slab.

Foundation Backfill

We recommend that the exterior foundation backfill be compacted in loose lift thicknesses not to exceed 6 inches. Compaction should be to minimum of 92 percent of ASTM D 698 in lawn areas. Backfill which will support slabs, sidewalks or driveways should be compacted to at least 95 percent of ASTM D 698.

Site Drainage

We advise that adequate drainage be maintained during and after construction. We also recommend an appropriate closed conduit system be used to control roof drainage. Downspouts should have extensions and splash pads to carry the water well away from the backfill line.

Exterior grades in lawn areas should slope away from the building at a rate of 1 inch per foot or greater for a distance of at least 10 feet from the building.

Exterior Slabs

Due to the potential for frost movement for exterior slabs, precautions should be taken to minimize future post-construction movement of **sensitive** slabs due to frost action. Sensitive slabs are slabs that cannot tolerate much movement without causing some difficulties. An example would be a sidewalk or steps in front of a doorway. It is not intended to include all exterior sidewalks and driveways, etc.

Options available include excavating frost susceptible soils to a depth of 5 feet below the slabs and replacing them with non frost susceptible sand containing less than 5 percent passing the #200 sieve by weight. Another option would be to place at least 3 inches of extruded polystyrene foam insulation below the slabs and extend

it at least 5 feet laterally past the edge of the slabs. Typically, 6 to 12 inches of sand is placed above the insulation for protection. A third option is to support the slabs or steps on foundations taken to frost depth. At least a 4-inch void should be provided below the slabs if this option is used.

Excavation Slopes

Safe excavation slopes should be provided in accordance with current OSHA requirements. These regulations are found in the Federal Register, Tuesday, October 31, 1989, Part II, Department of Labor, Occupational Safety and Health Administration (OSHA), 29 CFR Part 1926, Occupational Safety and Health Administration, Standard-Excavation; Final Rule. Based on the boring logs, the existing soils should be considered Type B. The type of excavation will have to be verified by the contractor at the time of construction.

CONSTRUCTION TESTING AND OBSERVATIONS

We recommend that all excavations be observed by the geotechnical engineer or his representative during construction to verify extents of removal and that the soil conditions encountered during construction are similar or consistent with the borings drilled for this exploration.

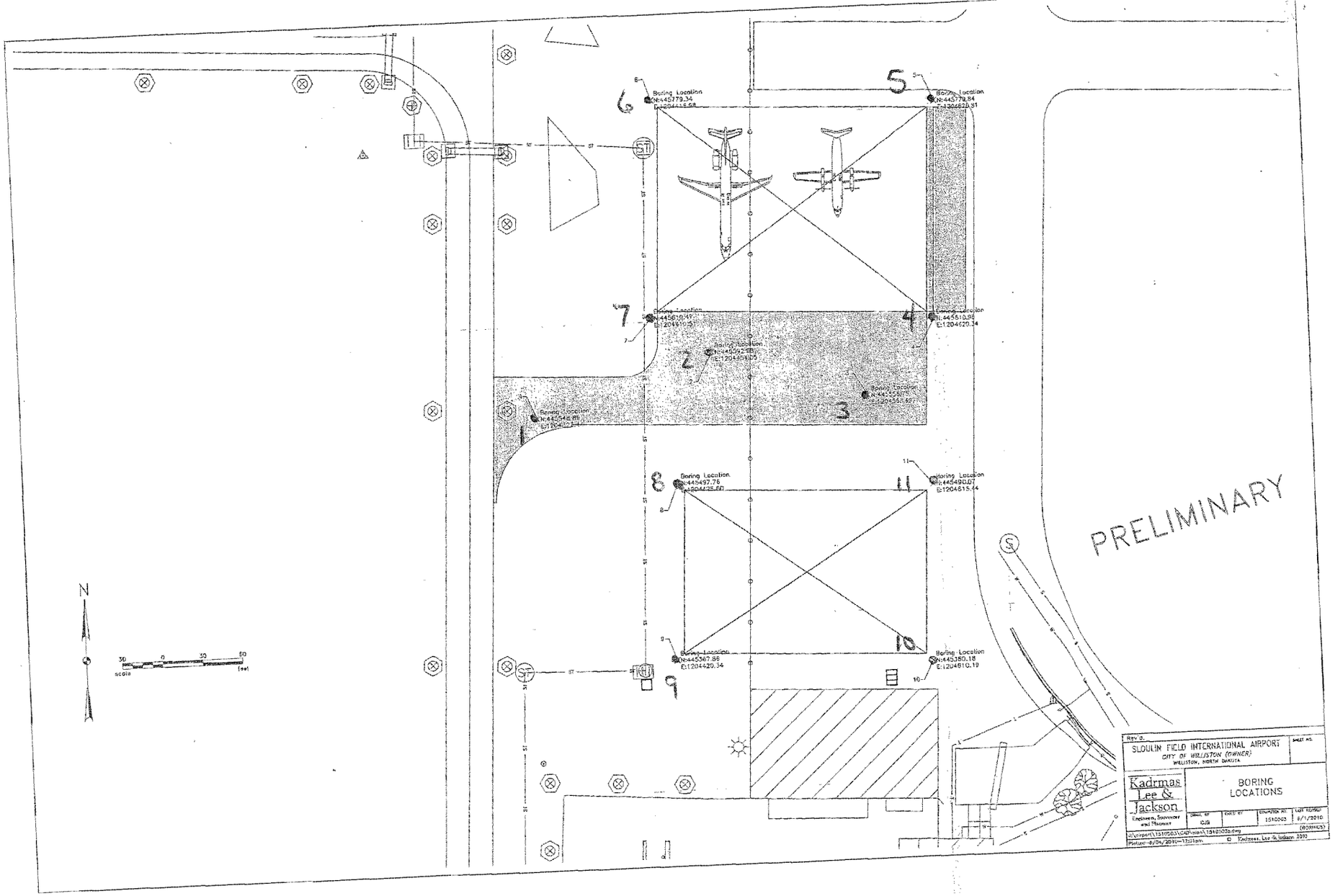
We recommend a representative number of compaction tests be taken during placement of the new fill and/or backfill. The tests should be performed to determine if the required compaction was achieved. As a general guideline, tests should be taken for each 2,000 square feet embankment fill, every 75 to 100 feet in trench fill, and for each 2 feet of fill thickness.

This report was written by:

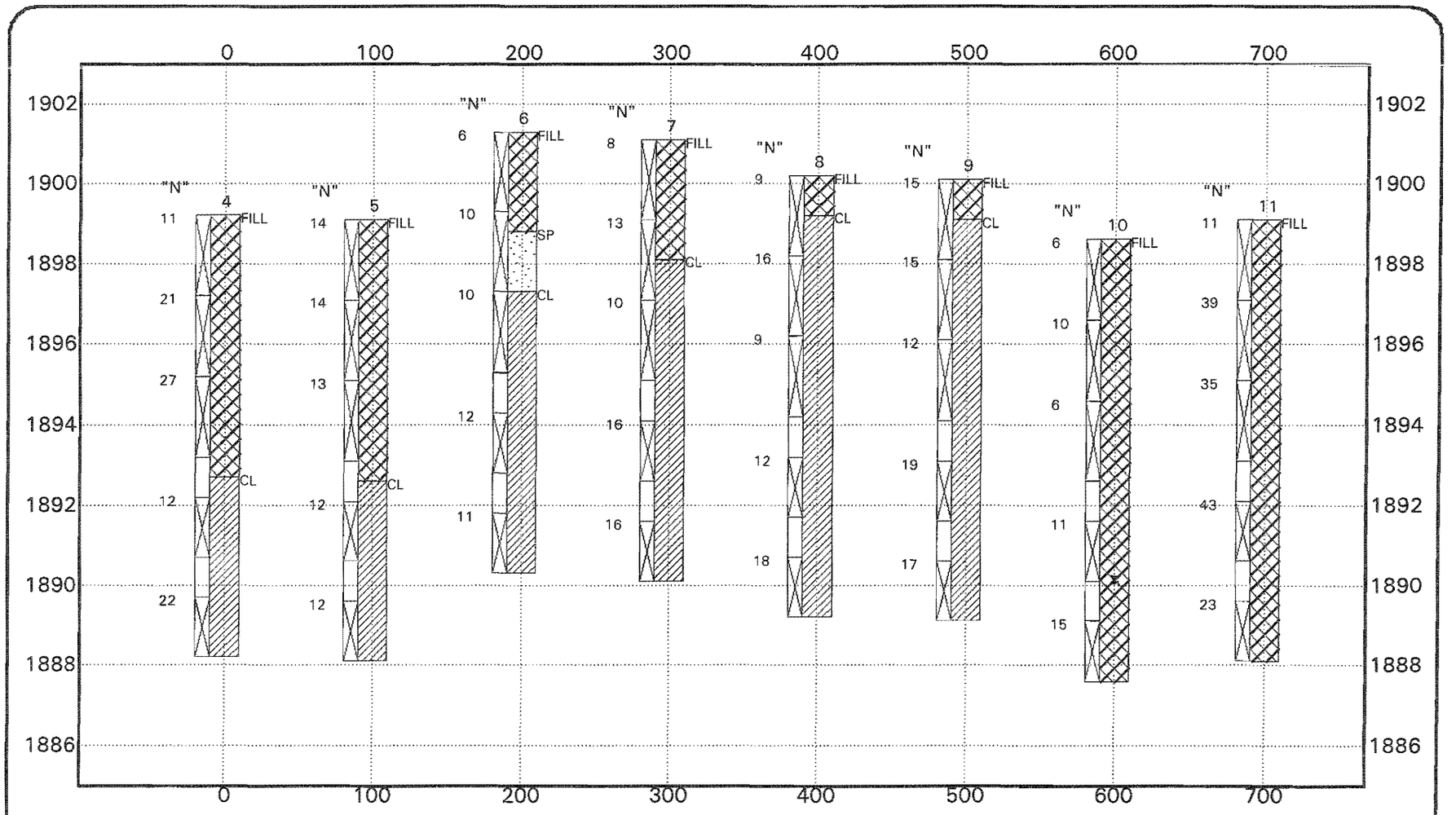
Steven A. Wald, PE

APPENDIX A

SITE SKETCH, BORING LOGS
SOIL CLASSIFICATION CHART
SYMBOLS AND TERMINOLOGY ON BORING LOGS



Boring Location
N:445779.34
E:1204415.68
Boring Location
N:445779.84
E:1204620.81
Boring Location
N:445610.47
E:1204610.51
Boring Location
N:445610.96
E:1204620.34
Boring Location
N:445592.68
E:1204404.05
Boring Location
N:445558.75
E:1204567.49
Boring Location
N:445548.86
E:1204422.
Boring Location
N:445497.76
E:1204425.60
Boring Location
N:445490.07
E:1204615.44
Boring Location
N:445367.86
E:1204420.34
Boring Location
N:445380.18
E:1204610.19
1
2
3
4
5
6
7
8
9
10
11
N
30 0 30 60
scale
feet
PRELIMINARY
Rev'd.
SLOULIN FIELD INTERNATIONAL AIRPORT
CITY OF WILLISTON (OWNER)
WILLISTON, NORTH DAKOTA
SHEET NO.
Kadrmas Lee & Jackson
Engineers, Surveyors and Planners
BORING LOCATIONS
DRAWN BY
CHKD BY
COMPUTER NO.
1510503
LAST REVISED
6/1/2010
(BORINGS)
J:\airport\1510503\CAD\plan\1510503a.dwg
Plotted: 6/04/2010-12:31am
© Kadrmas, Lee & Jackson 2010



Boring	North	East	Elev.	Depth
10	0	1000	1898.6	11.0
11	0	1100	1899.1	11.0
4	0	400	1899.2	11.0
5	0	500	1899.1	11.0
6	0	600	1901.3	11.0
7	0	700	1901.1	11.0
8	0	800	1900.2	11.0
9	0	900	1900.1	11.0

DISTANCES:

Beginning	0
Ending	700

VIEWING ANGLES (degrees):

Horizontal	0.0
Vertical	0.0

Position	North	East
Left, Front		
Right, Front		
Left, Back		
Right, Back		

SOIL PROFILE DIAGRAM

MATERIAL TESTING SERVICES, LLC

SLOULIN FIELD

WILLISTON, NORTH DAKOTA

PROJECT #	DATE	PLATE
10-204	AUG 10	1

MATERIAL TESTING SERVICES, LLC
Box 634
Minot, North Dakota 58702
(701) 852-5553

SOIL BORING RECORD

BORING NUMBER	1	SHEET	1 OF 1
PROJECT	SLOULIN FIELD		
PROJECT LOCATION	WILLISTON, NORTH DAKOTA		
PROJECT NUMBER	10-204		
START DATE	6/29/10	FINISH DATE	6/29/10

LAYER DEPTH/ ELEVATION (FT)	SOIL DESCRIPTION	SYMBOLIC LOG	ELEVATION/ DEPTH (FT)	GEOLOGY	SAMPLE TYPE	SAMPLE LEGEND	SAMPLE RECOVERY (%)	SAMPLE N VALUE	SAMPLE WATER LEVEL	TEST RESULTS WATER CONTENT (%)	TEST RESULTS LIQUID LIMIT (%)	TEST RESULTS PLASTIC LIMIT (%)	TEST RESULTS DRY DEN (pcf)
	Fill, sandy lean clay, brown, trace of gravel, (CL)		0 1902.0	Fill	SB			7		13			
					SB			14					
3.0 1899.0	**Sandy Lean Clay**, brown, trace of gravel and lignite, soft to hard, (CL)												
					SB			5					
			5 1897.0	Glacial Till									
					SB			15					
					SB			17					
			10 1892.0										
11.0 1891.0	end of boring NM-none measurable												

DRILLER	BG
DRILL RIG	CME 45
METHOD	4" FA
LOGGER	EJ
REVIEWER	SW

WATER LEVEL MEASUREMENTS

DATE	TIME	SAMPLED DEPTH	CASING DEPTH	CAVE-IN DEPTH	DRILLING MUD LEVEL	WATER LEVEL
6-29	1500	11		10.8		NM
6-29	1540			10.8		NM

MATERIAL TESTING SERVICES, LLC
Box 634
Minot, North Dakota 58702
(701) 852-5553

SOIL BORING RECORD

BORING NUMBER	2	SHEET	1 OF 1
PROJECT	SLOULIN FIELD		
PROJECT LOCATION	WILLISTON, NORTH DAKOTA		
PROJECT NUMBER	10-204		
START DATE	6/29/10	FINISH DATE	6/29/10

LAYER DEPTH/ ELEVATION (FT)	SOIL DESCRIPTION	SYMBOLIC LOG	ELEVATION/ DEPTH (FT)	GEOLOGY	SAMPLE TYPE	SAMPLE LEGEND	SAMPLE RECOVERY (%)	SAMPLE N VALUE	SAMPLE WATER LEVEL	TEST RESULTS WATER CONTENT (%)	TEST RESULTS LIQUID LIMIT (%)	TEST RESULTS PLASTIC LIMIT (%)	TEST RESULTS DRY DEN (pcf)
	Fill, sandy lean clay, dark brown, trace of gravel, (CL)		0 1901.0	Fill	SB			10		8			
					SB			26					
4.0 1897.0	**Sandy Lean Clay**, brown, trace of gravel and lignite, hard to very hard, (CL)				SB			43					
			5 1896.0	Glacial Till									
					SB			31					
					SB			19					
			10 1891.0										
11.0 1890.0	end of boring NM-none measurable												

DRILLER	**BG**
DRILL RIG	**CME 45**
METHOD	**4" FA**
LOGGER	**EJ**
REVIEWER	**SW**

WATER LEVEL MEASUREMENTS

DATE	TIME	SAMPLED DEPTH	CASING DEPTH	CAVE-IN DEPTH	DRILLING MUD LEVEL	WATER LEVEL
6-29	1340	11		9.9		NM
6-29	1540			9.5		NM

MATERIAL TESTING SERVICES, LLC
Box 634
Minot, North Dakota 58702
(701) 852-5553

SOIL BORING RECORD

BORING NUMBER **3** SHEET **1** OF **1**
PROJECT **SLOULIN FIELD**
PROJECT LOCATION **WILLISTON, NORTH DAKOTA**
PROJECT NUMBER **10-204**
START DATE **6/29/10** FINISH DATE **6/29/10**

LAYER DEPTH/ ELEVATION (FT)	SOIL DESCRIPTION	SYMBOLIC LOG	ELEVATION/ DEPTH (FT)	GEOLOGY	SAMPLE TYPE	SAMPLE LEGEND	SAMPLE RECOVERY (%)	SAMPLE N VALUE	SAMPLE WATER LEVEL	TEST RESULTS WATER CONTENT (%)	TEST RESULTS LIQUID LIMIT (%)	TEST RESULTS PLASTIC LIMIT (%)	TEST RESULTS DRY DEN (pcf)
	Fill, sandy lean clay, dark brown, trace of gravel, (CL)		0 1900.8	Fill	SB			9		7			
					SB			26					
			5 1895.8		SB			23					
9.0 1891.8	**Sandy Lean Clay**, dark brown, trace of gravel and lignite, hard, (CL)			Glacial Till	SB			20					
			10 1890.8		SB			18					
11.0 1889.8	end of boring NM-none measurable												

DRILLER **BG**
DRILL RIG **CME 45**
METHOD **4" FA**
LOGGER **EJ**
REVIEWER **SW**

WATER LEVEL MEASUREMENTS

DATE	TIME	SAMPLED DEPTH	CASING DEPTH	CAVE-IN DEPTH	DRILLING MUD LEVEL	WATER LEVEL
6-29	1040	11		10.4		NM
6-29	1530			10.2		NM

MATERIAL TESTING SERVICES, LLC
Box 634
Minot, North Dakota 58702
(701) 852-5553

SOIL BORING RECORD

BORING NUMBER	4	SHEET	1 OF 1
PROJECT	SLOULIN FIELD		
PROJECT LOCATION	WILLISTON, NORTH DAKOTA		
PROJECT NUMBER	10-204		
START DATE	6/29/10	FINISH DATE	6/29/10

LAYER DEPTH/ ELEVATION (FT)	SOIL DESCRIPTION	SYMBOLIC LOG	ELEVATION/ DEPTH (FT)	GEOLOGY	SAMPLE TYPE	SAMPLE LEGEND	SAMPLE RECOVERY (%)	SAMPLE N VALUE	SAMPLE WATER LEVEL	TEST RESULTS WATER CONTENT (%)	TEST RESULTS LIQUID LIMIT (%)	TEST RESULTS PLASTIC LIMIT (%)	TEST RESULTS DRY DEN (pcf)
	Fill, 3" of topsoil then sandy lean clay, brown, trace of gravel, (CL)		0 1899.2	Fill	SB			11					
					SB			21		7			
			5 1894.2		SB			27					
6.5 1892.7	**Sandy Lean Clay**, dark brown, trace of gravel and lignite, hard, (CL)			Glacial Till	SB			12					
			10 1889.2		SB			22					
11.0 1888.2	end of boring NM-none measurable												

DRILLER	**BG**
DRILL RIG	**CME 45**
METHOD	**4" FA**
LOGGER	**EJ**
REVIEWER	**SW**

WATER LEVEL MEASUREMENTS

DATE	TIME	SAMPLED DEPTH	CASING DEPTH	CAVE-IN DEPTH	DRILLING MUD LEVEL	WATER LEVEL
6-29	1115	11		10.3		NM
6-29	1530			10.2		NM

MATERIAL TESTING SERVICES, LLC
Box 634
Minot, North Dakota 58702
(701) 852-5553

SOIL BORING RECORD

BORING NUMBER 5 SHEET 1 OF 1
PROJECT SLOULIN FIELD
PROJECT LOCATION WILLISTON, NORTH DAKOTA
PROJECT NUMBER 10-204
START DATE 6/29/10 FINISH DATE 6/29/10

LAYER DEPTH/ ELEVATION (FT)	SOIL DESCRIPTION	SYMBOLIC LOG	ELEVATION/ DEPTH (FT)	GEOLOGY	SAMPLE TYPE	SAMPLE LEGEND	SAMPLE RECOVERY (%)	SAMPLE N VALUE	SAMPLE WATER LEVEL	TEST RESULTS WATER CONTENT (%)	TEST RESULTS LIQUID LIMIT (%)	TEST RESULTS PLASTIC LIMIT (%)	TEST RESULTS DRY DEN (pcf)
	Fill, 2" of topsoil then sandy lean clay, brown, trace of gravel, (CL)		0 1899.1	Fill	SB			14					
					SB			14		9			
					SB			13					
			5 1894.1										
6.5 1892.6	**Sandy Lean Clay**, dark brown, trace of gravel and lignite, hard, (CL)			Glacial Till	SB			12					
					SB			12					
			10 1889.1										
11.0 1888.1	end of boring NM-none measurable												

DRILLER BG
DRILL RIG CME 45
METHOD 4" FA
LOGGER EJ
REVIEWER SW

WATER LEVEL MEASUREMENTS

DATE	TIME	SAMPLED DEPTH	CASING DEPTH	CAVE-IN DEPTH	DRILLING MUD LEVEL	WATER LEVEL
6-29	1143	11		10.4		NM
6-29	1530			10.4		NM

MATERIAL TESTING SERVICES, LLC
Box 634
Minot, North Dakota 58702
(701) 852-5553

SOIL BORING RECORD

BORING NUMBER	6	SHEET	1 OF 1
PROJECT	SLOULIN FIELD		
PROJECT LOCATION	WILLISTON, NORTH DAKOTA		
PROJECT NUMBER	10-204		
START DATE	6/29/10	FINISH DATE	6/29/10

LAYER DEPTH/ ELEVATION (FT)	SOIL DESCRIPTION	SYMBOLIC LOG	ELEVATION/ DEPTH (FT)	GEOLOGY	SAMPLE TYPE	SAMPLE LEGEND	SAMPLE RECOVERY (%)	SAMPLE N VALUE	SAMPLE WATER LEVEL	TEST RESULTS WATER CONTENT (%)	TEST RESULTS LIQUID LIMIT (%)	TEST RESULTS PLASTIC LIMIT (%)	TEST RESULTS DRY DEN (pcf)
	Fill, 3" of sand and gravel then sandy lean clay, dark brown, trace of gravel, (CL)		0 1901.3	Fill	SB			6					
2.5					SB			10					
1898.8	**Sand**, brown, trace of gravel, loose, (SP)			Alluvial									
4.0													
1897.3	**Sandy Lean Clay**, brown, trace of gravel and lignite, firm, (CL)			Glacial Till	SB			10					
			5 1896.3										
					SB			12					
					SB			11					
			10 1891.3										
11.0													
1890.3	end of boring												
	NM-none measurable												

DRILLER	**BG**
DRILL RIG	**CME 45**
METHOD	**4" FA**
LOGGER	**EJ**
REVIEWER	**SW**

WATER LEVEL MEASUREMENTS

DATE	TIME	SAMPLED DEPTH	CASING DEPTH	CAVE-IN DEPTH	DRILLING MUD LEVEL	WATER LEVEL
6-29	1245	11		9.9		NM
6-29	1540			9.8		NM

MATERIAL TESTING SERVICES, LLC
Box 634
Minot, North Dakota 58702
(701) 852-5553

SOIL BORING RECORD

BORING NUMBER 7 SHEET 1 OF 1
PROJECT SLOULIN FIELD
PROJECT LOCATION WILLISTON, NORTH DAKOTA
PROJECT NUMBER 10-204
START DATE 6/29/10 FINISH DATE 6/29/10

LAYER DEPTH/ ELEVATION (FT)	SOIL DESCRIPTION	SYMBOLIC LOG	ELEVATION/ DEPTH (FT)	GEOLOGY	SAMPLE TYPE	SAMPLE LEGEND	SAMPLE RECOVERY (%)	SAMPLE N VALUE	SAMPLE WATER LEVEL	TEST RESULTS WATER CONTENT (%)	TEST RESULTS LIQUID LIMIT (%)	TEST RESULTS PLASTIC LIMIT (%)	TEST RESULTS DRY DEN (pcf)
	Fill, sandy lean clay, brown to dark brown, trace of gravel, some organics, (CL)		0 1901.1	Fill	SB			8		7			
					SB			13					
3.0 1898.1	**Sandy Lean Clay**, brown, trace of gravel and lignite, sand lenses, firm to hard, (CL)			Glacial Till	SB			10					
			5 1896.1		SB			16					
					SB			16					
			10 1891.1										
11.0 1890.1	end of boring NM-none measurable												

DRILLER BG
DRILL RIG CME 45
METHOD 4" FA
LOGGER EJ
REVIEWER SW

WATER LEVEL MEASUREMENTS

DATE	TIME	SAMPLED DEPTH	CASING DEPTH	CAVE-IN DEPTH	DRILLING MUD LEVEL	WATER LEVEL
6-29	1308	11		10.7		NM
6-29	1540			10.6		NM

MATERIAL TESTING SERVICES, LLC
Box 634
Minot, North Dakota 58702
(701) 852-5553

SOIL BORING RECORD

BORING NUMBER	8	SHEET	1 OF 1
PROJECT	SLOULIN FIELD		
PROJECT LOCATION	WILLISTON, NORTH DAKOTA		
PROJECT NUMBER	10-204		
START DATE	6/29/10	FINISH DATE	6/29/10

LAYER DEPTH/ ELEVATION (FT)	SOIL DESCRIPTION	SYMBOLIC LOG	ELEVATION/ DEPTH (FT)	GEOLOGY	SAMPLE TYPE	SAMPLE LEGEND	SAMPLE RECOVERY (%)	SAMPLE N VALUE	SAMPLE WATER LEVEL	TEST RESULTS WATER CONTENT (%)	TEST RESULTS LIQUID LIMIT (%)	TEST RESULTS PLASTIC LIMIT (%)	TEST RESULTS DRY DEN (pcf)
	Fill, sandy lean clay, dark brown, trace of gravel, (CL)		0 1900.2	Fill	SB			9					
1.0 1899.2	**Sandy Lean Clay**, brown, trace of gravel and lignite, firm to hard, (CL)									10			
					SB			16					
				Glacial Till	SB			9					
			5 1895.2										
					SB			12					
					SB			18					
			10 1890.2										
11.0 1889.2	end of boring NM-none measurable												

DRILLER	**BG**
DRILL RIG	**CME 45**
METHOD	**4" FA**
LOGGER	**EJ**
REVIEWER	**SW**

WATER LEVEL MEASUREMENTS

DATE	TIME	SAMPLED DEPTH	CASING DEPTH	CAVE-IN DEPTH	DRILLING MUD LEVEL	WATER LEVEL
6-29	1410	11		10.4		NM
6-29	1540			10.4		NM

MATERIAL TESTING SERVICES, LLC
Box 634
Minot, North Dakota 58702
(701) 852-5553

SOIL BORING RECORD

BORING NUMBER	9	SHEET	1 OF 1
PROJECT	SLOULIN FIELD		
PROJECT LOCATION	WILLISTON, NORTH DAKOTA		
PROJECT NUMBER	10-204		
START DATE	6/29/10	FINISH DATE	6/29/10

LAYER DEPTH/ ELEVATION (FT)	SOIL DESCRIPTION	SYMBOLIC LOG	ELEVATION/ DEPTH (FT)	GEOLOGY	SAMPLE TYPE	SAMPLE LEGEND	SAMPLE RECOVERY (%)	SAMPLE N VALUE	SAMPLE WATER LEVEL	TEST RESULTS WATER CONTENT (%)	TEST RESULTS LIQUID LIMIT (%)	TEST RESULTS PLASTIC LIMIT (%)	TEST RESULTS DRY DEN (pcf)
	Fill, sandy lean clay, brown, trace of gravel, (CL)		0 1900.1	Fill	SB			15		12			
1.0 1899.1	**Sandy Lean Clay**, brown, trace of gravel and lignite, sand lenses, firm to hard, (CL)				SB			15					
				Glacial Till	SB			12					
			5 1895.1										
					SB			19					
					SB			17					
			10 1890.1										
11.0 1889.1	end of boring NM-none measurable												

DRILLER	**BG**
DRILL RIG	**CME 45**
METHOD	**4" FA**
LOGGER	**EJ**
REVIEWER	**SW**

WATER LEVEL MEASUREMENTS

DATE	TIME	SAMPLED DEPTH	CASING DEPTH	CAVE-IN DEPTH	DRILLING MUD LEVEL	WATER LEVEL
6-29	1430	11		10.6		NM
6-29	1540			10.5		NM

MATERIAL TESTING SERVICES, LLC
Box 634
Minot, North Dakota 58702
(701) 852-5553

SOIL BORING RECORD

BORING NUMBER **10** SHEET **1** OF **1**
PROJECT **SLOULIN FIELD**
PROJECT LOCATION **WILLISTON, NORTH DAKOTA**
PROJECT NUMBER **10-204**
START DATE **6/29/10** FINISH DATE **6/29/10**

LAYER DEPTH/ ELEVATION (FT)	SOIL DESCRIPTION	SYMBOLIC LOG	ELEVATION/ DEPTH (FT)	GEOLOGY	SAMPLE TYPE	SAMPLE LEGEND	SAMPLE RECOVERY (%)	SAMPLE N VALUE	SAMPLE WATER LEVEL	TEST RESULTS WATER CONTENT (%)	TEST RESULTS LIQUID LIMIT (%)	TEST RESULTS PLASTIC LIMIT (%)	TEST RESULTS DRY DEN (pcf)
	Fill, 4" of topsoil then sandy lean clay, brown, trace of gravel, (CL)		0 1898.6	Fill	SB			6					
										12			
					SB			10					
					SB			6					
			5 1893.6										
					SB			11	▼				
					SB			15					
			10 1888.6										
11.0 1887.6	end of boring NM-none measurable												

DRILLER **BG**
DRILL RIG **CME 45**
METHOD **4" FA**
LOGGER **EJ**
REVIEWER **SW**

WATER LEVEL MEASUREMENTS

DATE	TIME	SAMPLED DEPTH	CASING DEPTH	CAVE-IN DEPTH	DRILLING MUD LEVEL	WATER LEVEL
6-29	938	11		10.8		NM
6-29	1530			9.0		8.5

MATERIAL TESTING SERVICES, LLC
Box 634
Minot, North Dakota 58702
(701) 852-5553

SOIL BORING RECORD

BORING NUMBER **11** SHEET **1** OF **1**
PROJECT **SLOULIN FIELD**
PROJECT LOCATION **WILLISTON, NORTH DAKOTA**
PROJECT NUMBER **10-204**
START DATE **6/29/10** FINISH DATE **6/29/10**

LAYER DEPTH/ ELEVATION (FT)	SOIL DESCRIPTION	SYMBOLIC LOG	ELEVATION/ DEPTH (FT)	GEOLOGY	SAMPLE TYPE	SAMPLE LEGEND	SAMPLE RECOVERY (%)	SAMPLE N VALUE	SAMPLE WATER LEVEL	TEST RESULTS WATER CONTENT (%)	TEST RESULTS LIQUID LIMIT (%)	TEST RESULTS PLASTIC LIMIT (%)	TEST RESULTS DRY DEN (pcf)
	Fill, 2" of topsoil then sandy lean clay, brown, trace of gravel, (CL)		0 1899.1	Fill	SB			11		7			
					SB			39					
					SB			35					
			5 1894.1										
					SB			43					
					SB			23					
			10 1889.1										
11.0 1888.1	end of boring NM-none measurable												

DRILLER **BG**
DRILL RIG **CME 45**
METHOD **4" FA**
LOGGER **EJ**
REVIEWER **SW**

WATER LEVEL MEASUREMENTS

DATE	TIME	SAMPLED DEPTH	CASING DEPTH	CAVE-IN DEPTH	DRILLING MUD LEVEL	WATER LEVEL
6-29	945	11		9		NM
6-29	1530			9		NM

SYMBOLS AND DESCRIPTIVE TERMINOLOGY ON TEST BORING LOG

SYMBOLS FOR DRILLING AND SAMPLING

Symbol	Description
HSA	3 1/4" I.D. hollow stem auger
_FA	4", 6" or 10" diameter flight auger
_HA	2", 4" or 6" hand auger
_DC	2 1/2", 4", 5" or 6" steel drive casing
_RC	Size A, B or N rotary casing
PD	Pipe drill or cleanout tube
CS	Continuous split barrel sampling
DM	Drilling mud
JW	Jetting water
SB	2" O.D. split barrel sampling
_L	2 1/2" or 3 1/2" O.D. SB liner sample
_T	2" or 3" thin walled tube sample
3TP	3" thin walled tube using pitcher sampler
_TO	2" or 3" thin walled tube using Osterberg sampler
W	Wash sample
B	Bag sample
P	Test pit sample
_Q	BQ, NQ, or PQ wireline system
_X	AX, BX, or NX double tube barrel
N	Standard penetration test, blows per foot
CR	Core recovery, percent
WL	Water level
?	Water level
NMR	No measurement recorded, primarily due to presence of drilling or coring fluid

SYMBOLS FOR LABORATORY TESTS

Symbol	Description
W	Water content
D	Dry density - pounds per cubic foot
LL	Liquid limit - ASTM** D 4318
PL	Plastic limit - ASTM D 4318
	--- Inserts in Last Column (Qu or RQD) ---
Qu	Unconfined compressive strength, psf - ASTM D 2166
Pq	Penetrometer reading, tsf
Ts	Torvane reading, tsf
G	Specific gravity
SL	Shrinkage limits - ASTM D 427
OC	Organic content - Combustion method
SP	Swell pressure, tsf
PS	Percent swell under pressure
FS	Free swell, percent
SS	Shrink swell, percent
pH	Hydrogen ion content - Meter Method
SC	Sulfate content, parts/million or mg/l
CC	Chloride content, parts/million or mg/l
C*	One dimensional consolidation - ASTM D 2435
Qc*	Triaxial compression
D.S.*	Direct shear - ASTM D 3080
K*	Coefficient of permeability, cm/sec
DH*	Double hydrometer - ASTM D 4221
MA*	Particle size analysis - ASTM D 422
R	Laboratory electrical resistivity, ohm-cm - ASTM G 57
E*	Pressuremeter deformation modulus, tsf
PM*	Pressuremeter test
VS*	Field vane shear - ASTM D 2573
IR*	Infiltrometer test - ASTM D 3385
RQD	Rock quality designation, percent
*	Results shown on attached data sheet or graph
**	ASTM designates American Society for Testing and Materials

DESCRIPTIONS OF N-VALUES VS. SOIL PROPERTIES

N Value	Density	N Value	Consistency
0 - 4	Very loose	0 - 4	Very soft
5 - 10	Loose	5 - 8	Soft
11 - 30	Medium dense	9 - 15	Firm
31 - 50	Dense	16 - 30	Hard
Over 50	Very dense	Over 30	Very hard

DESCRIPTIONS OF SOIL CONDITIONS

Condition	Description
Lamination	Up to 1/2" thick stratum
Layer	1/2" to 6" thick stratum
Dry	Powdery, no noticeable water
Moist	Below saturation
Wet	Saturated, above liquid limit
Waterbearing	Pervious soil below water
Varved	Alternating laminations of any combinations of clay, silt and fine grained sand

DESCRIPTIONS OF GRAVEL PROPORTIONS IN SOILS

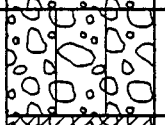
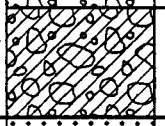
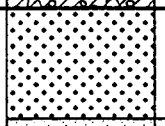
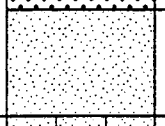
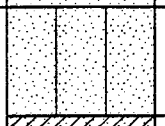
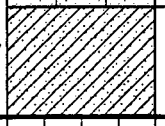
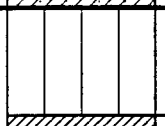
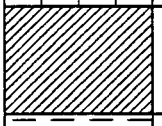
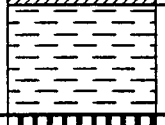
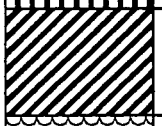
Soil Type	Description	Range, %
Coarse grained soils	A little gravel	2 - 14
Coarse grained soils	With gravel	15 - 49
Fine grained soils:		
71-85% passing #200 sieve	A little gravel	2 - 7
71-85% passing #200 sieve	With gravel	8 - 29
70% passing #200 sieve	A little gravel	2 - 14
70% passing #200 sieve	With gravel	15 - 24
70% passing #200 sieve	Gravelly	16 - 49

DESCRIPTIONS OF PARTICLE SIZES

Material Type	Size
Boulders	Over 12"
Cobbles	3" - 12"
Coarse gravel	3/4" - 3"
Fine gravel	#4 sieve - 3/4"
Coarse sand	#4 - #10 sieve
Medium sand	#10 - #40 sieve
Fine sand	#40 - #200 sieve
Silt	100% passing #200 sieve and > 0.002mm
Clay	100% passing #200 sieve and < 0.002mm

c:\wpwin\forms\desc

SOIL CLASSIFICATION CHART

MAJOR DIVISIONS			SYMBOLS GRAPH	SYMBOLS LETTER	TYPICAL DESCRIPTIONS
COARSE GRAINED SOILS — MORE THAN 50% OF MATERIAL IS LARGER THAN NO. 200 SIEVE SIZE	GRAVEL AND GRAVELLY SOILS — MORE THAN 50% OF COARSE FRACTION RETAINED ON NO. 4 SIEVE	CLEAN GRAVELS (LITTLE OR NO FINES)		GW	WELL-GRADED GRAVELS, GRAVEL - SAND MIXTURES, LITTLE OR NO FINES
				GP	POORLY-GRADED GRAVELS, GRAVEL - SAND MIXTURES, LITTLE OR NO FINES
		GRAVELS WITH FINES (APPRECIABLE AMOUNT OF FINES)		GM	SILTY GRAVELS, GRAVEL - SAND - SILT MIXTURES
				GC	CLAYEY GRAVELS, GRAVEL - SAND - CLAY MIXTURES
	SAND AND SANDY SOILS — MORE THAN 50% OF COARSE FRACTION PASSING ON NO. 4 SIEVE	CLEAN SANDS (LITTLE OR NO FINES)		SW	WELL-GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES
				SP	POORLY-GRADED SANDS, GRAVELLY SAND, LITTLE OR NO FINES
		SANDS WITH FINES (APPRECIABLE AMOUNT OF FINES)		SM	SILTY SANDS, SAND - SILT MIXTURES
				SC	CLAYEY SANDS, SAND - CLAY MIXTURES
FINE GRAINED SOILS — MORE THAN 50% OF MATERIAL IS SMALLER THAN NO. 200 SIEVE SIZE	SILTS AND CLAYS	LIQUID LIMIT LESS THAN 50		ML	INORGANIC SILTS AND VERY FINE SANDS, ROCK FLOUR, SILTY OR CLAYEY FINE SANDS OR CLAYEY SILTS WITH SLIGHT PLASTICITY
				CL	INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY, GRAVELLY CLAYS, SANDY CLAYS, SILTY CLAYS, LEAN CLAYS
				OL	ORGANIC SILTS AND ORGANIC SILTY CLAYS OF LOW PLASTICITY
	SILTS AND CLAYS	LIQUID LIMIT GREATER THAN 50		MH	INORGANIC SILTS, MICACEOUS OR DIATOMACEOUS FINE SAND OR SILTY SOILS
				CH	INORGANIC CLAYS OF HIGH PLASTICITY
				OH	ORGANIC CLAYS OF MEDIUM TO HIGH PLASTICITY, ORGANIC SILTS
HIGHLY ORGANIC SOILS				PT	PEAT, HUMUS, SWAMP SOILS WITH HIGH ORGANIC CONTENTS

NOTE: DUAL SYMBOLS ARE USED TO INDICATE BORDERLINE SOIL CLASSIFICATIONS

<<TemplateID>> <<Format(<<Now>>,<<fdNumSlash>>)>>

APPENDIX B

LABORATORY TESTS

MATERIAL TESTING SERVICES, LLC

P.O. Box 634
Minot, ND 58702
(701) 852-5553

P.O. Box 1093
Williston, ND 58802
(701) 572-4226

UNCONFINED COMPRESSIVE STRENGTH
ASTM D 2166

PROJECT: PROPOSED HANGARS
SLOULIN FIELD INTERNATIONAL AIRPORT
WILLISTON, NORTH DAKOTA

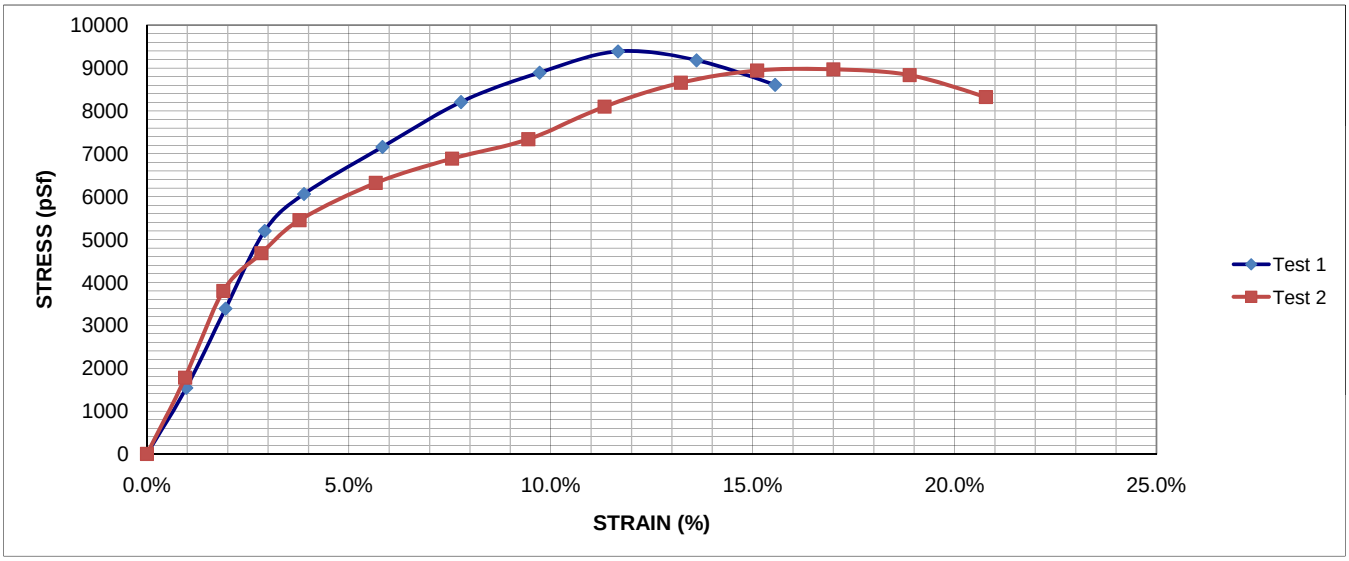
DATE: 4-Aug-10

COPIES TO:

REPORTED TO: City of Williston
PO Box 1306
Williston, ND 58802

Laboratory Number 10-204

Specimen ID:	**Test 1**	**Test 2**
	boring 6 SS, 7.5 to 8.5 feet	boring 6 SS, 10 to 11 feet
Soil Class:	Brown Sandy Lean Clay (CL)	Brown Sandy Lean Clay (CL)
Dry Density (pcf):	111.6	112.1
Water Content:	15.6%	16.6%
Sample Dia. (mm):	35.7	34.1
Sample Ht (mm):	65.3	67.2
Height/Diameter:	1.83	1.97
Unc. Strength (psf):	**9389**	**8940**
Strain at Failure (%):	11.7	15



AS A MUTUAL PROTECTION TO CLIENTS, THE PUBLIC AND OURSELVES, ALL REPORTS ARE SUBMITTED AS THE CONFIDENTIAL PROPERTY OF CLIENTS, AND AUTHORIZATION FOR PUBLICATION OF STATEMENTS, CONCLUSIONS OR EXTRACTS FROM OR REGARDING OUR REPORTS IS RESERVED PENDING OUR WRITTEN APPROVAL.

Material Testing Services, LLC

by

MATERIAL TESTING SERVICES, LLC

P.O. Box 634
Minot, ND 58702
(701) 852-5553

P.O. Box 1093
Williston, ND 58802
(701) 572-4226

MOISTURE-DENSITY RELATIONSHIP

PROJECT: PRELIMINARY SOIL TESTING
SLOULIN FIELD INTERNATIONAL AIRPORT
NEW HANGAR AREA
WILLISTON, NORTH DAKOTA

DATE: 12-Jul-10

COPIES TO:

REPORTED TO: Kadrmas, Lee & Jackson
PO Box 1157
Bismarck, ND 58502

Laboratory Number 10-204

Sample Number: Bulk 2

Sample ID: auger cuttings, borings 1, 8, 9, 1 to 5 feet
sampled 6/29/10
tested 7/7/10

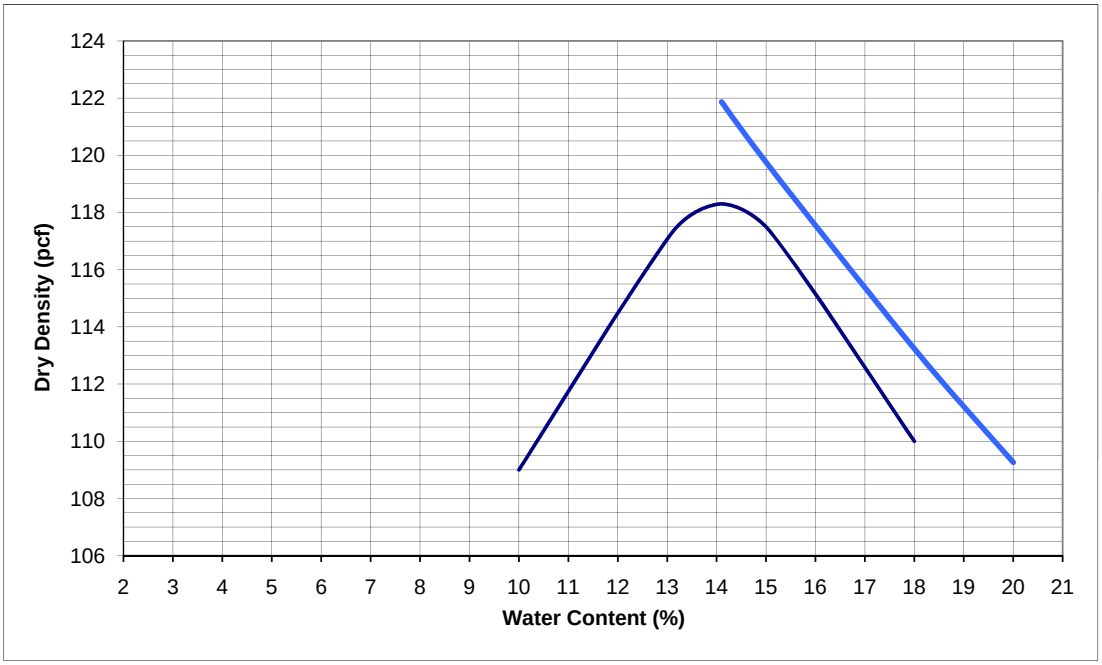
Soil Description: Brown SANDY LEAN CLAY

Unified Soil Classification: CL

Results:

Method	**ASTM D 698, Method A**	
Maximum Dry Density	**118.3**	pcf
Optimum Moisture Content	**14.1**	%

Specific Gravity (estimated): 2.70



AS A MUTUAL PROTECTION TO CLIENTS, THE PUBLIC AND OURSELVES, ALL REPORTS ARE SUBMITTED AS THE CONFIDENTIAL PROPERTY OF CLIENTS, AND AUTHORIZATION FOR PUBLICATION OF STATEMENTS, CONCLUSIONS OR EXTRACTS FROM OR REGARDING OUR REPORTS IS RESERVED PENDING OUR WRITTEN APPROVAL.

Material Testing Services, LLC

by

MATERIAL TESTING SERVICES, LLC

P.O. Box 634
Minot, ND 58702
(701) 852-5553

P.O. Box 1093
Williston, ND 58802
(701) 572-4226

MOISTURE-DENSITY RELATIONSHIP

PROJECT: PRELIMINARY SOIL TESTING
SLOULIN FIELD INTERNATIONAL AIRPORT
NEW HANGAR AREA
WILLISTON, NORTH DAKOTA

DATE: 12-Jul-10

COPIES TO:

REPORTED TO: Kadrmas, Lee & Jackson
PO Box 1157
Bismarck, ND 58502

Laboratory Number 10-204

Sample Number: Bulk 1

Sample ID: auger cuttings, borings 3, 5, 11, 1 to 5 feet
sampled 6/29/10
tested 7/7/10

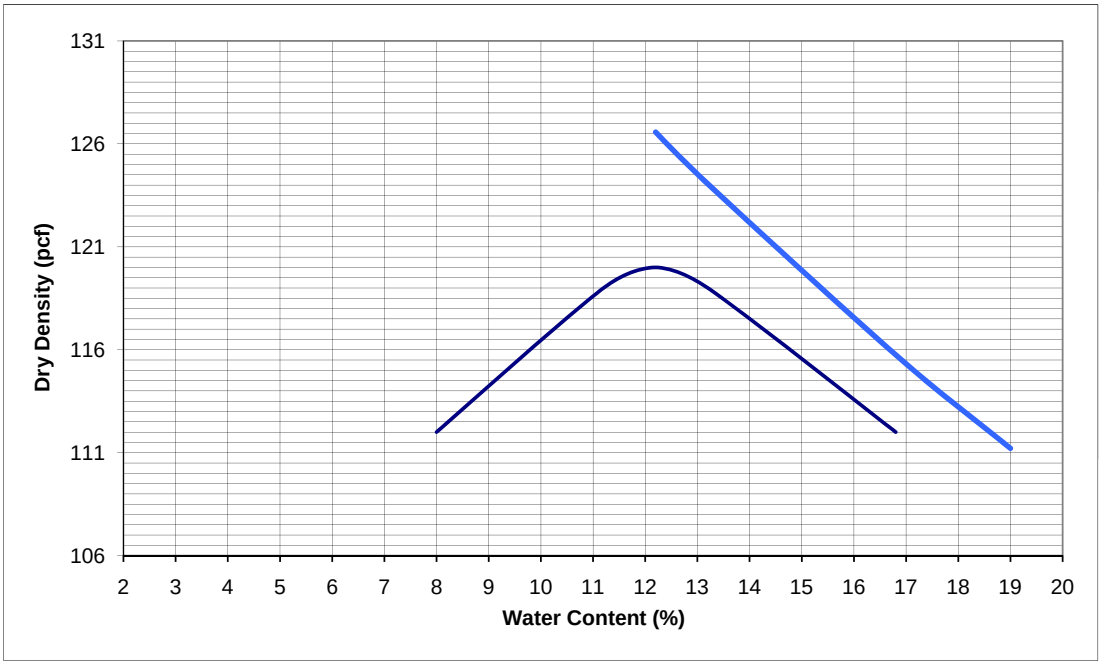
Soil Description: Brown CLAYEY SAND

Unified Soil Classification: SC

Results:

Method	**ASTM D 698, Method A**	
Maximum Dry Density	**120.0**	pcf
Optimum Moisture Content	**12.2**	%

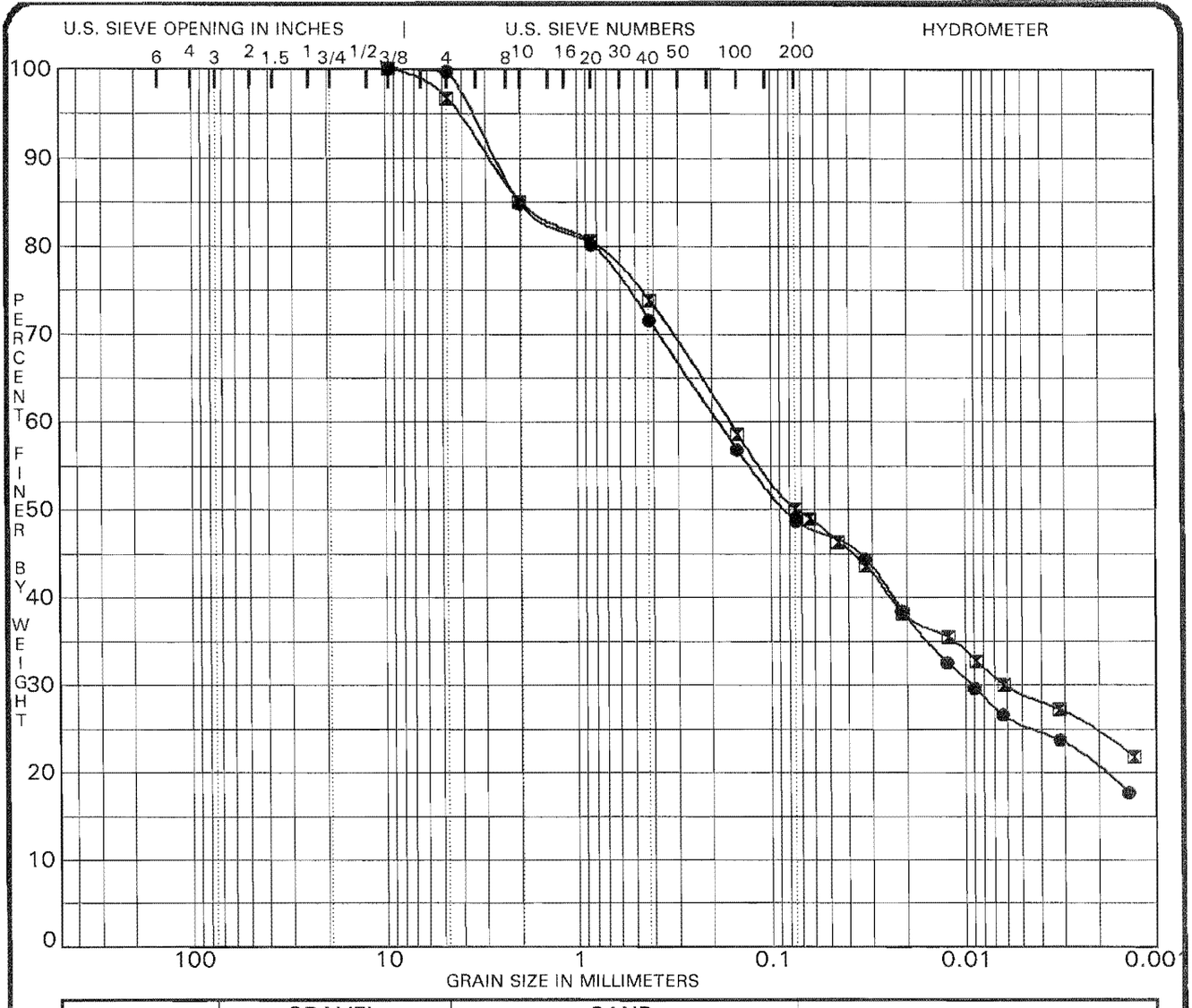
Specific Gravity (estimated): 2.70



AS A MUTUAL PROTECTION TO CLIENTS, THE PUBLIC AND OURSELVES, ALL REPORTS ARE SUBMITTED AS THE CONFIDENTIAL PROPERTY OF CLIENTS, AND AUTHORIZATION FOR PUBLICATION OF STATEMENTS, CONCLUSIONS OR EXTRACTS FROM OR REGARDING OUR REPORTS IS RESERVED PENDING OUR WRITTEN APPROVAL.

Material Testing Services, LLC

by _____



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

Specimen Identification			Classification	MC%	LL	PL	PI	Cc	Cu
●	BULK 1	0.0	CLAYEY SAND SC		24	14	10		
⊠	BULK 2	0.0	SANDY LEAN CLAY CL		27	12	15		

Specimen Identification			D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	BULK 1	0.0	9.50	0.19	0.009		0.3	51.0	23.1	25.6
⊠	BULK 2	0.0	9.50	0.17	0.006		3.3	46.7	21.0	29.0

PROJECT SLOULIN FIELD - WILLISTON, NORTH DAKOTA

JOB NO. 10-204

DATE 7/14/10

PARTICLE SIZE ANALYSIS

MATERIAL TESTING SERVICES, INC
PO BOX 634 MINOT ND 58702

SECTION 01 1000
SUMMARY

PART 1 GENERAL

1.01 PROJECT

A. Project Name: Williston Ice & Turf BP3.

B. Owner's Name: Williston Parks & Recreation District.

C. Architect's Name: ICON Architectural Group.

D. Structural Engineer: ICON Architectural Group.

E. Mechanical Engineer: Martin Mechanical Design Inc.

F. Electrical Engineer: Prairie Engineering.

G. Civil Engineer: AE2S, Inc.

H. Landscape Architect: Interstate Engineering.

I. Food Service Consultant: Foodservice Concept Design.

J. Ice Consultant: B32 Engineering.

1.02 DESCRIPTION OF WORK

A. Scope of new construction work is shown on drawings and specified in the project manual.

B. Services (Including but not limited to Plumbing, HVAC, Electrical Power and Lighting, Fire Protection, Telecommunications, and Security): Alter existing system and add new construction, keeping existing in operation.

1.03 OWNER-FURNISHED ITEMS

A. Cooperate fully with separate contractors so work on those contracts may be carried out smoothly, without interfering with or delaying work under this Contract or other contracts. Coordinate the Work of this Contract with work performed under separate contracts.

B. The Work includes providing support systems to receive Owner's equipment, and mechanical and electrical connections.

C. The Owner will arrange and pay for delivery of Owner-furnished items in accordance with the Contractor's Construction Schedule, and will inspect deliveries for damage.

D. If Owner-furnished items are damaged, defective or missing, the Owner will arrange for replacement. The Owner will also arrange for manufacturer's field services, and the delivery of manufacturer's warranties and bonds to the Contractor.

E. The Contractor is responsible for designating the delivery dates of Owner furnished items in the Contractor's Construction Schedule and for receiving, unloading and handling Owner-furnished items at the site.

F. The Contractor is responsible for protecting Owner-furnished items from damage, including damage from exposure to the elements, and to repair or replace items damaged as a result of his operations.

1.04 OWNER OCCUPANCY

A. Owner intends to occupy the Project upon Substantial Completion.

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

C. Schedule the Work to accommodate Owner occupancy.

1.05 CONTRACTOR USE OF SITE AND PREMISES

A. Construction Operations: Limited to areas noted on Drawings.
   1. Locate and conduct construction activities in ways that will limit disturbance to site.

B. Arrange use of site and premises to allow:
   1. Owner occupancy.

2. Work by Others.
3. Work by Owner.
4. Use of site and premises by the public.
5. Adjacent building operations.

C. Provide access to and from site as required by law and by Owner:
1. Emergency Building Exits During Construction: Keep all exits required by code open during construction period; provide temporary exit signs if exit routes are temporarily altered.
a. Alternative entrances, exits and Interim life safety procedures will be required if the main entrance or any fire exits are closed during construction. Coordinate durations with Owner.
2. Do not obstruct roadways, sidewalks, or other public ways without permit.

D. Existing building spaces may not be used for storage, except as allowed by the Owner's representative.

E. Time Restrictions:
1. Limit conduct of especially noisy, malodorous, and dusty exterior work to after business hours.

F. Utility Outages and Shutdown:
1. Limit disruption of utility services to hours the building is unoccupied.
2. Do not disrupt or shut down life safety systems, including but not limited to fire sprinklers and fire alarm system, without 7 days notice to Owner and authorities having jurisdiction.
3. Prevent accidental disruption of utility services to facilities.

1.06 WORK SEQUENCE

A. Coordinate construction schedule and operations with Owner.

B. Coordinate work of the various Sections of Specifications to assure efficient and orderly sequence of installation of construction elements, with provisions for accommodating items installed later.

C. Verify characteristics of elements of interrelated operating equipment are compatible; coordinate work of various Sections having interdependent responsibilities for installing, connecting to, and placing in service, such equipment.

D. Coordinate space requirements and installation of mechanical and electrical work which are indicated diagrammatically on Drawings. Follow routing shown for pipes, ducts, and conduits, as closely as practicable; make runs parallel with lines of building. Utilize spaces efficiently to maximize accessibility for other installations, for maintenance, and for repairs.

E. Execute cutting and patching to integrate elements of Work, uncover ill-timed, defective, and non-conforming Work, provide openings for penetrations of existing surfaces, and provide samples for testing if required. Seal penetrations through floors, walls, and roof.

1.07 DEFINITIONS AND EXPLANATIONS

A. Imperative language is used generally in the specifications. Except as otherwise indicated, requirements expressed imperatively are to be performed by the Contractor as if preceded by the phrase “The Contractor shall”.

B. The term “provide” means furnish and install, complete, and ready for intended use. Except as otherwise defined in greater detail, the term “furnish” means supply and deliver to the project site, including unloading, unpacking, inspecting, and storing until ready for receipt by Owner, installation, etc., as applicable.

C. Except as otherwise defined in greater detail, the term “install” is used to describe operations at project site including assembly, erection, placing, anchoring, applying, working to dimension, finishing, curing, protecting, cleaning, and similar operations, as applicable.

D. The term “indicated” is as cross-reference to graphics, notes or schedules on drawings, to other paragraphs or schedules in the specifications, and to similar means of recording requirements in contract documents. Where terms such as “shows”, “noted”, “schedules”, and “specified” are used in lieu of “indicated”, it is for purpose of helping reader locate cross-reference, and no limitations of location is intended.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION

SECTION 01 2000
PRICE AND PAYMENT PROCEDURES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Procedures for preparation and submittal of applications for progress payments.

B. Documentation of changes in Contract Sum and Contract Time.

C. Change procedures.

D. Procedures for preparation and submittal of application for final payment.

1.02 RELATED REQUIREMENTS

A. Section 01 7800 - Closeout Submittals: Project record documents.

1.03 SCHEDULE OF VALUES

A. Use Schedule of Values Form: AIA G703, edition stipulated in the Agreement.

B. Electronic media printout including equivalent information will be considered in lieu of standard form specified; submit draft to Architect for approval.

C. Forms filled out by hand will not be accepted.

D. Submit Schedule of Values in duplicate within 15 days after date receipt of Notice to Proceed.

E. Format: Utilize the Table of Contents of this Project Manual. Identify each line item with number and title of the specification Section. Identify site mobilization and bonds and insurance.

F. Include in each line item, the amount of Allowances specified in this section. For unit cost Allowances, identify quantities taken from Contract Documents multiplied by the unit cost to achieve the total for the item.

G. Include separately from each line item, a direct proportional amount of Contractor's overhead and profit.

H. Revise schedule to list approved Change Orders, with each Application For Payment.

1.04 APPLICATIONS FOR PROGRESS PAYMENTS

A. Payment Period: Submit at intervals stipulated in the Agreement.

B. Use Form AIA G702 and Form AIA G703, edition stipulated in the Agreement.

C. Electronic media printout including equivalent information will be considered in lieu of standard form specified; submit sample to Architect for approval.

D. Forms filled out by hand will not be accepted.

E. For each item, provide a column for listing each of the following:
   1. Item Number.
   2. Description of work.
   3. Scheduled Values.
   4. Previous Applications.
   5. Work in Place and Stored Materials under this Application.
   6. Authorized Change Orders.
   7. Total Completed and Stored to Date of Application.
   8. Percentage of Completion.
   9. Balance to Finish.
   10. Retainage.

F. Execute certification by signature of authorized officer.

G. Use data from approved Schedule of Values. Provide dollar value in each column for each line item for portion of work performed and for stored products.

H. List each authorized Change Order as a separate line item, listing Change Order number and dollar amount as for an original item of work.

I. Submit one electronic copy of each Application for Payment.

J. Include the following with the application:
   1. Partial release of liens from major subcontractors and vendors.
   2. Affidavits attesting to off-site stored products.

K. When Architect requires substantiating information, submit data justifying dollar amounts in question. Provide one copy of data with cover letter for each copy of submittal. Show application number and date, and line item by number and description.

1.05 MODIFICATION PROCEDURES

A. Submit name of the individual authorized to receive change documents and who will be responsible for informing others in Contractor's employ or subcontractors of changes to Contract Documents.

B. For minor changes not involving an adjustment to the Contract Sum or Contract Time, Architect will issue instructions directly to Contractor.

C. For other required changes, Architect will issue a document signed by Owner instructing Contractor to proceed with the change, for subsequent inclusion in a Change Order.
   1. The document will describe the required changes and will designate method of determining any change in Contract Sum or Contract Time.
   2. Promptly execute the change.

D. For changes for which advance pricing is desired, Architect will issue a document that includes a detailed description of a proposed change with supplementary or revised drawings and specifications, a change in Contract Time for executing the change with a stipulation of any overtime work required and the period of time during which the requested price will be considered valid. Contractor shall prepare and submit a estimated price quotation within 14 days.

E. Contractor may propose a change by submitting a request for change to Architect, describing the proposed change and its full effect on the work, with a statement describing the reason for the change, and the effect on the Contract Sum and Contract Time with full documentation. Document any requested substitutions in accordance with Section 01 6000.

F. Computation of Change in Contract Amount: As specified in the Agreement and Conditions of the Contract.
   1. For change requested by Architect for work falling under a fixed price contract, the amount will be based on Contractor's price quotation.
   2. For change requested by Contractor, the amount will be based on the Contractor's request for a Change Order as approved by Architect.
   3. For pre-determined unit prices and quantities, the amount will be based on the fixed unit prices.
   4. For change ordered by Architect without a quotation from Contractor, the amount will be determined by Architect based on the Contractor's substantiation of costs as specified for Time and Material work.

G. Substantiation of Costs: Provide full information required for evaluation.
   1. Provide the following data:
      a. Quantities of products, labor, and equipment.
      b. Taxes, insurance, and bonds.
      c. Overhead and profit.
      d. Justification for any change in Contract Time.
      e. Credit for deletions from Contract, similarly documented.
   2. Support each claim for additional costs with additional information:
      a. Origin and date of claim.
      b. Dates and times work was performed, and by whom.
      c. Time records and wage rates paid.
      d. Invoices and receipts for products, equipment, and subcontracts, similarly documented.
   3. For Time and Material work, submit itemized account and supporting data after completion of change, within time limits indicated in the Conditions of the Contract.

H. Execution of Change Orders: Architect will issue Change Orders for signatures of parties as provided in the Conditions of the Contract.

I. After execution of Change Order, promptly revise Schedule of Values and Application for Payment forms to record each authorized Change Order as a separate line item and adjust the Contract Sum.

J. Promptly revise progress schedules to reflect any change in Contract Time, revise sub-schedules to adjust times for other items of work affected by the change, and resubmit.

K. Promptly enter changes in Project Record Documents.

1.06 APPLICATION FOR FINAL PAYMENT

A. Prepare Application for Final Payment as specified for progress payments, identifying total adjusted Contract Sum, previous payments, and sum remaining due.

B. Application for Final Payment will not be considered until the following have been accomplished:
   1. All closeout procedures specified in Section 01 7000.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION

SECTION 01 2300
ALTERNATES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Description of Alternates.

B. Procedures for pricing Alternates.

C. Documentation of changes to Contract Sum and Contract Time.

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.

B. Coordinate related work and modify surrounding work to integrate the Work of each Alternate.

1.03 SCHEDULE OF ALTERNATES

A. See list of Alternates on Drawings.

B. Alternate No. 1 - Indoor Playground.
   1. Base Bid: As indicated on Drawings and Specifications.
   2. Alternate: All work associated with the indoor playground PEMB lean-to. Work is between grids Q to S and 5 to10. The scope includes additional PEMB wall and roof structure at the lean-to and modification to rink 2 PEMB wall along grid Q. As indicated on Drawings and Specifications.

C. Alternate No. 2 - Athletic Training.
   1. Base Bid: As indicated on Drawings and Specifications.
   2. Alternate: All work associated with the athletic training PEMB lean-to. Work is between grids AA to A and 1 to11. The scope includes PEMB wall and roof structure at the lean-to and modification to the rink 3 PEMB wall along grid A. As indicated on Drawings and Specifications.

D. Alternate 3 – Simple Saver Insulation System (Bid Package #1 only)

E. Alternate 4 – SW Parking lot (Bid Package #1 only)

F. Alternate 5 – SE Sidewalk (Bid Package #1 only)

G. Alternate 6 – Concrete in lieu of Asphalt (Bid Package #1 only)

H. Alternate 7 – Light Duty Asphalt in lieu of Heavy Duty at lanes in parking lots (Bid Package #1 only)

I. Alternate 8 - Over excavation under the ice rinks. (Bid Package #2 only)

J. Alternate 9 - Mezzanine Storage Room:
   1. Base Bid: Unoccupied space.
   2. Alternate: Includes door access, Stair #6, mechanical and electrical that serves the space only as indicated on Drawings.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION

SECTION 01 3000
ADMINISTRATIVE REQUIREMENTS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. General administrative requirements.

B. Electronic document submittal service.

C. Preconstruction meeting.

D. Progress meetings.

E. Construction progress schedule.

F. Coordination drawings.

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

H. Number of copies of submittals.

I. Requests for Information (RFI) procedures.

J. Submittal procedures.

1.02 RELATED REQUIREMENTS

A. Section 01 6000 - Product Requirements: General product requirements.

B. Section 01 7000 - Execution and Closeout Requirements: Additional coordination. requirements.

C. Section 01 7800 - Closeout Submittals: Project record documents; operation and maintenance data; warranties and bonds.

1.03 GENERAL ADMINISTRATIVE REQUIREMENTS

A. Comply with requirements of Section 01 7000 - Execution and Closeout Requirements for coordination of execution of administrative tasks with timing of construction activities.

1.04 PROJECT COORDINATOR

A. Project Coordinator: Construction Manager.

B. Cooperate with the Project Coordinator in allocation of mobilization areas of site; for field offices and sheds, for site access, traffic, and parking facilities.

C. During construction, coordinate use of site and facilities through the Project Coordinator.

D. Comply with Project Coordinator's procedures for intra-project communications; submittals, reports and records, schedules, coordination drawings, and recommendations; and resolution of ambiguities and conflicts.

E. Comply with instructions of the Project Coordinator for use of temporary utilities and construction facilities.

F. Coordinate field engineering and layout work under instructions of the Project Coordinator.

G. Make the following types of submittals to Architect through the Project Coordinator:
   1. Requests for Information.
   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 ELECTRONIC DOCUMENT SUBMITTAL SERVICE

A. All documents transmitted for purposes of administration of the contract are to be in electronic (PDF, MS Word, or MS Excel) format, as appropriate to the document, and transmitted via an Internet-based submittal service that receives, logs and stores documents, provides electronic stamping and signatures, and notifies addressees via email.
   1. The web-based software will provide status logs, reports, searching and automated notifications.
   2. Besides submittals for review, information, and closeout, this procedure applies to Requests for Information (RFIs), progress documentation, contract modification documents (e.g. supplementary instructions, change proposals, change orders), applications for payment, field reports and meeting minutes, Contractor's correction punchlist, and any other document any participant wishes to make part of the project record.
   3. Contractor and Architect are required to use this service.
   4. It is Contractor's responsibility to submit documents in allowable format.
   5. Subcontractors, suppliers, and Architect's consultants are to be permitted to use the service at no extra charge.
   6. Users of the service need an email address, internet access, and PDF review software that includes ability to mark up and apply electronic stamps (such as Adobe Acrobat, www.adobe.com, or Bluebeam PDF Revu, www.bluebeam.com), unless such software capability is provided by the service provider.
   7. Paper document transmittals will not be reviewed; emailed electronic documents will not be reviewed.
   8. All other specified submittal and document transmission procedures apply, except that electronic document requirements do not apply to samples or color selection charts, which shall be delivered by mail or courier.

B. Cost: The cost of the service is to be paid by Contractor; include the cost of the service in the Contract Sum.

C. Submittal Service: The selected service is:
   1. Provided by the Project Coordinator as approved by Owner and Architect.

D. Project Closeout: Architect will determine when to terminate the service for the project and is responsible for obtaining archive copies of files for Owner.

3.02 PRECONSTRUCTION MEETING

A. Project Coordinator will schedule a meeting after Notice of Award.

B. Attendance Required:
   1. Owner.
   2. Architect.
   3. Contractor.
   4. Major subcontractors, including mechanical and electrical.

C. 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, the Owner's Representative and Architect/Engineer.
   6. Procedures and processing of field decisions, submittals, substitutions, applications for payments, proposal request, Change Orders, and Contract closeout procedures.
   7. Scheduling.
   8. Scheduling activities of a Geotechnical Engineer and Testing/Inspection Agency

D. Project Coordinator will record minutes and distribute copies within 7 days after meeting to participants, with copies to Architect, Owner, participants, and those affected by decisions made.
   1. Minutes will be distributed through Web-based project management software system.

3.03 PROGRESS MEETINGS

A. Project Coordinator will make arrangements for meetings, prepare agenda with copies for participants, preside at meetings.

B. Attendance Required:
   1. Contractor.
   2. Owner.
   3. Architect, at frequency per Owner-Architect agreement.
   4. Contractor's superintendent.
   5. Major subcontractors.
   6. Major Suppliers.
   7. Additional consultants, subcontractors, suppliers and product representatives as appropriate to agenda topics for each meeting.

C. 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. Review of off-site fabrication and delivery schedules.
   7. Maintenance of progress schedule.
   8. Corrective measures to regain projected schedules.
   9. Planned progress during succeeding work period.
   10. Coordination of projected progress.
   11. Maintenance of quality and work standards.
   12. Effect of proposed changes on progress schedule and coordination.
   13. Other business relating to work.

D. Project Coordinator will record minutes and distribute copies within 5 days after meeting to participants, with copies to Architect, Owner, participants, and those affected by decisions made.
   1. Minutes will be distributed through Web based project management software system

3.04 CONSTRUCTION PROGRESS SCHEDULE

A. Within 10 days after date of the Agreement, submit preliminary schedule defining planned operations for the first 60 days of work, with a general outline for remainder of work.

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

3.05 COORDINATION DRAWINGS

A. Provide information required by Project Coordinator for preparation of coordination drawings.

B. Review drawings prior to submission to Architect.

3.06 REQUESTS FOR INTERPRETATION (RFI)

A. Definition: A request seeking one of the following:
   1. An interpretation, amplification, or clarification of some requirement of Contract Documents arising from inability to determine from them the exact material, process, or system to be installed; or when the elements of construction are required to occupy the same space (interference); or when an item of work is described differently at more than one place in Contract Documents.
   2. A resolution to an issue which has arisen due to field conditions and affects design intent.

B. Whenever possible, request clarifications at the next appropriate project progress meeting, with response entered into meeting minutes, rendering unnecessary the issuance of a formal RFI.

C. 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.
      a. Review, coordinate, and comment on requests originating with subcontractors and/or materials suppliers.
      b. Do not forward requests which solely require internal coordination between subcontractors.
   2. Prepare in a format and with content acceptable to Owner.
   3. Prepare using software provided by the Electronic Document Submittal Service.
   4. Combine RFI and its attachments into a single electronic file. PDF format is preferred.

D. Reason for the RFI: Prior to initiation of an RFI, carefully study all Contract Documents to confirm that information sufficient for their interpretation is definitely not included.
   1. Include in each request Contractor's signature attesting to good faith effort to determine from Contract Documents information requiring interpretation.
   2. Unacceptable Uses for RFIs: Do not use RFIs to request the following::
      a. Approval of submittals (use procedures specified elsewhere in this section).
      b. Approval of substitutions (see Section - 01 6000 - Product Requirements)
      c. Changes that entail change in Contract Time and Contract Sum (comply with provisions of the Conditions of the Contract).
      d. Different methods of performing work than those indicated in the Contract Drawings and Specifications (comply with provisions of the Conditions of the Contract).
   3. Improper RFIs: Requests not prepared in compliance with requirements of this section, and/or missing key information required to render an actionable response. They will be returned without a response, with an explanatory notation.
   4. Frivolous RFIs: Requests regarding information that is clearly indicated on, or reasonably inferable from, Contract Documents, with no additional input required to clarify the question. They will be returned without a response, with an explanatory notation.
      a. The Owner reserves the right to assess the Contractor for the costs (on time-and-materials basis) incurred by the Architect, and any of its consultants, due to processing of such RFIs.

E. Content: Include identifiers necessary for tracking the status of each RFI, and information necessary to provide an actionable response.
   1. Official Project name and number, and any additional required identifiers established in Contract Documents.
   2. Owner's, Architect's, and Contractor's names.
   3. Discrete and consecutive RFI number, and descriptive subject/title.
   4. Issue date, and requested reply date.
   5. Reference to particular Contract Document(s) requiring additional information/interpretation. Identify pertinent drawing and detail number and/or specification section number, title, and paragraph(s).
   6. Annotations: Field dimensions and/or description of conditions which have engendered the request.
   7. Contractor's suggested resolution: A written and/or a graphic solution, to scale, is required in cases where clarification of coordination issues is involved, for example; routing, clearances, and/or specific locations of work shown diagrammatically in Contract Documents. If applicable, state the likely impact of the suggested resolution on Contract Time or the Contract Sum.

F. Attachments: Include sketches, coordination drawings, descriptions, photos, submittals, and other information necessary to substantiate the reason for the request.

G. RFI Log: Maintain and print "hard copy" reports for progress meeting. Reports to contain:
   1. Indicate current status of every RFI. Update log promptly and on a regular basis.
   2. Note dates of when each request is made, and when a response is received.
   3. Highlight items requiring priority or expedited response.
   4. Highlight items for which a timely response has not been received to date.
   5. Identify and include improper or frivolous RFIs.

H. Review Time: Architect will respond and return RFIs to Contractor within seven calendar days of receipt. For the purpose of establishing the start of the mandated response period, RFIs received after 12:00 noon will be considered as having been received on the following regular working day.
   1. Response period may be shortened or lengthened for specific items, subject to mutual agreement, and recorded in a timely manner in progress meeting minutes.

I. Responses: Content of answered RFIs will not constitute in any manner a directive or authorization to perform extra work or delay the project. If in Contractor's belief it is likely to lead to a change to Contract Sum or Contract Time, promptly issue a notice to this effect, and follow up with an appropriate Change Order request to Owner.
   1. Response may include a request for additional information, in which case the original RFI will be deemed as having been answered, and an amended one is to be issued forthwith. Identify the amended RFI with an R suffix to the original number.
   2. Do not extend applicability of a response to specific item to encompass other similar conditions, unless specifically so noted in the response.
   3. Upon receipt of a response, promptly review and distribute it to all affected parties, and update the RFI Log.
   4. Notify Architect within seven calendar days if an additional or corrected response is required by submitting an amended version of the original RFI, identified as specified above.

3.07 SUBMITTAL SCHEDULE

A. Submit to Architect for review a schedule for submittals in tabular format.
   1. Submit at the same time as the preliminary schedule.
   2. Coordinate with Contractor's construction schedule and schedule of values.
   3. Format schedule to allow tracking of status of submittals throughout duration of construction.
   4. Arrange information to include scheduled date for initial submittal, specification number and title, submittal category (for review or for information), description of item of work covered, and role and name of subcontractor.
   5. Account for time required for preparation, review, manufacturing, fabrication and delivery when establishing submittal delivery and review deadline dates.
      a. For assemblies, equipment, systems comprised of multiple components and/or requiring detailed coordination with other work, allow for additional time to make corrections or revisions to initial submittals, and time for their review.

3.08 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.
   5. Other types indicated.

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 01 7800 - Closeout Submittals.

3.09 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.

3.10 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 01 7800 - 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.

3.11 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.
1. Transmit to Architect/ Engineer via email to Project Coordinator or via Electronic Document Submittal Service.

B. Extra Copies at Project Closeout: See Section 01 7800.

C. Samples: Submit the number specified in individual specification sections; one of which will be retained by Architect.
1. Retained samples will not be returned to Contractor unless specifically so stated.

3.12 SUBMITTAL PROCEDURES

A. General Requirements:
1. Use a single transmittal for related items.
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 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.
7. Deliver each submittal on date noted in submittal schedule, unless an earlier date has been agreed to by all affected parties, and is of the benefit to the project.
   a. Upload submittals in electronic form to Electronic Document Submittal Service website.
8. Schedule submittals to expedite the Project, and coordinate submission of related items.
   a. For each submittal for review, allow 15 days excluding delivery time to and from the Contractor.
   b. For sequential reviews involving Architect's consultants, Owner, or another affected party, allow an additional 7 days.
   c. For sequential reviews involving approval from authorities having jurisdiction (AHJ), in addition to Architect's approval, allow an additional 15days.
9. Identify variations from Contract Documents and product or system limitations that may be detrimental to successful performance of the completed work.
10. Provide space for Contractor and Architect review stamps.
11. When revised for resubmission, identify all changes made since previous submission.

12. Distribute reviewed submittals. Instruct parties to promptly report inability to comply with requirements.
13. Incomplete submittals will not be reviewed, unless they are partial submittals for distinct portion(s) of the work, and have received prior approval for their use.
14. Submittals not requested will be recognized, and will be returned "Not Reviewed",

B. Product Data Procedures:
1. Submit only information required by individual specification sections.
2. Collect required information into a single submittal.
3. Submit concurrently with related shop drawing submittal.
4. 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. Do not reproduce Contract Documents to create shop drawings.
3. Generic, non-project-specific information submitted as shop drawings do not meet the requirements for shop drawings.

D. Samples Procedures:
1. Transmit related items together as single package.
2. Identify each item to allow review for applicability in relation to shop drawings showing installation locations.
3. Include with transmittal high-resolution image files of samples to facilitate electronic review and approval. Provide separate submittal page for each item image.

3.13 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.
1. Notations may be made directly on submitted items and/or listed on appended Submittal Review cover sheet.

D. Architect's and consultants' actions on items submitted for review:
1. Authorizing purchasing, fabrication, delivery, and installation:
a. "Reviewed", or language with same legal meaning.
b. "Make Corrections Noted", or language with same legal meaning.
1) At Contractor's option, submit corrected item, with review notations acknowledged and incorporated.
c. "Reviewed as Noted, Resubmit for Record", or language with same legal meaning.
1) Resubmit corrected item, with review notations acknowledged and incorporated. Resubmit separately, or as part of project record documents.
2) Non-responsive resubmittals may be rejected.
2. Not Authorizing fabrication, delivery, and installation:
a. "Revise and Resubmit".
1) Resubmit revised item, with review notations acknowledged and incorporated.
2) Non-responsive resubmittals may be rejected.
b. "Rejected".
1) Submit item complying with requirements of Contract Documents.

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 01 4000
QUALITY REQUIREMENTS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Submittals.

B. Quality assurance.

C. References and standards.

D. Testing and inspection agencies and services.

E. Contractor's construction-related professional design services.

F. Contractor's design-related professional design services.

G. Control of installation.

H. Mock-ups.

I. Tolerances.

J. Manufacturers' field services.

K. Defect Assessment.

1.02 RELATED REQUIREMENTS

A. Document 00 3100 - Available Project Information: Soil investigation data.

B. Section 01 3000 - Administrative Requirements: Submittal procedures.

C. Section 01 4533 - Code-Required Testing and Special Inspections.

D. Section 01 6000 - Product Requirements: Requirements for material and product quality.

1.03 REFERENCE STANDARDS

A. ASTM C1021 - Standard Practice for Laboratories Engaged in Testing of Building Sealants.

B. ASTM C1077 - Standard Practice for Agencies Testing Concrete and Concrete Aggregates for Use in Construction and Criteria for Testing Agency Evaluation.

C. ASTM C1093 - Standard Practice for Accreditation of Testing Agencies for Masonry.

D. ASTM D3740 - Standard Practice for Minimum Requirements for Agencies Engaged in Testing and/or Inspection of Soil and Rock as Used in Engineering Design and Construction.

E. ASTM E329 - Standard Specification for Agencies Engaged in Construction Inspection, Testing, or Special Inspection.

F. ASTM E543 - Standard Specification for Agencies Performing Nondestructive Testing.

G. ASTM E699 - Standard Specification for Agencies Involved in Testing, Quality Assurance, and Evaluating of Manufactured Building Components.

H. IAS AC89 - Accreditation Criteria for Testing Laboratories.

1.04 DEFINITIONS

A. Contractor's Quality Control Plan: Contractor's management plan for executing the Contract for Construction.

B. Contractor's Professional Design Services: Design of some aspect or portion of the project by party other than the design professional of record. Provide these services as part of the Contract for Construction.

1. Design Services Types Required:
    a. Construction-Related: Services Contractor needs to provide in order to carry out the Contractor's sole responsibilities for construction means, methods, techniques, sequences, and procedures.

b. Design-Related: Design services explicitly required to be performed by another design professional due to highly-technical and/or specialized nature of a portion of the project. Services primarily involve engineering analysis, calculations, and design, and are not intended to alter the aesthetic aspects of the design.

C. Design Data: Design-related, signed and sealed drawings, calculations, specifications, certifications, shop drawings and other submittals provided by Contractor, and prepared directly by, or under direct supervision of, appropriately licensed design professional.

1.05 CONTRACTOR'S CONSTRUCTION-RELATED PROFESSIONAL DESIGN SERVICES

A. Coordination: Contractor's professional design services are subject to requirements of project's Conditions for Construction Contract.

B. Provide such engineering design services as may be necessary to plan and safely conduct certain construction operations, pertaining to, but not limited to the following:
1. Temporary sheeting, shoring, or supports.
2. Temporary scaffolding.
3. Temporary bracing.
4. Temporary stairs or steps required for construction access only.
5. Temporary hoist(s) and rigging.
6. Investigation of soil conditions and design of temporary foundations to support construction equipment.

1.06 CONTRACTOR'S DESIGN-RELATED PROFESSIONAL DESIGN SERVICES

A. Coordination: Contractor's professional design services are subject to requirements of project's Conditions for Construction Contract.

B. Base design on performance and/or design criteria indicated in individual specification sections.
1. Submit a Request for Information to Architect if the criteria indicated are not sufficient to perform required design services.

C. Scope of Contractor's Professional Design Services: Provide for the following items of work:
1. Design of Structural Components: Include development of shop drawings, and performing shop and site work, as described in Section 13 3419 - Metal Building Systems including associated materials in 07 4113 - Metal Roof Panels and 07 4213.19 - Insulated Metal Wall Panels.

1.07 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Design Data: Submit for Architect's knowledge as contract administrator for the limited purpose of assessing compliance with information given and the design concept expressed in the Contract Documents, or for Owner's information.
1. Include calculations that have been used to demonstrate compliance to performance and regulatory criteria provided, and to determine design solutions.
2. Include required product data and shop drawings.
3. Include a statement or certification attesting that design data complies with criteria indicated, such as building codes, loads, functional, and similar engineering requirements.
4. Include signature and seal of design professional responsible for allocated design services on calculations and drawings.

C. Test Reports: After each test/inspection, promptly submit two copies of report to Architect and to Contractor.
1. Include:
a. Date issued.
b. Project title and number.
c. Name of inspector.
d. Date and time of sampling or inspection.
e. Identification of product and specifications section.
f. Location in the Project.

g. Type of test/inspection.
h. Date of test/inspection.
i. Results of test/inspection.
j. Compliance with Contract Documents.
k. When requested by Architect, provide interpretation of results.

2. Test report submittals are for Architect's knowledge as contract administrator for the limited purpose of assessing compliance with information given and the design concept expressed in the Contract Documents, or for Owner's information.

D. Certificates: When specified in individual specification sections, submit certification by the manufacturer and Contractor or installation/application subcontractor to Architect, 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.

1.08 QUALITY ASSURANCE

A. Designer Qualifications: Where professional engineering design services and design data submittals are specifically required of Contractor by Contract Documents, provide services of a Professional Engineer experienced in design of this type of work and licensed in the State in which the Project is located.

1.09 REFERENCES AND STANDARDS

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

B. Comply with reference standard of date of issue current on date of Contract Documents, except where a specific date is established by applicable code.

C. Obtain copies of standards where required by product specification sections.

D. Maintain copy at project site during submittals, planning, and progress of the specific work, until Substantial Completion.

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

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

1.10 TESTING AND INSPECTION AGENCIES AND SERVICES

A. Owner will employ and pay for services of an independent testing agency to perform specified testing and inspection.

B. Employment of agency in no way relieves Contractor of obligation to perform Work in accordance with requirements of Contract Documents.

C. Contractor Employed Agency:
1. Testing agency: Comply with requirements of ASTM E329, ASTM E543, ASTM E699, ASTM C1021, ASTM C1077, ASTM C1093, and ASTM D3740.
2. Inspection agency: Comply with requirements of ASTM D3740 and ASTM E329.
3. Laboratory Qualifications: Accredited by IAS according to IAS AC89.
4. Laboratory: Authorized to operate in the State in which the Project is located.
5. Laboratory Staff: Maintain a full time specialist on staff to review services.
6. Testing Equipment: Calibrated at reasonable intervals either by NIST or using an NIST established Measurement Assurance Program, under a laboratory measurement quality assurance program.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.01 CONTROL OF INSTALLATION

A. Monitor quality control over suppliers, manufacturers, products, services, site conditions, and workmanship, to produce work of specified quality.

B. Comply with manufacturers' instructions, including each step in sequence.

C. Should manufacturers' instructions conflict with Contract Documents, request clarification from Architect before proceeding.

D. Comply with specified standards as minimum quality for the work except where more stringent tolerances, codes, or specified requirements indicate higher standards or more precise workmanship.

E. Have work performed by persons qualified to produce required and specified quality.

F. Verify that field measurements are as indicated on shop drawings or as instructed by the manufacturer.

G. Secure products in place with positive anchorage devices designed and sized to withstand stresses, vibration, physical distortion, and disfigurement.

3.02 MOCK-UPS

A. Before installing portions of the Work where mock-ups are required, construct mock-ups in location and size indicated for each form of construction and finish required to comply with the following requirements, using materials indicated for the completed Work. The purpose of mock-up is to demonstrate the proposed range of aesthetic effects and workmanship.

B. Accepted mock-ups establish the standard of quality the Architect will use to judge the Work.

C. Notify Architect and Architect's Consultant fifteen (15) working days in advance of dates and times when mock-ups will be constructed.

D. Provide supervisory personnel who will oversee mock-up construction. Provide workers that will be employed during the construction at Project.

E. Tests shall be performed under provisions identified in this section and identified in the respective product specification sections.

F. Assemble and erect specified items with specified attachment and anchorage devices, flashings, seals, and finishes.

G. Obtain Architect's approval of mock-ups before starting work, fabrication, or construction.
   1. Architect will issue written comments within seven (7) working days of initial review and each subsequent follow up review of each mock-up.
   2. Make corrections as necessary until Architect's approval is issued.

H. Architect will use accepted mock-ups as a comparison standard for the remaining Work.

I. Where mock-up has been accepted by Architect and is specified in product specification sections to be removed, protect mock-up throughout construction, remove mock-up and clear area when directed to do so by Architect.

J. Where possible salvage and recycle the demolished mock-up materials.

3.03 TOLERANCES

A. Monitor fabrication and installation tolerance control of products to produce acceptable Work. Do not permit tolerances to accumulate.

B. Comply with manufacturers' tolerances. Should manufacturers' tolerances conflict with Contract Documents, request clarification from Architect before proceeding.

C. Adjust products to appropriate dimensions; position before securing products in place.

3.04 TESTING AND INSPECTION

A. See individual specification sections for testing and inspection required.

B. Testing Agency Duties:

1. Test samples of mixes submitted by Contractor.
2. Provide qualified personnel at site. Cooperate with Architect and Contractor in performance of services.
3. Perform specified sampling and testing of products in accordance with specified standards.
4. Ascertain compliance of materials and mixes with requirements of Contract Documents.
5. Promptly notify Architect and Contractor of observed irregularities or non-compliance of Work or products.
6. Perform additional tests and inspections required by Architect.
7. Attend preconstruction meetings and progress meetings.
8. Submit reports of all tests/inspections specified.

C. Limits on Testing/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.

D. Contractor Responsibilities:
1. Deliver to agency at designated location, adequate samples of materials proposed to be used that require testing, along with proposed mix designs.
2. Cooperate with laboratory personnel, and provide access to the Work and to manufacturers' facilities.
3. Provide incidental labor and facilities:
   a. To provide access to Work to be tested/inspected.
   b. To obtain and handle samples at the site or at source of Products to be tested/inspected.
   c. To facilitate tests/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/inspection services.
5. Employ services of an independent qualified testing laboratory and pay for additional samples, tests, and inspections required by Contractor beyond specified requirements.
6. Arrange with Owner's agency and pay for additional samples, tests, and inspections required by Contractor beyond specified requirements.

E. Re-testing required because of non-compliance with specified requirements shall be performed by the same agency on instructions by Architect.

F. Re-testing required because of non-compliance with specified requirements shall be paid for by Contractor.

3.05 MANUFACTURERS' FIELD SERVICES

A. When specified in individual specification sections, require material or product suppliers or manufacturers to provide qualified staff personnel to observe site conditions, conditions of surfaces and installation, quality of workmanship, start-up of equipment, test, adjust and balance of equipment as applicable, and to initiate instructions when necessary.

B. Report observations and site decisions or instructions given to applicators or installers that are supplemental or contrary to manufacturers' written instructions.

3.06 DEFECT ASSESSMENT

A. Replace Work or portions of the Work not complying with specified requirements.

B. If, in the opinion of Architect, it is not practical to remove and replace the work, Architect will direct an appropriate remedy or adjust payment.

END OF SECTION

SECTION 01 4533
CODE-REQUIRED TESTING AND SPECIAL INSPECTIONS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Code-required special inspections.

B. Testing services incidental to special inspections.

C. Submittals.

D. Manufacturers' field services.

E. Fabricators' field services.

1.02 RELATED REQUIREMENTS

A. Section 01 3000 - Administrative Requirements: Submittal procedures.

B. Section 01 4000 - Quality Requirements.

C. Section 01 6000 - Product Requirements: Requirements for material and product quality.

1.03 ABBREVIATIONS AND ACRONYMS

A. AHJ: Authority having jurisdiction.

B. NIST: National Institute of Standards and Technology.

1.04 DEFINITIONS

A. Code or Building Code: ICC (IBC)-2021, 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. NIST: National Institute of Standards and Technology.

D. Special Inspections and Tests: Inspections and testing of materials, installation, fabrication, erection, or placement of components and connections mandated by Building Code to safeguard public welfare.

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 and tests are separate from and independent of tests and inspections conducted by Owner or Contractor for purposes of quality assurance and contract administration.

1.05 REFERENCE STANDARDS

A. ASTM D3740 - Standard Practice for Minimum Requirements for Agencies Engaged in Testing and/or Inspection of Soil and Rock as Used in Engineering Design and Construction.

B. IAS AC89 - Accreditation Criteria for Testing Laboratories.

C. IAS AC291 - Accreditation Criteria for Special Inspection Agencies AC291.

D. ICC (IBC)-2021 - International Building Code; 2021.

1.06 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements for submittal procedures.

B. Testing & 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.
4. Submit documentation that Special Inspection Agency is accredited by IAS according to IAS AC291.

C. Special Inspection and Test Reports: After each special inspection or test, 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.

1.07 TESTING AND INSPECTION AGENCIES

A. Owner will employ services of a Special Inspection and Testing Agency to perform inspections and associated testing and sampling in accordance with ASTM E329 and required by the building code.

B. Owner may employ services of an independent Special Inspection and Testing Agency to perform additional testing and sampling or special inspections not required by the building code.

C. Employment of agency in no way relieves Contractor of obligation to perform work in accordance with requirements of contract documents.

1.08 QUALITY ASSURANCE

A. Special Inspection Agency Qualifications:
1. Independent firm specializing in performing testing and inspections of the type specified in this section.
2. Accredited by IAS according to IAS AC291.

B. Testing Agency Qualifications:
1. Independent firm specializing in performing testing and inspections of the type specified in this section.
2. Accredited by IAS according to IAS AC89.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.01 SPECIAL INSPECTIONS AND TESTING

A. The Code requires special inspections and testing of certain materials, components, assemblies, and connections used in constructing the project. Special inspections and testing will be performed in accordance with the Code.

B. Special inspections and testing will be performed in accordance with the Code for the following materials and project components:
1. Steel.
2. Soils.

3.02 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 is required to 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 is required to 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.

3.03 SPECIAL INSPECTIONS FOR STEEL CONSTRUCTION

A. See Division 13 sections and Structural Drawing General Notes

3.04 SPECIAL INSPECTIONS FOR SOILS

A. Materials and Placement: Verify each item below complies with approved construction documents and approved geotechnical report.
   1. Design bearing capacity of material below shallow foundations; periodic.
   2. Design depth of excavations and suitability of material at bottom of excavations; periodic.
   3. Materials, densities, lift thicknesses; placement and compaction of backfill: continuous.
   4. Subgrade, prior to placement of compacted fill verify proper preparation; periodic.

B. Testing: Classify and test excavated material; periodic.

3.05 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. Construction materials and systems that are alternatives to materials and systems prescribed by the building code.
   2. Unusual design applications of materials described in the building code.
   3. 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. Alternative Test Procedures: Where approved rules and standards do not exist, test materials and assemblies as required by AHJ or provide AHJ with documentation of quality and manner in which those materials and assemblies are used.

3.06 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.

3.07 TESTING AGENCY DUTIES AND RESPONSIBILITIES

A. Testing Agency Duties:
   1. Test samples submitted by Contractor.
   2. Provide qualified personnel at site. Cooperate with Architect and Contractor in performance of services.

3. Perform specified sampling and testing of products in accordance with specified standards.
4. Ascertain compliance of materials and mixes with requirements of Contract Documents.
5. Promptly notify Architect and Contractor of observed irregularities or non-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 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.

3.08 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 approved documents at project site, 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 by Contractor beyond specified requirements.
6. Retain special inspection records.

B. Contractor Responsibilities, Wind Force-Resisting System and Wind Force-Resisting Component: Submit written statement of responsibility for each item listed in the Statement of Special Inspections to AHJ and Owner prior to starting work. Statement of responsibility shall acknowledge awareness of special construction requirements and other requirements listed.

3.09 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. Submit qualifications of observer to Architect 30 days in advance of required observations.

C. Report observations and site decisions or instructions given to applicators or installers that are supplemental or contrary to manufacturers' written instructions.

END OF SECTION

SECTION 01 5600

TRAFFIC CONTROL

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:

1. Traffic Control Devices for use during construction period.
2. Construction Signing.

B. Related Sections:

1. Section 31 2200 - Site Grading.
2. Section 31 2316 - Excavating.
3. Section 32 1123 - Aggregate Base Course.
4. Section 32 1216 - Bituminous Pavement.
5. Section 32 1313 - Concrete Pavement.

1.2 REFERENCES

A. Manual on Uniform Traffic Control Devices (MUTCD), latest edition.

B. North Dakota Department of Transportation Standard Specifications for Road and Bridge Construction, latest edition.

1.3 SUBMITTALS

A. See Division 01 for submittal procedures.

B. Shop drawings on all signs, delineators and barricades illustrating types of signs, messages, and mounting.

C. Sign and barricade poles and bases.

PART 2 PRODUCTS

2.1 SIGNS, SIGNALS, BARRICADES, AND DEVICES

A. Conform to North Dakota Deparment of Transportation Standard Specifications for Road and Bridge Construction, latest edition.

B. Conform to MUTCD requirements.

PART 3 EXECUTION

3.1 GENERAL

A. All work shall conform to NDDOT Standard Construction Specifications.

B. A minimum of one week prior to implementation of traffic control measures, Contractor shall contact the Owner and Engineer to provide advance notice.

C. The Contractor shall furnish, install, and maintain all required traffic control devices, and shall provide watchpersons as necessary to protect the work and to ensure public and workers' safety. All required control devices shall be available for installation when needed and shall be maintained, relocated, covered, or removed as necessary.

D. When the project documents do not cover a specific traffic control situation, the Contractor shall submit a Traffic Control Plan to the Engineer and the City for approval prior to commencing construction. Contractor is responsible for all costs associated with properly controlling traffic.

E. Notify the Engineer and the City in writing of all restrictions and upcoming maintenance of traffic changes on a weekly basis.

3.2 CONSTRUCTION PARKING CONTROL

A. Control vehicular parking to prevent interference with public traffic and parking, access by emergency vehicles and Owner's operations.

B. Monitor parking of construction personnel's vehicles.

C. Prevent parking in non-designated areas.

3.3 TRAFFIC SIGNS, BARRICADES, SIGNALS, AND OTHER DEVICES

A. Contractor signs and barricades shall be furnished and placed at the Site as approved by the Engineer. At each section of Work under construction, where the character or condition of the Work creates a hazard to traffic, the Contractor shall provide, furnish, erect, and maintain adequate barricades, signs, and warnings during the course of construction as appropriate to the situation.

B. Relocate as Work progresses, to maintain effective traffic control.

C. Provide, at no additional cost to the Owner, additional signs and barricades, as may be required for the safety of the public.

D. The above provisions shall not in any way relieve the Contractor of any of its legal responsibilities or liabilities for the safety of the public.

E. When work zone signs interfere with permanent signs, the work zone signs shall be relocated to locations that afford the best results.

3.4 MAINTENANCE OF TRAFFIC

A. Under no circumstances shall the Contractor be allowed to restrict access to private properties unless approved by the Engineer.

B. Should a given street require temporary closure, contractor shall obtain written approval from City and provide all special provisions required for traffic control.

C. Should a given street require No Parking, it shall be the responsibility of the Contractor to inform the public of No Parking a minimum of one day ahead of time.

3.5 MAINTENANCE OF TRAFFIC CONTROL DEVICES

A. The contractor shall be responsible for making sure all construction signs are in place each day including weekends, replacing any signs that are damaged, and replacing or resetting traffic controld evices as necessary.

3.6 REMOVAL

A. Remove equipment and deices when no longer needed.

B. Repair damage caused by installation.

END OF SECTION

This page intentionally left blank

SECTION 01 6000
PRODUCT REQUIREMENTS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. General product requirements.

B. Re-use of existing products.

C. Transportation, handling, storage and protection.

D. Product option requirements.

E. Substitution limitations.

F. Procedures for Owner-supplied products.

G. Maintenance materials, including extra materials, spare parts, tools, and software.

1.02 RELATED REQUIREMENTS

A. Section 01 1000 - Summary: Lists of products to be removed from existing building.

B. Section 01 1000 - Summary: Identification of Owner-supplied products.

C. Section 01 6010 - Substitution Procedures: Substitutions made during procurement and/or construction phases.

D. Section 01 6010 - Substitution Procedures.

E. Section 01 6010.01 - Substitution Request Form.

F. Section 01 7419 - Construction Waste Management and Disposal: Waste disposal requirements potentially affecting product selection, packaging and substitutions.

1.03 SUBMITTALS

A. Product Data Submittals: Submit manufacturer's standard published data. Mark each copy to identify applicable products, models, options, and other data. Supplement manufacturers' standard data to provide information specific to this Project.

B. Shop Drawing Submittals: Prepared specifically for this Project; indicate utility and electrical characteristics, utility connection requirements, and location of utility outlets for service for functional equipment and appliances.

C. Sample Submittals: Illustrate functional and aesthetic characteristics of the product, with integral parts and attachment devices. Coordinate sample submittals for interfacing work.

1. For selection from standard finishes, submit samples of the full range of the manufacturer's standard colors, textures, and patterns.

PART 2 PRODUCTS

2.01 EXISTING PRODUCTS

A. Do not use materials and equipment removed from existing premises unless specifically required or permitted by Contract Documents.

B. Unforeseen historic items encountered remain the property of the Owner; notify Owner promptly upon discovery; protect, remove, handle, and store as directed by Owner.

C. Existing materials and equipment indicated to be removed, but not to be re-used, relocated, reinstalled, delivered to the Owner, or otherwise indicated as to remain the property of the Owner, become the property of the Contractor; remove from site.

D. Specific Products to be Reused: The reuse of certain materials and equipment already existing on the project site is required.

1. See Section 01 1000 for list of items required to be salvaged for reuse and relocation.

2.02 NEW PRODUCTS

A. Provide new products unless specifically required or permitted by Contract Documents.

B. Use of products having any of the following characteristics is not permitted:
   1. Made using or containing CFC's or HCFC's.
   2. Made of wood from newly cut old growth timber.
   3. Containing lead, cadmium, or asbestos.

C. Where other criteria are met, Contractor shall give preference to products that:
   1. If used on interior, have lower emissions, as defined in Section 01 6116.
   2. If wet-applied, have lower VOC content, as defined in Section 01 6116.
   3. Are extracted, harvested, and/or manufactured closer to the location of the project.
   4. Result in less construction waste. See Section 01 7419

2.03 PRODUCT OPTIONS

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

B. Products Specified by Naming One or More Manufacturers: Use a product of one of the manufacturers named and meeting specifications, no options or substitutions allowed.

C. Products Specified by Naming One or More Manufacturers with a Provision for Substitutions: Submit a request for substitution for any manufacturer not named.

D. See also Section 01 6010 - Substitution Procedures.

2.04 MAINTENANCE MATERIALS

A. Furnish extra materials, spare parts, tools, and software of types and in quantities specified in individual specification sections.

B. Deliver and place in location as directed; obtain receipt prior to final payment.

PART 3 EXECUTION

3.01 SUBSTITUTION LIMITATIONS

A. See Section 01 6010 - Substitution Procedures for procedures for submitting equal products for consideration.

3.02 OWNER-SUPPLIED PRODUCTS

A. Owner's Responsibilities:
   1. Arrange for and deliver Owner reviewed shop drawings, product data, and samples, to Contractor.
   2. Arrange and pay for product delivery to site.
   3. On delivery, inspect products jointly with Contractor.
   4. Submit claims for transportation damage and replace damaged, defective, or deficient items.
   5. Arrange for manufacturers' warranties, inspections, and service.

B. Contractor's Responsibilities:
   1. Review Owner reviewed shop drawings, product data, and samples.
   2. Receive and unload products at site; inspect for completeness or damage jointly with Owner.
   3. Handle, store, install and finish products.
   4. Repair or replace items damaged after receipt.

3.03 TRANSPORTATION AND HANDLING

A. Package products for shipment in manner to prevent damage; for equipment, package to avoid loss of factory calibration.

B. If special precautions are required, attach instructions prominently and legibly on outside of packaging.

C. Coordinate schedule of product delivery to designated prepared areas in order to minimize site storage time and potential damage to stored materials.

D. Transport and handle products in accordance with manufacturer's instructions.

E. Transport materials in covered trucks to prevent contamination of product and littering of surrounding areas.

F. Promptly inspect shipments to ensure that products comply with requirements, quantities are correct, and products are undamaged.

G. Provide equipment and personnel to handle products by methods to prevent soiling, disfigurement, or damage, and to minimize handling.

H. Arrange for the return of packing materials, such as wood pallets, where economically feasible.

3.04 STORAGE AND PROTECTION

A. Designate receiving/storage areas for incoming products so that they are delivered according to installation schedule and placed convenient to work area in order to minimize waste due to excessive materials handling and misapplication. See Section 01 7419.
   1. Structural Loading Limitations: Handle and store products and materials so as not to exceed static and dynamic load-bearing capacities of project floor and roof areas.

B. Store and protect products in accordance with manufacturers' instructions.

C. Store with seals and labels intact and legible.

D. Store sensitive products in weathertight, climate-controlled enclosures in an environment favorable to product.

E. For exterior storage of fabricated products, place on sloped supports above ground.

F. Provide off-site storage and protection when site does not permit on-site storage or protection.
   1. Execute a formal supplemental agreement between Owner and Contractor allowing off-site storage, for each occurrence.

G. Protect products from damage or deterioration due to construction operations, weather, precipitation, humidity, temperature, sunlight and ultraviolet light, dirt, dust, and other contaminants.

H. Comply with manufacturer's warranty conditions, if any.

I. Do not store products directly on the ground.

J. Cover products subject to deterioration with impervious sheet covering. Provide ventilation to prevent condensation and degradation of products.

K. Prevent contact with material that may cause corrosion, discoloration, or staining.

L. Provide equipment and personnel to store products by methods to prevent soiling, disfigurement, or damage.

M. Arrange storage of products to permit access for inspection. Periodically inspect to verify products are undamaged and are maintained in acceptable condition.

END OF SECTION

SECTION 01 6010
SUBSTITUTION PROCEDURES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Procedural requirements for proposed substitutions (equals), prior to bid and after award.

1.02 RELATED REQUIREMENTS

A. Section 00 2113 - Instructions to Bidders: Restrictions on timing of substitution requests.

B. Section 01 3000 - Administrative Requirements: Submittal procedures, coordination.

C. Section 01 6000 - Product Requirements: Fundamental product requirements, product options, delivery, storage, and handling.

D. Section 01 6010.01 - Substitution Request Form

1.03 DEFINITIONS

A. Substitutions: Changes from Contract Documents requirements proposed by Contractor to materials, products, assemblies, and equipment.
   1. "Equals" are products that:
      a. are equal in materials of construction, quality, durability, appearance, strength and design characteristics.
      b. will reliably perform and function at least equally well as the brand-named product and achieve the results imposed by the design concept of the completed project as a functions whole.
      c. have a proven record of performance and responsive service.
   2. "Substitutes" are items of materials or equipment proposed that are determined by the design professional not to be an equal or may require redesign to incorporate into the project.
      a. Under open and free competition requirements, owners are not required to consider substitutes and **substitutes will not be considered for this project.**
   3. Substitutions for Cause: Proposed due to changed Project circumstances beyond Contractor's control.
      a. Unavailability.
      b. Regulatory changes.
   4. Substitutions for Convenience: Proposed due to possibility of offering substantial advantage to the Project.
   5. Substitutions for this project shall only consist of Equal Products: The proposed products must have the same salient characteristics as the Basis of Design or other listed manufacturer or products, but were not listed as an acceptable manufacturer/product in specifications.
      a. The named products and listed qualities in each section establish the salient features against which comparable products will be evaluated. Qualities may include type, function, dimension, in-service performance, physical properties, appearance, and other characteristics.
      b. The Architect/Engineer will make the final determination of a proposed product as being equal.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.01 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 provide same or equivalent maintenance service and source of replacement parts, as applicable.

4. 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.
5. 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.
1. All characteristics shall be compliant.

C. Content: Include information necessary for tracking the status of each Substitution Request, and information necessary to provide an actionable response.
1. Forms included in the Project Manual are adequate for this purpose, and must be used.

D. Limit each request to a single proposed substitution item.
1. Submit an electronic document, combining the request form with supporting data into single document.

3.02 SUBSTITUTION PROCEDURES DURING PROCUREMENT

A. Submittal Time Restrictions:

B. Submittal Form (before award of contract):
1. Submit substitution requests by completing the form provided in Section 01 60 10.01. See this form for additional information and instructions. Use only this form; other forms of submission are unacceptable.
2. Substitution requests shall not be considered approved unless included by addendum.

3.03 SUBSTITUTION PROCEDURES DURING CONSTRUCTION

A. Submittal Form (after award of contract):
1. Submit substitution requests by completing the form provided in Section 01 60 10.01. See this section for additional information and instructions. Use only this form; other forms of submission are unacceptable.

B. Submit request for Substitution for Cause within 14 days of discovery of need for substitution, but not later than 14 days prior to time required for review and approval by Architect, in order to stay on approved project schedule.

C. Submit request for Substitution for Convenience within 14 days of discovery of its potential advantage to the project, but not later than 14 days prior to time required for review and approval by Architect, in order to stay on approved project schedule.
1. Contractor is responsible for ensuring that the proposed substitution is of equal to or superior to the basis of design in performance, appearance, quality and function prior to Architect’s review.
2. In addition to meeting general documentation requirements, document how the requested substitution benefits the Owner through cost savings, time savings, greater energy conservation, or in other specific ways.
3. Document means of coordinating of substitution item with other portions of the work, including work by affected subcontractors.
4. Bear the costs engendered by proposed substitution of:
   a. Other construction by Owner.
   b. Other unanticipated project considerations.

D. Substitutions will not be considered under one or more of the following circumstances:
1. When they are indicated or implied on shop drawing or product data submittals, without having received prior approval.

3.04 RESOLUTION

A. Architect may request additional information and documentation prior to rendering a decision. Provide this data in an expeditious manner.

B. Architect will notify Contractor in writing of decision to accept or reject request.
1. Architect's decision following review of proposed substitution will be noted on the submitted form.

3.05 ACCEPTANCE

A. Accepted substitutions change the work of the Project. They will be documented and incorporated into work of the project by Change Order, Construction Change Directive, Architectural Supplementary Instructions, or similar instruments provided for in the Conditions of the Contract.
   1. An approved and returned Substitution Request Form alone does not qualify.

3.06 CLOSEOUT ACTIVITIES

A. See Section 01 7800 - Closeout Submittals, for closeout submittals.

END OF SECTION

SECTION 01 6010.01
SUBSTITUTION REQUEST FORM

We hereby submit for your consideration the following product instead of the specified item for the following project:

PROJECT TITLE _____ PROJECT NO. _____

DRAWING NO. _____ DRAWING TITLE _____

SPEC. SECTION SPEC. TITLE PARAGRAPH SPECIFIED ITEM

_____ _____ _____ _____

Proposed Substitution:_____

Attach complete information on changes to Drawings and/or Specifications which proposed substitution will require for its proper installation.

Submit, with request, all necessary samples and substantiating data to prove equal quality and performance to that which is specified. Clearly mark manufacturer's literature to indicate equality in performance.

Substitutions of the materials and equipment described in the Contract Documents will be considered during the bidding period upon receipt of a written request to the Architect for approval up to ten (10) days before receipt of bids. Verbal or written requests without the completed Substitution Request Form will not be considered.

CERTIFICATION OF EQUAL PERFORMANCE AND ASSUMPTION OF LIABILITY FOR EQUAL PERFORMANCE

The undersigned states that the function, appearance, and quality are equivalent or superior to the specified item.

Submitted by:

_____

Signature

_____

Firm

_____

Address

_____ _____ _____

Telephone Email Date

Signature shall be by person having authority to legally bind his firm to the above terms. Failure to provide legally binding signature will result in retraction of approval.

Fill in Blanks Below:

Does the substitution affect dimensions shown on Drawings? Yes No

If yes, clearly indicate changes:

_____

_____

Will the undersigned pay for changes to the building design, including engineering and detailing costs caused by the requested substitution? Yes No

If no, fully explain:

_____

_____

What effect does substitution have on other Contracts or other trades?

_____

_____

What effect does substitution have on construction schedule?

_____

_____

Manufacturer's warranties of the proposed and specified items are:

_____ Same _____ Different (Explain on Attachment)

Reason for Request:

_____

_____

Itemized comparison of specified item(s) with the proposed substitution.

List significant variations:

_____

_____

Accurate cost data comparing proposed substitution with product specified:

_____

_____

Designation of maintenance services and sources:

_____

_____

(ATTACH ADDITIONAL SHEETS IF REQUIRED)

For Use by Design Professional:

_____ Recommended _____ Recommended as Noted

_____ Not Recommended _____ Received Too Late

Signed By _____

Date _____

For Use by Owner's Representative or Owner:

_____ Approved _____ Approved as Noted

_____ Not Approved _____ Approved Too Late

Signed By _____

Date _____

END OF SECTION

SECTION 01 6116
VOLATILE ORGANIC COMPOUND (VOC) CONTENT RESTRICTIONS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Requirements for Indoor-Emissions-Restricted products.

B. Requirements for VOC-Content-Restricted products.

C. Requirement for installer certification that they did not use any non-compliant products.

1.02 RELATED REQUIREMENTS

A. Section 01 3000 - Administrative Requirements: Submittal procedures.

B. Section 01 4000 - Quality Requirements: Procedures for testing and certifications.

C. Section 01 6000 - Product Requirements: Fundamental product requirements, substitutions and product options, delivery, storage, and handling.

1.03 DEFINITIONS

A. Indoor-Emissions-Restricted Products: All products in the following product categories, whether specified or not:
   1. Interior paints and coatings applied on site.
   2. Interior adhesives and sealants applied on site, including flooring adhesives.
   3. Flooring.
   4. Composite wood.
   5. Products making up wall and ceiling assemblies.
   6. Thermal and acoustical insulation.

B. VOC-Content-Restricted Products: All products in the following product categories, whether specified or not:
   1. Interior paints and coatings applied on site.
   2. Interior adhesives and sealants applied on site, including flooring adhesives.

C. Interior of Building: Anywhere inside the exterior weather barrier.

D. Adhesives: All gunnable, trowelable, liquid-applied, and aerosol adhesives, whether specified or not; including flooring adhesives, resilient base adhesives, and pipe jointing adhesives.

E. Sealants: All gunnable, trowelable, and liquid-applied joint sealants and sealant primers, whether specified or not; including firestopping sealants and duct joint sealers.

F. Inherently Non-Emitting Materials: Products composed wholly of minerals or metals, unless they include organic-based surface coatings, binders, or sealants; and specifically the following:
   1. Concrete.
   2. Metals that are plated, anodized, or powder-coated.
   3. Glass.
   4. Ceramics.

1.04 REFERENCE STANDARDS

A. 40 CFR 59, Subpart D - National Volatile Organic Compound Emission Standards for Architectural Coatings; U.S. Environmental Protection Agency.

B. ASTM D3960 - Standard Practice for Determining Volatile Organic Compound (VOC) Content of Paints and Related Coatings.

C. CAL (CDPH SM) - Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers Version 1.2.

D. CARB (ATCM) - Airborne Toxic Control Measure to Reduce Formaldehyde Emissions from Composite Wood Products.

E. CARB (SCM) - Suggested Control Measure for Architectural Coatings; California Air Resources Board.

F. CHPS (HPPD) - High Performance Products Database.

G. CRI (GLP) - Green Label Plus Testing Program - Certified Products.

H. GreenSeal GS-36 - Standard for Adhesives for Commercial Use.

I. SCAQMD 1113 - Architectural Coatings.

J. SCAQMD 1168 - Adhesive and Sealant Applications.

K. SCS (CPD) - SCS Certified Products.

L. UL (GGG) - GREENGUARD Gold Certified Products.

1.05 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements for submittal procedures.

B. Product Data: For each VOC-restricted product used in the project, submit evidence of compliance.

C. Installer Certifications Regarding Prohibited Content: Require each installer of any type of product (not just the products for which VOC restrictions are specified) to certify that either 1) no adhesives, joint sealants, paints, coatings, or composite wood or agrifiber products have been used in the installation of installer's products, or 2) that such products used comply with these requirements.

1.06 QUALITY ASSURANCE

A. Indoor Emissions Standard and Test Method: CAL (CDPH SM), using Standard Private Office exposure scenario and the allowable concentrations specified in the method, and range of total VOC's after 14 days.
   1. Wet-Applied Products: State amount applied in mass per surface area.
   2. Paints and Coatings: Test tinted products, not just tinting bases.
   3. Evidence of Compliance: Acceptable types of evidence are the following;
      a. Current UL (GGG) certification.
      b. Current SCS (CPD) Floorscore certification.
      c. Current SCS (CPD) Indoor Advantage Gold certification.
      d. Current listing in CHPS (HPPD) as a low-emitting product.
      e. Current CRI (GLP) certification.
      f. Test report showing compliance and stating exposure scenario used.
   4. Product data submittal showing VOC content is NOT acceptable evidence.
   5. Manufacturer's certification without test report by independent agency is NOT acceptable evidence.

B. VOC Content Test Method: 40 CFR 59, Subpart D (EPA Method 24), or ASTM D3960, unless otherwise indicated.
   1. Evidence of Compliance: Acceptable types of evidence are:
      a. Report of laboratory testing performed in accordance with requirements.
      b. Published product data showing compliance with requirements.
      c. Certification by manufacturer that product complies with requirements.

C. Composite Wood Emissions Standard: CARB (ATCM) for ultra-low emitting formaldehyde (ULEF) resins.
   1. Evidence of Compliance: Acceptable types of evidence are:
      a. Current SCS "No Added Formaldehyde (NAF)" certification; www.scscertified.com.
      b. Report of laboratory testing performed in accordance with requirements.
      c. Published product data showing compliance with requirements.
      d. Certification by manufacturer that product complies with requirements.

D. Testing Agency Qualifications: Independent firm specializing in performing testing and inspections of the type specified in this section.

PART 2 PRODUCTS

2.01 MATERIALS

A. All Products: Comply with the most stringent of federal, State, and local requirements, or these specifications.

B. Indoor-Emissions-Restricted Products: Comply with Indoor Emissions Standard and Test Method, except for:
   1. Composite Wood, Wood Fiber, and Wood Chip Products: Comply with Composite Wood Emissions Standard or contain no added formaldehyde resins.
   2. Inherently Non-Emitting Materials.

C. VOC-Content-Restricted Products: VOC content not greater than required by the following:
   1. Adhesives, Including Flooring Adhesives: SCAQMD 1168 Rule.
   2. Aerosol Adhesives: GreenSeal GS-36.
   3. Joint Sealants: SCAQMD 1168 Rule.
   4. Paints and Coatings: Each color; most stringent of the following:
      a. 40 CFR 59, Subpart D.
      b. SCAQMD 1113 Rule.
      c. CARB (SCM).

PART 3 EXECUTION

3.01 FIELD QUALITY CONTROL

A. Owner reserves the right to reject non-compliant products, whether installed or not, and require their removal and replacement with compliant products at no extra cost to Owner.

B. Additional costs to restore indoor air quality due to installation of non-compliant products will be borne by Contractor.

END OF SECTION

SECTION 01 7000
EXECUTION AND CLOSEOUT REQUIREMENTS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Examination, preparation, and general installation procedures.

B. Requirements for alterations work, including selective demolition, except removal, disposal, and/or remediation of hazardous materials and toxic substances.

C. Pre-installation meetings.

D. Cutting and patching.

E. Cleaning and protection.

F. Starting of systems and equipment.

G. Demonstration and instruction of Owner personnel.

H. Closeout procedures, including Contractor's Correction Punch List, except payment procedures.

I. General requirements for maintenance service.

1.02 RELATED REQUIREMENTS

A. Section 01 1000 - Summary: Limitations on working in existing building; continued occupancy; work sequence; identification of salvaged and relocated materials.

B. Section 01 3000 - Administrative Requirements: Submittals procedures, Electronic document submittal service.

C. Section 01 4000 - Quality Requirements: Testing and inspection procedures.

D. Section 01 7419 - Construction Waste Management and Disposal: Additional procedures for trash/waste removal, recycling, salvage, and reuse.

E. Section 01 7800 - Closeout Submittals: Project record documents, operation and maintenance data, warranties .

F. Section 02 4100 - Selective Demolition: Demolition of whole structures and parts thereof; site utility demolition.

G. Section 07 8400 - Firestopping.

H. Individual Product Specification Sections:
   1. Advance notification to other sections of openings required in work of those sections.

1.03 REFERENCE STANDARDS

A. NFPA 241 - Standard for Safeguarding Construction, Alteration, and Demolition Operations.

1.04 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Survey work: Submit name, address, and telephone number of Engineer before starting survey work.
   1. On request, submit documentation verifying accuracy of survey work.
   2. Submit a copy of site drawing signed by the Land Surveyor, that the elevations and locations of the work are in compliance with Contract Documents.
   3. Submit surveys and survey logs for the project record.

C. Demolition Plan: Submit demolition plan as specified by OSHA and local authorities.
   1. Indicate extent of demolition, removal sequence, bracing and shoring, and location and construction of barricades and fences. Include design drawings and calculations for bracing and shoring.
   2. Include a summary of safety procedures.

D. Cutting and Patching: Submit written request in advance of cutting or alteration that affects:
   1. Structural integrity of any element of Project.

2. Integrity of weather exposed or moisture resistant element.
3. Efficiency, maintenance, or safety of any operational element.
4. Visual qualities of sight exposed elements.
5. Work of Owner or separate Contractor.
6. Include in request:
    a. Identification of Project.
    b. Location and description of affected work.
    c. Necessity for cutting or alteration.
    d. Description of proposed work and products to be used.
    e. Alternatives to cutting and patching.
    f. Effect on work of Owner or separate Contractor.
    g. Written permission of affected separate Contractor.
    h. Date and time work will be executed.

E. Project Record Documents: Accurately record actual locations of capped and active utilities.

1.05 QUALIFICATIONS

A. For surveying work, employ a professional engineer registered in the State in which the Project is located and acceptable to Architect. Submit evidence of surveyor's Errors and Omissions insurance coverage in the form of an Insurance Certificate. Employ only individual(s) trained and experienced in collecting and recording accurate data relevant to ongoing construction activities,

B. For design of temporary shoring and bracing, employ a Professional Engineer experienced in design of this type of work and licensed in the State in which the Project is located.

1.06 PROJECT CONDITIONS

A. Grade site to drain. Maintain excavations free of water. Provide, operate, and maintain pumping equipment.

B. Protect site from puddling or running water. Provide water barriers as required to protect site from soil erosion.

C. Perform dewatering activities, as required, for the duration of the project.

D. Ventilate enclosed areas to assist cure of materials, to dissipate humidity, and to prevent accumulation of dust, fumes, vapors, or gases.

E. Dust Control: Execute work by methods to minimize raising dust from construction operations. Provide positive means to prevent air-borne dust from dispersing into atmosphere and over adjacent property.
1. Provide dust-proof enclosures to prevent entry of dust generated outdoors.
2. Provide dust-proof barriers between construction areas and areas continuing to be occupied by Owner.

F. Erosion and Sediment Control: Plan and execute work by methods to control surface drainage from cuts and fills, from borrow and waste disposal areas. Prevent erosion and sedimentation.
1. See civil and SWPPP for additional requirements.
2. Minimize amount of bare soil exposed at one time.
3. Provide temporary measures such as berms, dikes, and drains, to prevent water flow.
4. Construct fill and waste areas by selective placement to avoid erosive surface silts or clays.
5. Periodically inspect earthwork to detect evidence of erosion and sedimentation; promptly apply corrective measures.

G. Noise Control: Provide methods, means, and facilities to minimize noise produced by construction operations.
1. Outdoors: Limit conduct of especially noisy exterior work to the hours of 8 am to 5 pm.

H. Pest and Rodent Control: Provide methods, means, and facilities to prevent pests and insects from accessing or invading premises or damaging the work.

I. Pollution Control: Provide methods, means, and facilities to prevent contamination of soil, water, and atmosphere from discharge of noxious, toxic substances, and pollutants produced by construction operations. Comply with federal, state, and local regulations.

1.07 COORDINATION

A. See Section 01 1000 for occupancy-related requirements.

B. Coordinate scheduling, submittals, and work of the various sections of the Project Manual to ensure efficient and orderly sequence of installation of interdependent construction elements, with provisions for accommodating items installed later.

C. Notify affected utility companies and comply with their requirements.

D. Verify that utility requirements and characteristics of new operating equipment are compatible with building utilities. Coordinate work of various sections having interdependent responsibilities for installing, connecting to, and placing in service, such equipment.

E. Coordinate space requirements, supports, and installation of mechanical and electrical work that are indicated diagrammatically on drawings. Follow routing indicated for pipes, ducts, and conduit, as closely as practicable; place runs parallel with lines of building. Utilize spaces efficiently to maximize accessibility for other installations, for maintenance, and for repairs.

F. In finished areas except as otherwise indicated, conceal pipes, ducts, and wiring within the construction. Coordinate locations of fixtures and outlets with finish elements.

G. Coordinate completion and clean-up of work of separate sections.

H. After Owner occupancy of premises, coordinate access to site for correction of defective work and work not in accordance with Contract Documents, to minimize disruption of Owner's activities.

PART 2 PRODUCTS

2.01 PATCHING MATERIALS

A. New Materials: As specified in product sections; match existing products and work for patching and extending work.

B. Type and Quality of Existing Products: Determine by inspecting and testing products where necessary, referring to existing work as a standard.

C. Product Substitution: For any proposed change in materials, submit request for substitution described in Section 01 6000 - Product Requirements.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that existing site conditions and substrate surfaces are acceptable for subsequent work. Start of work means acceptance of existing conditions.

B. Verify that existing substrate is capable of structural support or attachment of new work being applied or attached.

C. Examine and verify specific conditions described in individual specification sections.

D. Take field measurements before confirming product orders or beginning fabrication, to minimize waste due to over-ordering or misfabrication.

E. Verify that utility services are available, of the correct characteristics, and in the correct locations.

F. Prior to Cutting: Examine existing conditions prior to commencing work, including elements subject to damage or movement during cutting and patching. After uncovering existing work, assess conditions affecting performance of work. Beginning of cutting or patching means acceptance of existing conditions.

3.02 PREPARATION

A. Clean substrate surfaces prior to applying next material or substance.

B. Seal cracks or openings of substrate prior to applying next material or substance.

C. Apply manufacturer required or recommended substrate primer, sealer, or conditioner prior to applying any new material or substance in contact or bond.

3.03 PREINSTALLATION MEETINGS

A. When required in individual specification sections, convene a preinstallation meeting at the site prior to commencing work of the section.

B. Include pre-installation meetings in overall schedule.

C. Require attendance of parties directly affecting, or affected by, work of the specific section.

D. Notify Architect five days in advance of meeting date.

E. Prepare agenda and preside at meeting:
   1. Review conditions of examination, preparation and installation procedures.
   2. Review coordination with related work.

F. 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.

3.04 LAYING OUT THE WORK

A. Verify locations of survey control points prior to starting work.

B. Promptly notify Architect of any discrepancies discovered.

C. Contractor shall locate and protect survey control and reference points.

D. Control datum for survey is that established by Owner provided survey.

E. Protect survey control points prior to starting site work; preserve permanent reference points during construction.

F. Promptly report to Architect the loss or destruction of any reference point or relocation required because of changes in grades or other reasons.

G. Replace dislocated survey control points based on original survey control. Make no changes without prior written notice to Architect.

H. Utilize recognized engineering survey practices.

I. Establish a minimum of two permanent bench marks on site, referenced to established control points. Record locations, with horizontal and vertical data, on project record documents.

J. Establish elevations, lines and levels. Locate and lay out by instrumentation and similar appropriate means:
   1. Site improvements including pavements; stakes for grading, fill and topsoil placement; utility locations, slopes, and invert elevations.
   2. Grid or axis for structures.
   3. Building foundation, column locations, ground floor elevations, and roof elevations.
   4. Controlling lines and levels required for mechanical and electrical trades.

K. Periodically verify layouts by same means.

L. Maintain a complete and accurate log of control and survey work as it progresses.

M. On completion of foundation walls and major site improvements, prepare a certified survey illustrating dimensions, locations, angles, and elevations of construction and site work.

3.05 GENERAL INSTALLATION REQUIREMENTS

A. In addition to compliance with regulatory requirements, conduct construction operations in compliance with NFPA 241, including applicable recommendations in Appendix A.

B. Install products as specified in individual sections, in accordance with manufacturer's instructions and recommendations, and so as to avoid waste due to necessity for replacement.

C. Make vertical elements plumb and horizontal elements level, unless otherwise indicated.

D. Install equipment and fittings plumb and level, neatly aligned with adjacent vertical and horizontal lines, unless otherwise indicated.

E. Make consistent texture on surfaces, with seamless transitions, unless otherwise indicated.

F. Make neat transitions between different surfaces, maintaining texture and appearance.

3.06 ALTERATIONS

A. Drawings showing existing construction and utilities are based on casual field observation and existing record documents only.
   1. Verify that construction and utility arrangements are as indicated.
   2. Report discrepancies to Architect before disturbing existing installation.
   3. Beginning of alterations work constitutes acceptance of existing conditions.

B. Maintain weatherproof exterior building enclosure except for interruptions required for replacement or modifications; take care to prevent water and humidity damage.
   1. Where openings in exterior enclosure exist, provide construction to make exterior enclosure weatherproof.
   2. Insulate existing ducts or pipes that are exposed to outdoor ambient temperatures by alterations work.

C. Remove existing work as indicated and as required to accomplish new work.
   1. Remove rotted wood, corroded metals, and deteriorated masonry and concrete; replace with new construction specified.
   2. Remove items indicated on drawings.
   3. Relocate items indicated on drawings.
   4. Where new surface finishes are to be applied to existing work, perform removals, patch, and prepare existing surfaces as required to receive new finish; remove existing finish if necessary for successful application of new finish.
   5. Where new surface finishes are not specified or indicated, patch holes and damaged surfaces to match adjacent finished surfaces as closely as possible.

D. Services (Including but not limited to HVAC, Plumbing, Fire Protection, Electrical, and Telecommunications): Remove, relocate, and extend existing systems to accommodate new construction.
   1. Maintain existing active systems that are to remain in operation; maintain access to equipment and operational components; if necessary, modify installation to allow access or provide access panel.
   2. Where existing systems or equipment are not active and Contract Documents require reactivation, put back into operational condition; repair supply, distribution, and equipment as required.
   3. Where existing active systems serve occupied facilities but are to be replaced with new services, maintain existing systems in service until new systems are complete and ready for service.
      a. Disable existing systems only to make switchovers and connections; minimize duration of outages.
      b. See Section 01 1000 for other limitations on outages and required notifications.
      c. Provide temporary connections as required to maintain existing systems in service.
   4. Verify that abandoned services serve only abandoned facilities.
   5. Remove abandoned pipe, ducts, conduits, and equipment , including those above accessible ceilings; remove back to source of supply where possible, otherwise cap stub and tag with identification; patch holes left by removal using materials specified for new construction.

E. Protect existing work to remain.
   1. Prevent movement of structure; provide shoring and bracing if necessary.
   2. Perform cutting to accomplish removals neatly and as specified for cutting new work.
   3. Repair adjacent construction and finishes damaged during removal work.

F. Adapt existing work to fit new work: Make as neat and smooth transition as possible.
   1. When existing finished surfaces are cut so that a smooth transition with new work is not possible, terminate existing surface along a straight line at a natural line of division and make recommendation to Architect.
   2. Where removal of partitions or walls results in adjacent spaces becoming one, rework floors, walls, and ceilings to a smooth plane without breaks, steps, or bulkheads.

3. Where a change of plane of 1/4 inch or more occurs in existing work, submit recommendation for providing a smooth transition for Architect review and request instructions.

G. Patching: Where the existing surface is not indicated to be refinished, patch to match the surface finish that existed prior to cutting. Where the surface is indicated to be refinished, patch so that the substrate is ready for the new finish.

H. Refinish existing surfaces as indicated:
1. Where rooms or spaces are indicated to be refinished, refinish all visible existing surfaces to remain to the specified condition for each material, with a neat transition to adjacent finishes.
2. If mechanical or electrical work is exposed accidentally during the work, re-cover and refinish to match.

I. Clean existing systems and equipment.

J. Remove demolition debris and abandoned items from alterations areas and dispose of off-site; do not burn or bury.

K. Do not begin new construction in alterations areas before demolition is complete.

L. Comply with all other applicable requirements of this section.

3.07 CUTTING AND PATCHING

A. Whenever possible, execute the work by methods that avoid cutting or patching.

B. See Alterations article above for additional requirements.

C. Perform whatever cutting and patching is necessary to:
1. Complete the work.
2. Fit products together to integrate with other work.
3. Provide openings for penetration of mechanical, electrical, and other services.
4. Match work that has been cut to adjacent work.
5. Repair areas adjacent to cuts to required condition.
6. Repair new work damaged by subsequent work.
7. Remove samples of installed work for testing when requested.
8. Remove and replace defective and non-complying work.

D. Execute work by methods that avoid damage to other work and that will provide appropriate surfaces to receive patching and finishing. In existing work, minimize damage and restore to specified condition.

E. Employ skilled and experienced installer to perform cutting for weather exposed and moisture resistant elements, and sight exposed surfaces.

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

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

H. Fit work tightly to pipes, sleeves, ducts, conduit, and other penetrations through surfaces.

I. At penetrations of fire rated walls, partitions, ceiling, or floor construction, completely seal voids with fire rated material in accordance with Section 07 8400, to full thickness of the penetrated element.

J. Patching:
1. Finish patched surfaces to match finish that existed prior to patching. On continuous surfaces, refinish to nearest intersection or natural break. For an assembly, refinish entire unit.
2. Match color, texture, and appearance.
3. Repair patched surfaces that are damaged, lifted, discolored, or showing other imperfections due to patching work. If defects are due to condition of substrate, repair substrate prior to repairing finish.

3.08 PROGRESS CLEANING

A. Maintain areas free of waste materials, debris, and rubbish. Maintain site in a clean and orderly condition.

B. Remove debris and rubbish from pipe chases, plenums, attics, crawl spaces, and other closed or remote spaces, prior to enclosing the space.

C. Broom and vacuum clean interior areas prior to start of surface finishing, and continue cleaning to eliminate dust.

D. Collect and remove waste materials, debris, and trash/rubbish from site weekly and dispose off-site; do not burn or bury.

3.09 PROTECTION OF INSTALLED WORK

A. Protect installed work from damage by construction operations.

B. Provide special protection where specified in individual specification sections.

C. Provide temporary and removable protection for installed products. Control activity in immediate work area to prevent damage.

D. Provide protective coverings at walls, projections, jambs, sills, and soffits of openings.

E. Protect finished floors, stairs, and other surfaces from traffic, dirt, wear, damage, or movement of heavy objects, by protecting with durable sheet materials.

F. Protect work from spilled liquids. If work is exposed to spilled liquids, immediately remove protective coverings, dry out work, and replace protective coverings.

G. Prohibit traffic or storage upon waterproofed or roofed surfaces. If traffic or activity is necessary, obtain recommendations for protection from waterproofing or roofing material manufacturer.

1. Minimum protection to include the following:
    a. One layer of 1/4 inch thick fanfold board ("Amocor'PB4" by Amoco or equal) laid directly over roof.
    b. One layer of nominal 1/2 inch thick exterior plywood or exterior OSB board laid over fanfold board. Provide suitable ballast to maintain position and preclude blow-off. Do not overload structure.
2. After completion of work operations on roof, remove temporary protection, restore roof to pre-construction condition, and repair damage to roof, if any; see below.
    a. Damage/Warranties: Damage to existing roofing due to operations under this Contract to be repaired as required by roofing membrane manufacturer without reduction in Owner's warranty provisions and rights:
    b. All costs associated with repairs and warranty reinstatements, if any, to be borne by the Contractor who caused the damage.

H. Prohibit traffic from landscaped areas.

I. Remove protective coverings when no longer needed; reuse or recycle coverings if possible.

3.10 SYSTEM STARTUP

A. Coordinate schedule for start-up of various equipment and systems.

B. Verify that each piece of equipment or system has been checked for proper lubrication, drive rotation, belt tension, control sequence, and for conditions that may cause damage.

C. Verify tests, meter readings, and specified electrical characteristics agree with those required by the equipment or system manufacturer.

D. Verify that wiring and support components for equipment are complete and tested.

E. Execute start-up under supervision of applicable Contractor personnel in accordance with manufacturers' instructions.

F. When specified in individual specification Sections, require manufacturer to provide authorized representative to be present at site to inspect, check, and approve equipment or system installation prior to start-up, and to supervise placing equipment or system in operation.

G. Submit a written report that equipment or system has been properly installed and is functioning correctly.

3.11 DEMONSTRATION AND INSTRUCTION

A. Demonstrate start-up, operation, control, adjustment, trouble-shooting, servicing, maintenance, and shutdown of each item of equipment at scheduled time, at equipment location.

B. For equipment or systems requiring seasonal operation, perform demonstration for other season within six months.

C. Provide a qualified person who is knowledgeable about the Project to perform demonstration and instruction of Owner's personnel.

D. Utilize operation and maintenance manuals as basis for instruction. Review contents of manual with Owner's personnel in detail to explain all aspects of operation and maintenance.

E. Prepare and insert additional data in operations and maintenance manuals when need for additional data becomes apparent during instruction.

3.12 ADJUSTING

A. Adjust operating products and equipment to ensure smooth and unhindered operation.

B. Testing, adjusting, and balancing HVAC systems: See Section 23 0593 - Testing, Adjusting, and Balancing for HVAC.

3.13 FINAL CLEANING

A. Execute final cleaning prior to Substantial Completion.
   1. Clean areas to be occupied by Owner prior to final completion before Owner occupancy.

B. Use cleaning materials that are nonhazardous.

C. Clean interior and exterior glass, surfaces exposed to view; remove temporary labels, stains and foreign substances, polish transparent and glossy surfaces, vacuum carpeted and soft surfaces.

D. Remove all labels that are not permanent. Do not paint or otherwise cover fire test labels or nameplates on mechanical and electrical equipment.

E. Clean equipment and fixtures to a sanitary condition with cleaning materials appropriate to the surface and material being cleaned.

F. Replace filters of operating equipment.

G. Clean debris from roofs and drainage systems.

H. Clean site; sweep paved areas, rake clean landscaped surfaces.

I. Remove waste, surplus materials, trash/rubbish, and construction facilities from the site; dispose of in legal manner; do not burn or bury.

J. Clean Owner-occupied areas of work.

3.14 CLOSEOUT PROCEDURES

A. Make submittals that are required by governing or other authorities.
   1. Provide copies to Architect and Owner.

B. Accompany Contractor and/or Owner on preliminary inspection to determine items to be listed for completion or correction in the Contractor's Correction Punch List for Contractor's Notice of Substantial Completion.

C. Notify Architect when work is considered ready for Architect's Substantial Completion inspection.

D. Submit written certification containing Contractor's Correction Punch List, that Contract Documents have been reviewed, work has been inspected, and that work is complete in accordance with Contract Documents and ready for Architect's Substantial Completion inspection.

E. Conduct Substantial Completion inspection and create Final Correction Punch List containing Architect's and Contractor's comprehensive list of items identified to be completed or corrected and submit to Architect.

F. Correct items of work listed in Final Correction Punch List and comply with requirements for access to Owner-occupied areas.

G. Notify Architect when work is considered finally complete and ready for Architect's Substantial Completion final inspection.

H. Complete items of work determined by Architect listed in executed Certificate of Substantial Completion.

3.15 MAINTENANCE

A. Provide service and maintenance of components indicated in specification sections.

B. Maintenance Period: As indicated in specification sections or, if not indicated, not less than one year from the Date of Substantial Completion or the length of the specified warranty, whichever is longer.

C. Examine system components at a frequency consistent with reliable operation. Clean, adjust, and lubricate as required.

D. Include systematic examination, adjustment, and lubrication of components. Repair or replace parts whenever required. Use parts produced by the manufacturer of the original component.

E. Maintenance service shall not be assigned or transferred to any agent or subcontractor without prior written consent of the Owner.

END OF SECTION

SECTION 01 7419
CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL

PART 1 GENERAL

1.01 WASTE MANAGEMENT REQUIREMENTS

A. Owner requests that this project generate the least amount of trash and waste possible.

B. Employ processes that ensure the generation of as little waste as possible due to error, poor planning, breakage, mishandling, contamination, or other factors.

C. Minimize trash/waste disposal in landfills; reuse, salvage, or recycle as much waste as economically feasible.

D. Owner may decide to pay for additional recycling, salvage, and/or reuse based on Landfill Alternatives Proposal specified below.

E. Required Recycling, Salvage, and Reuse: The following may not be disposed of in landfills or by incineration:
   1. Aluminum and plastic beverage containers.
   2. Corrugated cardboard.
   3. Wood pallets.
   4. Clean dimensional wood: May be used as blocking or furring.
   5. Land clearing debris, including brush, branches, logs, and stumps; see Section 31 1000 - Site Clearing for use options.
   6. Metals, including packaging banding, metal studs, sheet metal, structural steel, piping, reinforcing bars, door frames, and other items made of steel, iron, galvanized steel, stainless steel, aluminum, copper, zinc, lead, brass, and bronze.

F. The following sources may be useful in developing the Waste Management Plan:
   1. State Recycling Department, at https://deq.nd.gov/WM/Recycling/.

G. Methods of trash/waste disposal that are not acceptable are:
   1. Burning on the project site.
   2. Burying on the project site.
   3. Dumping or burying on other property, public or private.
   4. Other illegal dumping or burying.

H. Regulatory Requirements: Contractor is responsible for knowing and complying with regulatory requirements, including but not limited to Federal, state and local requirements, pertaining to legal disposal of all construction and demolition waste materials.

1.02 RELATED REQUIREMENTS

A. Section 01 1000 - Summary: List of items to be salvaged from the existing building for relocation in project or for Owner.

B. Section 01 6010 - Substitution Procedures.

C. Section 01 3000 - Administrative Requirements: Additional requirements for project meetings, reports, submittal procedures, and project documentation.

D. Section 01 6000 - Product Requirements: Waste prevention requirements related to product substitutions.

E. Section 01 6000 - Product Requirements: Waste prevention requirements related to delivery, storage, and handling.

F. Section 01 7000 - Execution and Closeout Requirements: Trash/waste prevention procedures related to demolition, cutting and patching, installation, protection, and cleaning.

1.03 DEFINITIONS

A. Clean: Untreated and unpainted; not contaminated with oils, solvents, caulk, or the like.

B. Construction and Demolition Waste: Solid wastes typically including building materials, packaging, trash, debris, and rubble resulting from construction, remodeling, repair and demolition operations.

C. Hazardous: Exhibiting the characteristics of hazardous substances, i.e., ignitibility, corrosivity, toxicity or reactivity.

D. Nonhazardous: Exhibiting none of the characteristics of hazardous substances, i.e., ignitibility, corrosivity, toxicity, or reactivity.

E. Nontoxic: Neither immediately poisonous to humans nor poisonous after a long period of exposure.

F. Recyclable: The ability of a product or material to be recovered at the end of its life cycle and remanufactured into a new product for reuse by others.

G. Recycle: To remove a waste material from the project site to another site for remanufacture into a new product for reuse by others.

H. Recycling: The process of sorting, cleansing, treating and reconstituting solid waste and other discarded materials for the purpose of using the altered form. Recycling does not include burning, incinerating, or thermally destroying waste.

I. Return: To give back reusable items or unused products to vendors for credit.

J. Reuse: To reuse a construction waste material in some manner on the project site.

K. Salvage: To remove a waste material from the project site to another site for resale or reuse by others.

L. Sediment: Soil and other debris that has been eroded and transported by storm or well production run-off water.

M. Source Separation: The act of keeping different types of waste materials separate beginning from the first time they become waste.

N. Toxic: Poisonous to humans either immediately or after a long period of exposure.

O. Trash: Any product or material unable to be reused, returned, recycled, or salvaged.

P. Waste: Extra material or material that has reached the end of its useful life in its intended use. Waste includes salvageable, returnable, recyclable, and reusable material.

1.04 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements for submittal procedures.

B. Landfill Alternatives Proposal: Within 10 calendar days after receipt of Notice to Proceed, or prior to any trash or waste removal, whichever occurs sooner, submit a projection of trash/waste that will require disposal and alternatives to landfilling, with net costs.
   1. Submit to Architect for Owner's review and approval.
   2. If Owner wishes to implement any cost alternatives, the Contract Sum will be adjusted as specified elsewhere.
   3. Include an analysis of trash/waste to be generated and landfill options as specified for Waste Management Plan described below.
   4. Describe as many alternatives to landfilling as possible:
      a. List each material proposed to be salvaged, reused, or recycled.
      b. List the proposed local market for each material.
      c. State the estimated net cost resulting from each alternative, after subtracting revenue from sale of recycled or salvaged materials and landfill tipping fees saved due to diversion of materials from the landfill.
   5. Provide alternatives to landfilling for at least the following materials:
      a. Concrete.
      b. Bricks.
      c. Concrete masonry units.
      d. Asphalt paving.
      e. Glass.
      f. Gypsum drywall and plaster.
      g. Plastic buckets.

h. Carpet, carpet cushion, carpet tile, and carpet remnants, both new and removed: DuPont (http://flooring.dupont.com) and Interface (www.interfaceinc.com) conduct reclamation programs.
i. Paint.
j. Plastic sheeting.
k. Rigid foam insulation.
l. Windows, doors, and door hardware.
m. Plumbing fixtures.
n. Mechanical and electrical equipment.
o. Fluorescent lamps (light bulbs).
p. Acoustical ceiling tile and panels.

C. Once Owner has determined which of the landfill alternatives addressed in the Proposal above are acceptable, prepare and submit Waste Management Plan; submit within 10 calendar days after notification by Architect.

D. Waste Management Plan: Include the following information:
1. Analysis of the trash and waste projected to be generated during the entire project construction cycle, including types and quantities.
2. Landfill Options: The name, address, and telephone number of the landfill(s) where trash/waste will be disposed of, the applicable landfill tipping fee(s), and the projected cost of disposing of all project trash/waste in the landfill(s).
3. Landfill Alternatives: List all waste materials that will be diverted from landfills by reuse, salvage, or recycling.
a. List each material proposed to be salvaged, reused, or recycled.
b. List the local market for each material.
c. State the estimated net cost, versus landfill disposal.
4. Meetings: Describe regular meetings to be held to address waste prevention, reduction, recycling, salvage, reuse, and disposal.
5. Materials Handling Procedures: Describe the means by which materials to be diverted from landfills will be protected from contamination and prepared for acceptance by designated facilities; include separation procedures for recyclables, storage, and packaging.
6. Transportation: Identify the destination and means of transportation of materials to be recycled; i.e. whether materials will be site-separated and self-hauled to designated centers, or whether mixed materials will be collected by a waste hauler.
7. Recycling Incentives: Describe procedures required to obtain credits, rebates, or similar incentives.

PART 2 PRODUCTS

2.01 PRODUCT SUBSTITUTIONS

A. See Section 01 6000 and Section 01 6010.

B. For each proposed product substitution, submit the following information in addition to requirements specified in Section 01 6000:
1. Relative amount of waste produced, compared to specified product.
2. Cost savings on waste disposal, compared to specified product, to be deducted from the Contract Sum.
3. Proposed disposal method for waste product.
4. Markets for recycled waste product.

PART 3 EXECUTION

3.01 WASTE MANAGEMENT PROCEDURES

A. See Section 01 1000 for list of items to be salvaged from the existing building for relocation in project or for Owner.

B. See Section 01 3000 for additional requirements for project meetings, reports, submittal procedures, and project documentation.

C. See Section 01 6000 for waste prevention requirements related to delivery, storage, and handling.

D. See Section 01 7000 for trash/waste prevention procedures related to demolition, cutting and patching, installation, protection, and cleaning.

3.02 WASTE MANAGEMENT PLAN IMPLEMENTATION

A. Manager: Designate an on-site person or persons responsible for instructing workers and overseeing and documenting results of the Waste Management Plan.

B. Communication: Distribute copies of the Waste Management Plan to job site foreman, each subcontractor, Owner, and Architect.

C. Instruction: Provide on-site instruction of appropriate separation, handling, and recycling, salvage, reuse, and return methods to be used by all parties at the appropriate stages of the project.

D. Meetings: Discuss trash/waste management goals and issues at project meetings, particularly at:
   1. Prebid meeting.
   2. Preconstruction meeting.
   3. Regular job-site meetings.
   4. Job safety meetings.

E. Facilities: Provide specific facilities for separation and storage of materials for recycling, salvage, reuse, return, and trash disposal, for use by all contractors and installers.
   1. As a minimum, provide:
      a. Separate area for storage of materials to be reused on-site, such as wood cut-offs for blocking.
      b. Separate dumpsters for each category of recyclable.
      c. Recycling bins at worker lunch area.
   2. Provide containers as required.
   3. Provide temporary enclosures around piles of separated materials to be recycled or salvaged.
   4. Provide materials for barriers and enclosures that are nonhazardous, recyclable, or reusable to the maximum extent possible; reuse project construction waste materials if possible.
   5. Locate enclosures out of the way of construction traffic.
   6. Provide adequate space for pick-up and delivery and convenience to subcontractors.
   7. If an enclosed area is not provided, clearly lay out and label a specific area on-site.
   8. Keep recycling and trash/waste bin areas neat and clean and clearly marked in order to avoid contamination of materials.

F. Hazardous Wastes: Separate, store, and dispose of hazardous wastes according to applicable regulations.

G. Recycling: Separate, store, protect, and handle at the site identified recyclable waste products in order to prevent contamination of materials and to maximize recyclability of identified materials. Arrange for timely pickups from the site or deliveries to recycling facility in order to prevent contamination of recyclable materials.

H. Reuse of Materials On-Site: Set aside, sort, and protect separated products in preparation for reuse.

I. Salvage: Set aside, sort, and protect products to be salvaged for reuse off-site.

END OF SECTION

SECTION 01 7800
CLOSEOUT SUBMITTALS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Project record documents.

B. Operation and maintenance data.

C. Warranties and bonds.

1.02 RELATED REQUIREMENTS

A. Section 01 3000 - Administrative Requirements: Submittals procedures, shop drawings, product data, and samples.

B. Section 01 7000 - Execution and Closeout Requirements: Contract closeout procedures.

C. Individual Product Sections: Specific requirements for operation and maintenance data.

D. Individual Product Sections: Warranties required for specific products or Work.

1.03 SUBMITTALS

A. Project Record Documents: Submit documents to Architect with claim for final Application for Payment.

B. Operation and Maintenance Data:
1. Submit two copies of preliminary draft or proposed formats and outlines of contents before start of Work. Architect will review draft and return one copy with comments.
2. For equipment, or component parts of equipment put into service during construction and operated by Owner, submit completed documents within ten days after acceptance.
3. Submit one copy of completed documents 30 days prior to final inspection. This copy will be reviewed and returned after final inspection, with Architect comments. Revise content of all document sets as required prior to final submission.
4. Submit two sets of revised final documents in final form prior to final inspection.

C. Warranties and Bonds:
1. For equipment or component parts of equipment put into service during construction with Owner's permission, submit documents within 10 days after acceptance.
2. Make other submittals within 10 days after Date of Substantial Completion, prior to final Application for Payment.
3. For items of Work for which acceptance is delayed beyond Date of Substantial Completion, submit within 10 days after acceptance, listing the date of acceptance as the beginning of the warranty period.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.01 PROJECT RECORD DOCUMENTS

A. Maintain on site one set of the following record documents; record actual revisions to the Work:
1. Drawings.
2. Specifications.
3. Addenda.
4. Change Orders and other modifications to the Contract.
5. Reviewed shop drawings, product data, and samples.
6. Manufacturer's instruction for assembly, installation, and adjusting.

B. Ensure entries are complete and accurate, enabling future reference by Owner.

C. Store record documents separate from documents used for construction.

D. Record information concurrent with construction progress.

E. Specifications: Legibly mark and record at each product section description of actual products installed, including the following:
   1. Manufacturer's name and product model and number.
   2. Product substitutions or alternates utilized.
   3. Changes made by Addenda and modifications.

F. Record Drawingsand Shop Drawings: Legibly mark each item to record actual construction including:
   1. Measured locations of internal utilities and appurtenances concealed in construction, referenced to visible and accessible features of the Work.
   2. Field changes of dimension and detail.
   3. Details not on original Contract drawings.

3.02 OPERATION AND MAINTENANCE DATA

A. Source Data: For each product or system, list names, addresses and telephone numbers of Subcontractors and suppliers, including local source of supplies and replacement parts.

B. Product Data: Mark each sheet to clearly identify specific products and component parts, and data applicable to installation. Delete inapplicable information.

C. Drawings: Supplement product data to illustrate relations of component parts of equipment and systems, to show control and flow diagrams. Do not use Project Record Documents as maintenance drawings.

D. Typed Text: As required to supplement product data. Provide logical sequence of instructions for each procedure, incorporating manufacturer's instructions.

3.03 OPERATION AND MAINTENANCE DATA FOR MATERIALS AND FINISHES

A. For Each Product, Applied Material, and Finish:
   1. Product data, with catalog number, size, composition, and color and texture designations.
   2. Information for re-ordering custom manufactured products.

B. Instructions for Care and Maintenance: Manufacturer's recommendations for cleaning agents and methods, precautions against detrimental cleaning agents and methods, and recommended schedule for cleaning and maintenance.

C. Moisture protection and weather-exposed products: Include product data listing applicable reference standards, chemical composition, and details of installation. Provide recommendations for inspections, maintenance, and repair.

D. Additional information as specified in individual product specification sections.

E. Where additional instructions are required, beyond the manufacturer's standard printed instructions, have instructions prepared by personnel experienced in the operation and maintenance of the specific products.

3.04 OPERATION AND MAINTENANCE DATA FOR EQUIPMENT AND SYSTEMS

A. For Each Item of Equipment and Each System:
   1. Description of unit or system, and component parts.
   2. Identify function, normal operating characteristics, and limiting conditions.
   3. Include performance curves, with engineering data and tests.
   4. Complete nomenclature and model number of replaceable parts.

B. Where additional instructions are required, beyond the manufacturer's standard printed instructions, have instructions prepared by personnel experienced in the operation and maintenance of the specific products.

C. Panelboard Circuit Directories: Provide electrical service characteristics, controls, and communications; typed.

D. Include color coded wiring diagrams as installed.

E. Operating Procedures: Include start-up, break-in, and routine normal operating instructions and sequences. Include regulation, control, stopping, shut-down, and emergency instructions. Include summer, winter, and any special operating instructions.

F. Maintenance Requirements: Include routine procedures and guide for preventative maintenance and trouble shooting; disassembly, repair, and reassembly instructions; and alignment, adjusting, balancing, and checking instructions.

G. Provide servicing and lubrication schedule, and list of lubricants required.

H. Include manufacturer's printed operation and maintenance instructions.

I. Include sequence of operation by controls manufacturer.

J. Provide original manufacturer's parts list, illustrations, assembly drawings, and diagrams required for maintenance.

K. Provide control diagrams by controls manufacturer as installed.

L. Provide charts of valve tag numbers, with location and function of each valve, keyed to flow and control diagrams.

M. Include test and balancing reports.

N. Additional Requirements: As specified in individual product specification sections.

3.05 ASSEMBLY OF OPERATION AND MAINTENANCE MANUALS

A. Assemble operation and maintenance data into durable manuals for Owner's personnel use, with data arranged in the same sequence as, and identified by, the specification sections.
   1. Electronic Documents: Submit one electronic copy in PDF format organized in same manner as printed manual. Coordinate with Owner for transmission of electronic document.

B. Where systems involve more than one specification section, provide separate tabbed divider for each system.

C. Binders: Commercial quality, 8-1/2 by 11 inch three D side ring binders with durable plastic covers; 2 inch maximum ring size. When multiple binders are used, correlate data into related consistent groupings.

D. Cover: Identify each binder with typed or printed title OPERATION AND MAINTENANCE INSTRUCTIONS; identify title of Project; identify subject matter of contents.

E. Project Directory: Title and address of Project; names, addresses, and telephone numbers of Architect, Consultants,Contractorand subcontractors, with names of responsible parties.

F. Tables of Contents: List every item separated by a divider, using the same identification as on the divider tab; where multiple volumes are required, include all volumes Tables of Contents in each volume, with the current volume clearly identified.

G. Dividers: Provide tabbed dividers for each separate product and system; identify the contents on the divider tab; immediately following the divider tab include a description of product and major component parts of equipment.

H. Text: Manufacturer's printed data, or typewritten data on 20 pound paper.

I. Drawings: Provide with reinforced punched binder tab. Bind in with text; fold larger drawings to size of text pages.

J. Arrangement of Contents: Organize each volume in parts as follows:
   1. Project Directory.
   2. Table of Contents, of all volumes, and of this volume.
   3. Operation and Maintenance Data: Arranged by system, then by product category.
      a. Source data.
      b. Product data, shop drawings, and other submittals.
      c. Operation and maintenance data.
      d. Field quality control data.
      e. Original warranties and bonds.

3.06 WARRANTIES AND BONDS

A. Obtain warranties and bonds, executed in duplicate by responsible Subcontractors, suppliers, and manufacturers, within 10 days after completion of the applicable item of work. Except for items put into use with Owner's permission, leave date of beginning of time of warranty until Date of Substantial completion is determined.

B. Verify that documents are in proper form, contain full information, and are notarized.

C. Co-execute submittals when required.

D. Retain warranties and bonds until time specified for submittal.

E. Include originals of each in operation and maintenance manuals, indexed separately on Table of Contents.

END OF SECTION

SECTION 02 4100
SELECTIVE DEMOLITION

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Selective demolition of building elements for alteration purposes.

1.02 RELATED REQUIREMENTS

A. Section 01 1000 - Summary: Project conditions; protection of bench marks, survey control points, and existing construction to remain; reinstallation of removed products; temporary bracing and shoring.

B. Section 01 6000 - Product Requirements: Handling and storage of items removed for salvage and relocation.

1.03 DEFINITIONS

A. Demolish: Dismantle, raze, destroy, or wreck any building or structure or any part thereof.

B. Remove: Detach or dismantle items from existing construction and dispose of them off site, unless items are indicated to be salvaged or reinstalled.

C. Remove and Salvage: Detach or dismantle items from existing construction in a manner to prevent damage. Clean, package, label and deliver salvaged items to Owner in ready-for-reuse condition.

D. Remove and Reinstall: Detach or dismantle items from existing construction in a manner to prevent damage. Clean and prepare for reuse and reinstall where indicated.

E. Existing to Remain: Designation for existing items that are not to be removed and that are not otherwise indicated to be salvaged or reinstalled.

1.04 REFERENCE STANDARDS

A. 29 CFR 1926 - Safety and Health Regulations for Construction.

B. NFPA 241 - Standard for Safeguarding Construction, Alteration, and Demolition Operations.

1.05 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements for submittal procedures.

B. Site Plan: Indicate:
   1. Vegetation to be protected.
   2. Areas for temporary construction and field offices.
   3. Areas for temporary and permanent placement of removed materials.

C. Demolition Plan: Submit demolition plan as required by OSHA and local AHJs.
   1. Indicate extent of demolition, removal sequencing, bracing and shoring, and location and construction of barricades and fences.
   2. Summary of safety procedures.
   3. Indicate locations of items and materials scheduled for salvage and reuse in the project.

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

PART 2 PRODUCTS -- NOT USED

PART 3 EXECUTION

3.01 DEMOLITION

A. Remove portions of existing buildings as indicated in the Demolition Drawings.

B. Remove other items indicated, for salvage and relocation.

3.02 GENERAL PROCEDURES AND PROJECT CONDITIONS

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

2. Comply with applicable requirements of NFPA 241.
3. Take precautions to prevent catastrophic or uncontrolled collapse of structures to be removed; do not allow worker or public access within range of potential collapse of unstable structures.
4. Provide, erect, and maintain temporary barriers and security devices.
5. Use physical barriers to prevent access to areas that could be hazardous to workers or the public.
6. Conduct operations to minimize effects on and interference with adjacent structures and occupants.
7. Do not close or obstruct roadways or sidewalks without permits from authority having jurisdiction.
8. Conduct operations to minimize obstruction of public and private entrances and exits. Do not obstruct required exits at any time. Protect persons using entrances and exits from removal operations.
9. Obtain written permission from owners of adjacent properties when demolition equipment will traverse, infringe upon, or limit access to their property.

B. Do not begin removal until receipt of notification to proceed from Owner.

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

D. Protect existing structures and other elements to remain in place and not removed.
1. Provide bracing and shoring.
2. Prevent movement or settlement of adjacent structures.
3. Stop work immediately if adjacent structures appear to be in danger.

E. Hazardous Materials:
1. If hazardous materials are discovered during removal operations, stop work and notify Architect and Owner; hazardous materials include regulated asbestos containing materials, lead, PCBs, and mercury.

F. Perform demolition in a manner that maximizes salvage and recycling of materials.
1. Dismantle existing construction and separate materials.
2. Set aside reusable, recyclable, and salvageable materials; store and deliver to collection point or point of reuse.

3.03 EXISTING UTILITIES

A. Coordinate work with utility companies. Notify utilities before starting work, comply with their requirements, and obtain required permits.

B. Protect existing utilities to remain from damage.

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

D. Do not close, shut off, or disrupt existing life safety systems that are in use without at least 7 days prior written notification to Owner.

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

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

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

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

3.04 SELECTIVE DEMOLITION FOR ALTERATIONS

A. Existing construction and utilities indicated on drawings are based on casual field observation and existing record documents only.
1. Verify construction and utility arrangements are as indicated.
2. Report discrepancies to Architect before disturbing existing installation.
3. Beginning of demolition work constitutes acceptance of existing conditions that would be apparent upon examination prior to starting demolition.

B. Separate areas in which demolition is being conducted from areas that remain occupied.
   1. Provide, erect, and maintain temporary dustproof partitions of construction specified in Section 01 5000 in locations indicated on drawings.
   2. Provide sound retardant partitions when separating areas still occupied.

C. Remove existing work as indicated and required to accomplish new work.
   1. Remove rotted wood, corroded metals, and deteriorated masonry and concrete; replace with new construction indicated.
   2. Remove items indicated on drawings.
   3. Salvage items indicated on drawings. Carefully remove, clean and deliver to storage certain items for the Owner.

D. Services including, but not limited to, HVAC, Plumbing, Fire Protection, Electrical, and Telecommunications: Remove existing systems and equipment as indicated.
   1. Maintain existing active systems to remain in operation, and maintain access to equipment and operational components.
   2. Where existing active systems serve occupied facilities but are to be replaced with new services, maintain existing systems in service until new systems are complete and ready for service.
   3. See Section 01 1000 - Summary for limitations on outages and required notifications.
   4. Verify that abandoned services serve only abandoned facilities before removal.
   5. Remove abandoned pipe, ducts, conduits, and equipment, including those above accessible ceilings. Remove back to source of supply where possible, otherwise cap stub and tag with identification.

E. Protect existing work to remain.
   1. Prevent movement of structure. Provide shoring and bracing as required.
   2. Perform cutting to accomplish removal work neatly and as specified for cutting new work.
   3. Repair adjacent construction and finishes damaged during removal work.
   4. Patch to match new work.

3.05 DEBRIS AND WASTE REMOVAL

A. Remove debris, junk, and trash from site.

B. Remove materials not to be reused on site; do not burn or bury.

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

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

END OF SECTION

SECTION 03 0516
UNDERSLAB VAPOR BARRIER

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Sheet vapor barrier under concrete slabs on grade.

B. Accessories necessary to maintain moisture / vapor resistant installation of concrete slabs.

1.02 RELATED REQUIREMENTS

A. Section 03 3000 - Cast-in-Place Concrete: Preparation of subgrade, granular fill, placement of concrete.

1.03 REFERENCE STANDARDS

A. ASTM D882 - Standard Test Method for Tensile Properties of Thin Plastic Sheeting.

B. ASTM D1709 - Standard Test Methods for Impact Resistance of Plastic Film by the Free-Falling Dart Method.

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

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

1.04 ADMINISTRATIVE REQUIREMENTS

A. Coordination: Coordinate the installation of sheet vapor barrier with size, location and installation of subgrade utility lines.

B. Preinstallation Meeting: Conduct a preinstallation meeting one week prior to the start of the work of this section; require attendance by all affected installers.

C. Sequencing: Ensure that utility penetrations through vapor barrier are achieved in an orderly and expeditious manner.

1.05 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

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

C. Test Data: Submit report of tests showing compliance with specified requirements.

D. Certificates: Certify that products of this section meet or exceed specified requirements.

E. Manufacturer's Installation Instructions: Indicate installation procedures and interface required with adjacent construction.

1.06 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this Section.

B. Installer Qualifications: Company specializing in performing the work of this section.

1.07 DELIVERY, STORAGE AND HANDLING

A. Deliver materials to project site in original manufacturer's containers.

B. Store materials and accessories under cover and elevated above grade.

PART 2 PRODUCTS

2.01 MATERIALS

A. Underslab Vapor Barrier:
   1. Water Vapor Permeance: Not more than 0.010 perms, maximum.
   2. Complying with ASTM E1745 Class A.
   3. Minimum Puncture Resistance: 2200 grams when tested in accordance with ASTM D1709.
   4. Minimum Tensile Strength: 45.0 lb-ft / inch when tested in accordance with ASTM D882.
   5. Thickness: 15 mils.

6. Product:
   a. Epro Services; e.shield 115: www.eproserv.com.
   b. **BASIS OF DESIGN:** Stego Industries LLC; Stego Wrap Vapor Barrier: www.stegoindustries.com/#sle.
   c. W.R. Meadows, Inc.; PERMINATOR 15 Mil: www.wrmeadows.com.

B. Accessory Products: Vapor barrier manufacturer's recommended tape, adhesive, mastic, etc., for sealing seams and penetrations in vapor barrier.

C. Seam Tape: Manufacturer's pressure-sensitive type with maximum WVTR - 0.1 Perms.

D. Vapor Proofing Mastic: Manufacturer's recommended material with maximum WVTR - 0.1 Perms.

E. Pipe Boots / Slab Penetrations: Provide manufacturer's recommended sealant system compatible with vapor barrier.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that surface over which vapor barrier is to be installed is complete and ready before proceeding with installation of vapor barrier.

B. Verify that under slab aggregate fill is properly compacted and free of sharp projections which may puncture or damage vapor barrier.

3.02 INSTALLATION

A. Install vapor barrier in accordance with manufacturer's instructions and ASTM E1643.

B. Install vapor barrier under interior slabs on grade; lap sheet over footings and seal to foundation walls.

C. Lap joints minimum 6 inches.

D. Seal joints, seams and penetrations watertight with manufacturer's recommended products and follow manufacturer's written instructions.

E. No penetration of vapor barrier is allowed except for reinforcing steel and permanent utilities.

F. Repair damaged vapor retarder before covering with other materials.

3.03 FIELD QUALITY CONTROL

A. Perform visual inspection of vapor barrier prior to placing concrete; ensure continuity of taped joints and sealing of penetrations and sealing to perimeter or terminations of barrier.

B. Provide services of vapor barrier manufacturer's field representative to observe for proper installation of system and submit report required prior to pouring of concrete.

3.04 PROTECTION

A. Protect installed vapor barrier from damage resulting from subsequent construction operations.

B. Repair damaged areas with additional layer of sheet vapor barrier; overlap damaged area 6 inches and tape entire perimeter of patch.

END OF SECTION

SECTION 03 1000
CONCRETE FORMING AND ACCESSORIES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Formwork for cast-in-place concrete, with shoring, bracing and anchorage.

B. Openings for other work.

C. Form accessories.

D. Form stripping.

1.02 RELATED REQUIREMENTS

A. Section 03 2000 - Concrete Reinforcing.

B. Section 03 3000 - Cast-in-Place Concrete.

C. Section 04 2000 - Unit Masonry: Reinforcement for masonry.

D. Section 05 1200 - Structural Steel Framing: Placement of embedded steel anchors and plates in cast-in-place concrete.

E. Section 05 3100 - Steel Decking: Placement of steel anchors in composite decking.

1.03 REFERENCE STANDARDS

A. ACI CODE-318 - Building Code Requirements for Structural Concrete and Commentary; 2019 (Reapproved 2022).

B. ACI PRC-347 - Guide to Formwork for Concrete; 2014 (Reapproved 2021).

C. ACI SPEC-117 - Specification for Tolerances for Concrete Construction and Materials; 2010 (Reapproved 2015).

D. ACI SPEC-301 - Specifications for Concrete Construction; 2020.

E. ASME A17.1 - Safety Code for Elevators and Escalators Includes Requirements for Elevators, Escalators, Dumbwaiters, Moving Walks, Material Lifts, and Dumbwaiters with Automatic Transfer Devices; 2022.

F. COE CRD-C 572 - Handbook for Concrete and Cement Corps of Engineers Specifications for Polyvinylchloride Waterstop; 1974.

1.04 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide data on void form materials and installation requirements.

C. Samples: Submit two, 12 inch long samples of waterstops and construction joint devices.

PART 2 PRODUCTS

2.01 FORMWORK - GENERAL

A. Provide concrete forms, accessories, shoring, and bracing as required to accomplish cast-in-place concrete work.

B. Design and construct concrete that complies with design with respect to shape, lines, and dimensions.

C. Chamfer outside exposed corners of beams, joists, columns, and walls.

D. Comply with applicable state and local codes with respect to design, fabrication, erection, and removal of formwork.

E. Comply with relevant portions of ACI CODE-318, ACI PRC-347, and ACI SPEC-301.

2.02 WOOD FORM MATERIALS

A. Form Materials: At the discretion of the Contractor.

2.03 REMOVABLE PREFABRICATED FORMS

A. Void Forms: Moisture resistant treated paper faces, biodegradable, structurally sufficient to support weight of wet concrete mix until initial set; 4 inches thick.

2.04 FORMWORK ACCESSORIES

A. Form Ties: Snap-off type, _____ metal, fixed length, cone type, free of defects that could leave holes larger than 1 inch in concrete surface.

B. Form Release Agent: Capable of releasing forms from hardened concrete without staining or discoloring concrete or forming bugholes and other surface defects, compatible with concrete and form materials, and not requiring removal for satisfactory bonding of coatings to be applied.

C. Dowel Sleeves: Plastic sleeve and nailable plastic base for smooth, round, steel load-transfer dowels.

D. Embedded Anchor Shapes, Plates, Angles and Bars: As specified in Section 05 1200.

E. Waterstops: PVC, complying with COE CRD-C 572.
   1. Configuration: As indicated on drawings.
   2. Size: As indicated on drawings.
   3. Provide factory fabricated corners, intersections, and directional changes.
   4. All seams to be heat welded together per manufacturer's recommendations.
      a. Do not overlap waterstops at splice locations.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify lines, levels and centers before proceeding with formwork. Ensure that dimensions agree with drawings.

3.02 EARTH FORMS

A. Earth forms are not permitted.

3.03 ERECTION - FORMWORK

A. Erect formwork, shoring and bracing to achieve design requirements, in accordance with requirements of ACI SPEC-301.

B. Provide bracing to ensure stability of formwork. Shore or strengthen formwork subject to overstressing by construction loads.

C. Arrange and assemble formwork to permit dismantling and stripping. Do not damage concrete during stripping. Permit removal of remaining principal shores.

D. Obtain approval before framing openings in structural members that are not indicated on drawings.

E. Install void forms in accordance with manufacturer's recommendations. Protect forms from moisture or crushing.

F. If formwork is placed after reinforcement, resulting in insufficient concrete cover over reinforcement, request instructions from Architect before proceeding.

3.04 APPLICATION - FORM RELEASE AGENT

A. Apply form release agent on formwork in accordance with manufacturer's recommendations.

B. Apply prior to placement of reinforcing steel, anchoring devices, and embedded items.

3.05 INSERTS, EMBEDDED PARTS, AND OPENINGS

A. Provide formed openings where required for items to be embedded in passing through concrete work.

B. Locate and set in place items that will be cast directly into concrete.

C. Coordinate with work of other sections in forming and placing openings, slots, reglets, recesses, sleeves, bolts, anchors, other inserts, and components of other work.

D. Install waterstops in accordance with manufacturer's instructions, so they are continuous without displacing reinforcement. Heat seal joints so they are watertight.

3.06 FORM CLEANING

A. Clean forms as erection proceeds, to remove foreign matter within forms.

B. Clean formed cavities of debris prior to placing concrete.

1. During cold weather, remove ice and snow from within forms. Do not use de-icing salts. Do not use water to clean out forms, unless formwork and concrete construction proceed within heated enclosure. Use compressed air or other means to remove foreign matter.

3.07 FORMWORK TOLERANCES

A. Construct formwork to maintain tolerances required by ACI SPEC-117, unless otherwise indicated.

B. Construct and align formwork for elevator hoistway in accordance with ASME A17.1.

3.08 FIELD QUALITY CONTROL

A. An independent testing agency will perform field quality control tests, as specified in Section 01 4000 - Quality Requirements.

B. Inspect erected formwork, shoring, and bracing to ensure that work is in accordance with formwork design, and to verify that supports, fastenings, wedges, ties, and items are secure.

3.09 FORM REMOVAL

A. Do not remove forms or bracing until concrete has gained sufficient strength to carry its own weight and imposed loads.

B. Loosen forms carefully. Do not wedge pry bars, hammers, or tools against finish concrete surfaces scheduled for exposure to view.

END OF SECTION 03 1000

This page intentionally left blank

SECTION 03 2000
CONCRETE REINFORCING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Reinforcing steel for cast-in-place concrete.

B. Supports and accessories for steel reinforcement.

1.02 RELATED REQUIREMENTS

A. Section 03 1000 - Concrete Forming and Accessories.

B. Section 03 3000 - Cast-in-Place Concrete.

C. Section 04 2000 - Unit Masonry: Reinforcement for masonry.

1.03 REFERENCE STANDARDS

A. ACI CODE-318 - Building Code Requirements for Structural Concrete and Commentary; 2019 (Reapproved 2022).

B. ACI MNL-66 - ACI Detailing Manual; 2020.

C. ACI SPEC-301 - Specifications for Concrete Construction; 2020.

D. ASTM A615/A615M - Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement; 2024.

E. ASTM A704/A704M - Standard Specification for Welded Steel Plain Bar or Rod Mats for Concrete Reinforcement; 2024.

F. ASTM A706/A706M - Standard Specification for Deformed and Plain Low-Alloy Steel Bars for Concrete Reinforcement; 2022a.

G. ASTM A1064/A1064M - Standard Specification for Carbon-Steel Wire and Welded Wire Reinforcement, Plain and Deformed, for Concrete; 2024.

H. AWS D1.4/D1.4M - Structural Welding Code - Steel Reinforcing Bars; 2018, with Amendment (2020).

I. CRSI (DA4) - Manual of Standard Practice; 2023.

J. CRSI (P1) - Placing Reinforcing Bars, 10th Edition; 2019.

1.04 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Shop Drawings: Comply with requirements of ACI MNL-66 Include bar schedules, shapes of bent bars, spacing of bars, and location of splices.

1.05 QUALITY ASSURANCE

A. Perform work of this section in accordance with ACI SPEC-301.

PART 2 PRODUCTS

2.01 REINFORCEMENT

A. Reinforcing Steel: ASTM A615/A615M, Grade 60 (60,000 psi).
   1. Plain billet-steel bars.
   2. Unfinished.

B. Reinforcing Steel: ASTM A706/A706M, deformed low-alloy steel bars.
   1. Unfinished.

C. Steel Welded Wire Reinforcement (WWR): Galvanized, deformed type; ASTM A1064/A1064M.
   1. Form: Flat Sheets.
   2. WWR Style: As indicated on drawings.

D. Reinforcement Accessories:
   1. Tie Wire: Annealed, minimum 16 gauge, 0.0508 inch.

2. Chairs, Bolsters, Bar Supports, Spacers: Sized and shaped for adequate support of reinforcement during concrete placement.

2.02 FABRICATION

A. Fabricate concrete reinforcing in accordance with CRSI (DA4) - Manual of Standard Practice.

B. Welding of reinforcement is permitted only with the specific approval of Architect. Perform welding in accordance with AWS D1.4/D1.4M.

C. Locate reinforcing splices not indicated on drawings at point of minimum stress.

PART 3 EXECUTION

3.01 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 structural drawings.

E. Comply with applicable code for concrete cover over reinforcement.

3.02 FIELD QUALITY CONTROL

A. An independent testing agency, as specified in Section 01 4000 - Quality Requirements, will inspect installed reinforcement for compliance with contract documents before concrete placement.

END OF SECTION 03 2000

SECTION 03 3000
CAST-IN-PLACE CONCRETE

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Concrete for composite floor construction.

B. Precast topping.

C. Floors and slabs on grade.

D. Concrete foundation walls and piers and footings..

E. Joint devices associated with concrete work.

F. Miscellaneous concrete elements, including equipment pads and equipment pits.

G. Concrete curing.

1.02 RELATED REQUIREMENTS

A. Section 03 0516 - Underslab Vapor Barrier

B. Section 03 1000 - Concrete Forming and Accessories: Forms and accessories for formwork.

C. Section 03 2000 - Concrete Reinforcing.

D. Section 03 3511 - Concrete Floor Finishes: Densifiers, hardeners, applied coatings, and polishing.

E. Section 07 9200 - Joint Sealants: Products and installation for sealants and joint fillers for saw cut joints and isolation joints in slabs.

1.03 REFERENCE STANDARDS

A. ACI CODE-318 - Building Code Requirements for Structural Concrete and Commentary; 2019 (Reapproved 2022).

B. ACI PRC-211.1 - Selecting Proportions for Normal-Density and High Density-Concrete - Guide; 2022.

C. ACI PRC-302.1 - Guide to Concrete Floor and Slab Construction; 2015.

D. ACI PRC-304 - Guide for Measuring, Mixing, Transporting, and Placing Concrete; 2000 (Reapproved 2009).

E. ACI PRC-305 - Guide to Hot Weather Concreting; 2020.

F. ACI PRC-306 - Guide to Cold Weather Concreting; 2016.

G. ACI PRC-308 - Guide to External Curing of Concrete; 2016.

H. ACI SPEC-301 - Specifications for Concrete Construction; 2020.

I. ASTM A615/A615M - Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement; 2024.

J. ASTM A1064/A1064M - Standard Specification for Carbon-Steel Wire and Welded Wire Reinforcement, Plain and Deformed, for Concrete; 2024.

K. ASTM C33/C33M - Standard Specification for Concrete Aggregates; 2023.

L. ASTM C39/C39M - Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens; 2023.

M. ASTM C94/C94M - Standard Specification for Ready-Mixed Concrete; 2026.

N. ASTM C143/C143M - Standard Test Method for Slump of Hydraulic-Cement Concrete; 2020.

O. ASTM C150/C150M - Standard Specification for Portland Cement; 2024.

P. ASTM C171 - Standard Specification for Sheet Materials for Curing Concrete; 2020.

Q. ASTM C173/C173M - Standard Test Method for Air Content of Freshly Mixed Concrete by the Volumetric Method; 2024a.

R. ASTM C260/C260M - Standard Specification for Air-Entraining Admixtures for Concrete; 2024.

S. ASTM C494/C494M - Standard Specification for Chemical Admixtures for Concrete; 2024.

T. ASTM C595/C595M - Standard Specification for Blended Hydraulic Cements; 2021.

U. ASTM C618 - Standard Specification for Coal Ash and Raw or Calcined Natural Pozzolan for Use in Concrete; 2025a.

V. ASTM C685/C685M - Standard Specification for Concrete Made by Volumetric Batching and Continuous Mixing; 2017.

W. ASTM C989/C989M - Standard Specification for Slag Cement for Use in Concrete and Mortars; 2025.

X. ASTM C1240 - Standard Specification for Silica Fume Used in Cementitious Mixtures; 2020.

Y. ASTM C1602/C1602M - Standard Specification for Mixing Water Used in the Production of Hydraulic Cement Concrete; 2022.

Z. ASTM D471 - Standard Test Method for Rubber Property--Effect of Liquids; 2016a (Reapproved 2021).

AA. ASTM D1751 - Standard Specification for Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Nonextruding and Resilient Asphalt Types); 2023.

BB. ASTM D8139 - Standard Specification for Semi-Rigid, Closed-Cell Polypropylene Foam, Preformed Expansion Joint Fillers for Concrete Paving and Structural Construction; 2023.

CC. ASTM E1155/E1155M - Standard Test Method for Determining FF Floor Flatness and FL Floor Levelness Numbers; 2023.

1.04 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements for submittal procedures.

B. Product Data: Submit manufacturers' data on manufactured products showing compliance with specified requirements and installation instructions.
   1. For curing compounds, provide data on method of removal in the event of incompatibility with floor covering adhesives.
   2. For chemical-resistant waterstops, provide data on ASTM D471 test results.

C. Mix Design: Submit proposed concrete mix design.
   1. Indicate proposed mix design complies with requirements of ACI SPEC-301, Section 4 - Concrete Mixtures.
   2. Indicate proposed mix design complies with requirements of ACI CODE-318, Chapter 5 - Concrete Quality, Mixing and Placing.

D. Test Reports: Submit report for each test or series of tests specified.

1.05 QUALITY ASSURANCE

A. Perform work of this section in accordance with ACI SPEC-301 and ACI CODE-318.

B. Follow recommendations of ACI PRC-305 when concreting during hot weather.

C. Follow recommendations of ACI PRC-306 when concreting during cold weather.

1.06 WARRANTY

A. See Section 01 7800 - Closeout Submittals for additional warranty requirements.

PART 2 PRODUCTS

2.01 FORMWORK

A. Comply with requirements of Section 03 1000.

2.02 REINFORCEMENT MATERIALS

A. Comply with requirements of Section 03 2000.

2.03 CONCRETE MATERIALS

A. Cement: ASTM C150/C150M, Type I - Normal Portland type.

1. Acquire cement for entire project from same source.

B. Blended Hydraulic Cement: ASTM C595/C595M, Type IL(10).

C. Fine and Coarse Aggregates: ASTM C33/C33M.
1. Acquire aggregates for entire project from same source.

D. Fly Ash: ASTM C618, Class C or F.

E. Ground Granulated Blast Furnace Slag: ASTM C989/C989M.

F. Silica Fume: ASTM C1240, proportioned in accordance with ACI PRC-211.1.

G. Water: ASTM C1602/C1602M; clean, potable, and not detrimental to concrete.

2.04 ADMIXTURES

A. Do not use chemicals that will result in soluble chloride ions in excess of 0.1 percent by weight of cement.

B. Air Entrainment Admixture: ASTM C260/C260M.

C. High Range Water Reducing and Retarding Admixture: ASTM C494/C494M Type G.

D. High Range Water Reducing Admixture: ASTM C494/C494M Type F.

E. Water Reducing and Accelerating Admixture: ASTM C494/C494M Type E.

F. Water Reducing and Retarding Admixture: ASTM C494/C494M Type D.

G. Accelerating Admixture: ASTM C494/C494M Type C.

H. Retarding Admixture: ASTM C494/C494M Type B.

I. Water Reducing Admixture: ASTM C494/C494M Type A.

2.05 BONDING AND JOINTING PRODUCTS

A. Slab Isolation Joint Filler: 1/2-inch thick, height equal to slab thickness.
1. Material: ASTM D1751, cellulose fiber.
2. Material: ASTM D8139, semi-rigid, closed-cell polypropylene foam.

2.06 CURING MATERIALS

A. Curing Compound, Naturally Dissipating: Clear, water-based, liquid membrane-forming compound; complying with ASTM C309.

B. Moisture-Retaining Sheet: ASTM C171.

C. Water: Potable, not detrimental to concrete.

2.07 CONCRETE MIX DESIGN

A. Concrete Strength: Establish required average strength for each type of concrete on the basis of field experience or trial mixtures, as specified in ACI SPEC-301.
1. For trial mixtures method, employ independent testing agency acceptable to Architect for preparing and reporting proposed mix designs.

B. Admixtures: Add acceptable admixtures as recommended in ACI PRC-211.1 and at rates recommended or required by manufacturer.

C. Normal Weight Concrete: Footings
1. Compressive Strength, when tested in accordance with ASTM C39/C39M at 28 days: 3,500 pounds per square inch.
2. Fly Ash Content: Maximum 25 percent of cementitious materials by weight.
3. Water-Cement Ratio: Maximum 50 percent by weight.
4. Total Air Content: 4.5 percent, plus or minus 1.5 percent, determined in accordance with ASTM C173/C173M.
5. Maximum Slump: 5 inches.
6. Maximum Aggregate Size: 1 inch.

D. Normal Weight Concrete: Foundation Walls & Piers

1. Compressive Strength, when tested in accordance with ASTM C39/C39M at 28 days: 4,500 pounds per square inch.
2. Fly Ash Content: Maximum 25 percent of cementitious materials by weight.
3. Water-Cement Ratio: Maximum 45 percent by weight.
4. Total Air Content: 6 percent, plus or minus 1.5 percent, determined in accordance with ASTM C173/C173M.
5. Maximum Slump: 4 inches.
6. Maximum Aggregate Size: 3/4 inch.

E. Normal Weight Concrete: Interior Slabs-on-Ground and Elevated Slabs-on-Deck
1. Compressive Strength, when tested in accordance with ASTM C39/C39M at 28 days: 4,000 pounds per square inch.
2. Fly Ash Content: Maximum 25 percent of cementitious materials by weight.
3. Water-Cement Ratio: Maximum 50 percent by weight.
4. Total Air Content: Do not use an air-entraining admixture or allow total air content to exceed 3 percent for concrete used in trowel-finished floors
5. Maximum Slump: 5 inches.
6. Maximum Aggregate Size: 3/4 inch.

F. Normal Weight Concrete: Interior Polished Slabs-on-Ground
1. Compressive Strength, when tested in accordance with ASTM C39/C39M at 28 days: 4,000 pounds per square inch.
2. Fly Ash Content: Not allowed.
3. Water-Cement Ratio: Maximum 50 percent by weight.
4. Total Air Content: Do not use an air-entraining admixture or allow total air content to exceed 3 percent for concrete used in trowel-finished floors
5. Maximum Slump: 5 inches.
6. Maximum Aggregate Size: 1/2 inch.

2.08 MIXING

A. On Project Site: Mix in drum type batch mixer, complying with ASTM C685/C685M. Mix each batch not less than 1-1/2 minutes and not more than 5 minutes.

B. Transit Mixers: Comply with ASTM C94/C94M.

C. Adding Water: If concrete arrives on-site with slump less than suitable for placement, do not add water that exceeds the maximum water-cement ratio or exceeds the maximum permissible slump.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify lines, levels, and dimensions before proceeding with work of this section.

3.02 INSTALLING REINFORCEMENT AND OTHER EMBEDDED ITEMS

A. Comply with requirements of ACI SPEC-301. Clean reinforcement of loose rust and mill scale, and accurately position, support, and secure in place to achieve not less than minimum concrete coverage required for protection.

B. Verify that anchors, seats, plates, reinforcement and other items to be cast into concrete are accurately placed, positioned securely, and will not interfere with concrete placement.

3.03 PLACING CONCRETE

A. Place concrete in accordance with ACI PRC-304.

B. Place concrete for floor slabs in accordance with ACI PRC-302.1.

C. Maintain records of concrete placement. Record date, location, quantity, air temperature, and test samples taken.

D. Ensure reinforcement, inserts, waterstops, embedded parts, and formed construction joint devices will not be disturbed during concrete placement.

E. Place concrete continuously without construction (cold) joints wherever possible; where construction joints are necessary, before next placement prepare joint surface by removing laitance and exposing the sand and sound surface mortar, by sandblasting or high-pressure water jetting.

F. Finish floors level and flat, unless otherwise indicated, within the tolerances specified below.

3.04 SLAB JOINTING

A. Locate joints as indicated on drawings.

B. Anchor joint fillers and devices to prevent movement during concrete placement.

C. Isolation Joints: Use preformed joint filler with removable top section for joint sealant, total height equal to thickness of slab, set flush with top of slab.

D. Saw Cut Contraction Joints: Saw cut joints before concrete begins to cool, within 4 to 12 hours after placing; use 3/16 inch thick blade and cut at least 1 inch deep but not less than one quarter (1/4) the depth of the slab.

3.05 FLOOR FLATNESS AND LEVELNESS TOLERANCES

A. Maximum Variation of Surface Flatness:
   1. Exposed Concrete Floors: 1/4 inch in 10 feet.
   2. Under Seamless Resilient Flooring: 1/4 inch in 10 feet.
   3. Under Carpeting: 1/4 inch in 10 feet.

B. Correct the slab surface if tolerances are less than specified.

C. Correct defects by grinding or by removal and replacement of the defective work. Areas requiring corrective work will be identified. Re-measure corrected areas by the same process.

3.06 CONCRETE FINISHING

A. Repair surface defects, including tie holes, immediately after removing formwork.

B. Unexposed Form Finish: Rub down or chip off fins or other raised areas 1/4 inch or more in height.

C. Exposed Form Finish: Rub down or chip off and smooth fins or other raised areas 1/4 inch or more in height. Provide finish as follows:
   1. Smooth Rubbed Finish: Wet concrete and rub with carborundum brick or other abrasive, not more than 24 hours after form removal.

D. Concrete Slabs: Finish to requirements of ACI PRC-302.1 and as follows:
   1. Surfaces to Receive Thin Floor Coverings: "Steel trowel" as described in ACI PRC-302.1; thin floor coverings include carpeting, resilient flooring, seamless flooring, resinous matrix terrazzo, thin set quarry tile, and thin set ceramic tile.
   2. Other Surfaces to Be Left Exposed: Trowel as described in ACI PRC-302.1, minimizing burnish marks and other appearance defects.

E. Concrete Polishing: See Section 03 3511.

3.07 CURING AND PROTECTION

A. Comply with requirements of ACI PRC-308. Immediately after placement, protect concrete from premature drying, excessively hot or cold temperatures, and mechanical injury.

B. Maintain concrete with minimal moisture loss at relatively constant temperature for period necessary for hydration of cement and hardening of concrete.

C. Surfaces Not in Contact with Forms:
   1. Slabs and Floors To Receive Adhesive-Applied Flooring: Curing compounds and other surface coatings are usually considered unacceptable by flooring and adhesive manufacturers. If such materials must be used, either obtain the approval of the flooring and adhesive manufacturers prior to use or remove the surface coating after curing to flooring manufacturer's satisfaction.
   2. Initial Curing: Start as soon as free water has disappeared and before surface is dry. Keep continuously moist for not less than three days by water ponding, water-saturated sand, water-fog spray, or saturated burlap.

3. Final Curing: Begin after initial curing but before surface is dry.

3.08 FIELD QUALITY CONTROL

A. An independent testing agency will perform field quality control tests, as specified in Section 01 4000 - Quality Requirements.

B. Provide free access to concrete operations at project site and cooperate with appointed firm.

C. Tests of concrete and concrete materials may be performed at any time to ensure compliance with specified requirements.

D. Compressive Strength Tests: ASTM C39/C39M, for each test, mold and cure three concrete test cylinders. Obtain test samples for every 100 cubic yards or less of each class of concrete placed.

E. Take one additional test cylinder during cold weather concreting, cured on job site under same conditions as concrete it represents.

F. Perform one slump test for each set of test cylinders taken, following procedures of ASTM C143/C143M.

3.09 DEFECTIVE CONCRETE

A. Defective Concrete: Concrete not complying with required lines, details, dimensions, tolerances or specified requirements.

B. Repair or replacement of defective concrete will be determined by the Architect. The cost of additional testing shall be borne by Contractor when defective concrete is identified.

3.10 PROTECTION

A. Do not permit traffic over unprotected concrete floor surface until fully cured.

END OF SECTION 03 3000

SECTION 03 3511
CONCRETE FLOOR FINISHES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Surface treatments for concrete floors and slabs, including:
   1. Liquid densifiers and hardeners (CONC-S).

1.02 RELATED REQUIREMENTS

A. Section 03 3000 - Cast-in-Place Concrete: Finishing of concrete surface to tolerance; floating, troweling, and similar operations; curing.

B. Section 03 3536 - Polished Concrete Floor Finishing.

1.03 ADMINISTRATIVE REQUIREMENTS

A. Coordination:
   1. Coordinate the work with concrete floor placement and concrete floor curing.

1.04 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Product Data: Manufacturer's published data on each finishing product, including information on compatibility of different products and limitations.

C. Maintenance Data: Provide data on maintenance and renewal of applied finishes.

1.05 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section, with not less than five years of experience.

B. Flooring supplier shall approve concrete mix additives, topical treatments and curing methods prior to concrete placement.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials in manufacturer's sealed packaging, including application instructions.

B. Comply with manufacturer's written storage instructions.

C. Comply with manufacturer's written handling instructions prior to mixing.

1.07 FIELD CONDITIONS

A. Maintain light level equivalent to a minimum 200 W light source at 8 feet above the floor surface over each 20 foot square area of floor being finished.

B. Do not finish floors until interior heating system is operational.

C. Maintain ambient temperature of 50 degrees F minimum.

PART 2 PRODUCTS

2.01 APPLICATIONS

A. Densifier and Hardener:
   1. Use at following locations: areas indicated as sealed concrete.

2.02 DENSIFIERS AND HARDENERS

A. Liquid Densifier/Hardener: Penetrating chemical compound that reacts with concrete, filling the pores and dustproofing; for application to concrete after set.
   1. Composition: silicate and siliconate polymers.
   2. Products:
      a. Concrete Sealers USA; PS103 or PS107: www.concretesealersusa.com.
      b. CureCrete; Ashford Formula; www.ashfordformula.com
      c. Dayton Superior Corporation; Sure Hard Densifier J17: www.daytonsuperior.com.

d. Euclid Chemical Company; EucoDiamond Hard; www.euclidchemical.com
e. Kaufman Products Inc; SureHard LS: www.kaufmanproducts.net/#sle.
f. Laticrete; L&M SEAL HARD: www.laticrete.com.
g. Sika Corporation; SCOFIELD Formula One Lithium Densifier MP: www.scofield.com www.usa-sika.com.
h. Nox-Crete Inc; Duro-Nox LS: www.nox-crete.com/#sle.
i. PROSOCO, Inc; Consolideck LS/CS: www.prosoco.com/consolideck/#sle.
j. SpecChem, LLC; SpecHard: www.specchemllc.com.
k. W. R. Meadows, Inc; Liqui-Hard: www.wrmeadows.com.
l. Substitutions: See Section 01 6000 - Product Requirements.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that floor surfaces are acceptable to receive the work of this section.

B. Verify that flaws in concrete have been patched and joints filled with methods and materials suitable for further finishes.

C. Verify that surface is free of previous coatings, sealers, curing compounds, water repellents, laitance, efflorescence, fats, oils, grease, wax, soluble salts, residues from cleaning agents, and other impediments to adhesion.
1. If water droplets applied to surface do not soak in within 30 seconds, additional preparation is required. Chemically etch surface prior to proceeding with coating application.

D. Verify that water vapor emission from concrete and relative humidity in concrete are within limits established by coating manufacturer.

3.02 GENERAL

A. Apply materials in accordance with manufacturer's instructions.

3.03 COATING APPLICATION

A. Verify that surface is free of previous coatings, sealers, curing compounds, water repellents, laitance, efflorescence, fats, oils, grease, wax, soluble salts, residues from cleaning agents, and other impediments to adhesion.

B. Protect adjacent non-coated areas from drips, overflow, and overspray; immediately remove excess material.

C. Apply coatings in accordance with manufacturer's instructions, matching approved mock-ups for color, special effects, sealing and workmanship.

END OF SECTION

SECTION 03 3536
POLISHED CONCRETE FLOOR FINISHING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Final finishing for slabs: polished.

B. Surface treatment with concrete hardener and sealer.

1.02 RELATED REQUIREMENTS

A. Section 03 3000 - Cast-in-Place Concrete: Mix and preparing concrete floors to receive polished finish.

B. Section 03 3511 - Concrete Floor Finishes: finishes other than polished concrete.

C. Section 07 9200 - Joint Sealants: sealants for concrete control joints.

1.03 REFERENCES

A. ACI 310R-13 - Guide to Decorative Concrete; 2013

B. ASTM C1028 - Standard Test Method for Determining the Static Coefficient of Friction of Ceramic Tile and Other Like Surfaces by the Horizontal Dynamometer Pull-Meter Method; 2007e1.

C. ASTM D523 - Standard Test Method for Specular Gloss; 2008.

D. ASTM E1155 - Standard Test Method for Determining FF Floor Flatness and FL Floor Levelness Numbers; 1996 (Reapproved 2008).

1.04 ADMINISTRATIVE REQUIREMENTS

A. Preinstallation Meeting: Convene one week prior to start of installation of concrete slabs.

B. Require attendance of parties directly affecting work of this section, including mix supplier, concrete installer, testing agent, finishing/polishing contractor, technical representative of liquid applied product manufacturers, Owner, Contractor, and Architect.

C. Review examination, mix design, curing methods, testing, surface preparation, installation, application of liquid applied products, field quality control plan, phasing/scheduling of each step, protection and coordination with other work.

D. Minutes of the meeting shall be recorded, typed, and distributed by the contractor to all concerned parties, including but not limited to the Owner’s representative, and the architect within five (5) days of the meeting.

1.05 SUBMITTALS

A. Product Data: Provide data on concrete surface preparation and installation instructions, including information on compatibility of different products and limitations.

B. Samples: color selection samples for concrete stain/dye.

C. Floor Polishing Equipment Data: Include unit’s head down pressure, minimum grinding width, max RPM and verification of adjustable grinding pressure.

D. Diamond Tooling Data: Indicate that only matched sets will be used throughout entire process.

E. Certification: Approved applicator certificate for applicator of liquid densifier/sealer and polishing process.

F. Maintenance Data: Provide data on maintenance renewal and cleaning instructions, including frequency recommended for maintaining optimum condition under anticipated use. Include precautions against cleaning products and methods which may be detrimental.

G. Curing Plan: Indicate proposed method(s) for wet-curing.

H. Quality Control Plan:
   1. Schedule of areas to be polished.
   2. Floor flatness and level confirmation report, as provided by Section 03 30 00.
   3. Finishes indicated in contract documents.

4. Method to be used to protect adjacent surfaces from damage
5. Installation Log Form: Include the following data fields, with known information filled out.
    a. Unique identification of each area of work and/or unique finish
    b. Location on project.
    c. Substrate condition prior to start of work.
    d. Materials used.
    e. Stated performance values of materials used.
    f. Hardener/Densifier to be used, or indicate as "None" used.
    g. Sealer to be used, or indicate as "None" used.
    h. Color used, or indicate as "None" used
    i. Date of installation.
    j. Name of installer.
    k. Environmental Conditions
    l. Curing process used.
    m. Method of protection

1.06 QUALITY ASSURANCE

A. Perform Work in accordance with ACI 301.

B. Manufacturer Qualifications: minimum (5) five years experience in manufacturing components similar to or exceeding requirements of project.

C. Installer Qualifications: Successful completion of at least three (3) projects of similar size and scope within the past five (3) years and approved by manufacturer.

D. Supervisory Personnel: on site at all times while work is being performed and is currently certified as Craftsman - Level 1 or high by CPAA, CPC Craftsman or equivalent.

E. Pre-pour Meeting: as noted above.

1.07 MOCK-UP

A. 28 days prior to the Pre-Polish Conference, the polishing subcontractor shall provide a minimum 20 feet long by 8 feet wide mock up in designated mock-up area using the same personnel, equipment, tools and methods as will be used for the remaining interior floor slab. Mockup shall demonstrate each color, aggregate exposure class, appearance level, all joint treatments, inside wall edge treatments, and any protective sealers. Do not begin full scale product applications, floor polishing operations or deliver major materials until Architect has reviewed and accepted the preliminary sample panels.
    1. Use same mix design as scheduled for polished concrete (see Section 03 30 00).
    2. Leave section of concrete unpolished as baseline.
    3. Incorporate control joints and inside wall edge.
    4. Locate in an location agreed with the Architect. Confirm room name/number before proceeding.
    5. Provide lighting similar to actual condition.

B. Mock-up may remain as part of the Work.

C. Notify Architect seven (7) days in advance of dates and times when mockups will be completed.

D. Once accepted by Owner or Owner’s representative, protect mock-up from damage.

1.08 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials to site in manufacturer's original, unopened containers and packaging, with labels clearly identifying product name and manufacturer.

B. Storage:
    1. Store materials in clean, dry area indoors in accordance with manufacturer's instructions.
    2. Keep materials from freezing.

C. Handling: Protect materials during handling and application to prevent contamination or damage.

1.09 PROJECT CONDITIONS

A. Coordinate the work with concrete floor placement and concrete floor curing.

B. Limit dust created during polishing process with water, or other systems / methods.

C. Prevent damage and staining of concrete surfaces to be polished.
1. Prohibit use of markers, spray paint and soapstone.
2. Prohibit improper application of liquid membrane film-forming curing compounds.
3. Protect from acids and acidic detergents contacting concrete surfaces.
4. Prohibit storage of construction materials, equipment and tools on unprotected floor.
5. Prohibit ferrous metals storage over concrete surface.
6. Prohibit painting activities over concrete surfaces
7. Prohibit food or drinks other than clear drinking water.
8. Prohibit pipe cutting over slab
9. Prohibit welding or brazing without floor protection
10. Prohibit charging of equipment (only in designated areas)
11. Prohibit vehicle traffic on unprotected floor.
12. Protect from petroleum, oil, hydraulic fluid, or other liquid dipping from equipment working over concrete surfaces. Lifts or forklift traffic must have diapers and non-marking tires.

1.10 ENVIRONMENTAL REQUIREMENTS

A. Temporary Lighting: Minimum 200 W light source, placed 8 feet above the floor surface, for each 425 square feet of floor being finished.

B. Temporary Heat: Ambient temperature of 50 degrees F, minimum.

C. Ventilation: Sufficient to prevent injurious gases from temporary heat or other sources affecting concrete.

1.11 WARRANTY

A. See Section 01 7800 - Closeout Submittals, for additional warranty requirements.

B. Provide ten year manufacturer warranty for the treated floor to remain hardened, dustproof and water-repellant.

PART 2 PRODUCTS

2.01 MANUFACTURER

A. Flooring Products:
1. Advanced Floor Products/Curecrete Distribution; www.retroplatesystem.com
2. Ameripolish; www.ameripolish.com
3. Concrete Polishing Solutions; www.go2cps.com
4. Euclid Chemical; www.euclidchemical.com
5. Laticrete International: www.laticrete.com
6. PROSOCO; www.prosoco.com
7. W. R. Meadows, Inc; Induroshine: www.wrmeadows.com.
8. Substitutions: See Section 01 6000 - Product Requirements.

2.02 EQUIPMENT

A. Diamond Grinding Machine: Diamond grinding machinery shall be specifically designed to grind, and polish concrete floors. Machinery shall provide minimum grinding pressure of 775 pounds, minimum grinding width of 32 inches and shall be equipped with adjustable grinding pressure to ensure even grinding.

B. Equipment to be used for edge grinding/polishing shall be a hand grinder with dust extraction equipment.

C. Diamond grinding segments shall be:
1. Metal bonds: 40, 60, 80 and 150 grit.

D. Resin Bond grinding segments shall be:
1. Resin bonds: 100, 200, 400, 800, 1500, and 3000 grit.

E. Grinding pads for edges shall be:
1. Resin bonds: 40, 60, 80, 100, 200, 400, 800, 1500, and 3000 grit.

F. Equipment to be used for densifying and cleaning the floor after grinding/polishing procedure has been performed:
   1. Ride-on auto-scrubber or equivalent with a head pressure of 150 lb.
   2. Follow auto-scrubber's manual for cleaning instructions after densifying and conditioning the floor.
   3. Do not allow densifier to remain inside the auto-scrubber after densifying.

2.03 MATERIALS

A. All liquid floor treatments shall be manufactured by a single manufacturer and shall be fully compatible as specified herein.

B. Liquid Densifier Sealer: High performance, waterborne, lithium-silicate based, ready to use, deeply penetrating, permanent sealing, densifying, and hardening compound for concrete; odorless, VOC compliant, non-yellowing siliconate based solution designed to harden, dustproof and protect concrete floors and to resist black rubber tire marks.
   1. Product:
      a. W. R. Meadows, Inc; Liqui-Hard Ultra: www.wrmeadows.com.
      b. Substitutions: See Section 01 6000 - Product Requirements.

C. Concrete Sealer: Water-based synthetic polymer concrete floor enhancer.
   1. Product:
      a. W. R. Meadows, Inc; Bellatrix: www.wrmeadows.com.
      b. Substitutions: See Section 01 6000 - Product Requirements.

D. Grout: Thin mortar used for filling spaces:
   1. Epoxy or urethane

E. Semi-Rigid Self-Leveling Polyurea Joint Filler: See Section 07 9200 - Joint Sealants.

F. Cleaning Solution: as recommending by manufacturer.

2.04 FINISHES

A. Aggregate Exposure:
   1. Class B – Fine Aggregate (Salt & Pepper) Finish: Surface exposure of 85 to 95% fine aggregate and 5 to 15% cement fines and course aggregate based on visual observation of the overall area of the polished floor.

B. Appearance Level (Sheen):
   1. Level 2 Sheen – Satin (Honed):
      a. Procedure: no less than 4 step process with full refinement of each diamond tool with one application of densifier.
      b. Measurement: minimum of 3 distributed tests across the polished surface for areas up to 1000 SF, plus one additional test for each 1000 SF or fraction therof.
         1) Image Clarity Value, %: average value of 10 to 39, measured in accordance with ASTM D5767, prior to the application of sealers.
         2) Haze Index: average value less than 10, measured in accordance with ASTM D4039, prior to the application of sealers.

PART 3 EXECUTION

3.01 EXAMINATION

A. Examine floor to receive polished concrete floor system.

B. Notify Architect of conditions that would adversely affect installation or subsequent use.

C. Do not begin surface preparation or installation until unacceptable conditions are corrected.

D. Verify the following for new concrete floors:
   1. Floor Finish:
      a. Slabs and flatwork shall be placed and finished monolithically.
      b. Strike off and laser screed slabs to true, plane surfaces at required elevations.
      c. Thoroughly compact concrete with vibrators, floats, and tampers to force coarse aggregate below the surface.

d. Power trowel with no hand finishing.
e. Pan float.
f. Steel finish.
g. Surface should not be burned due to excessive troweling.
h. Imprints are not acceptable (i.e. boots, foreign objects dropped into concrete).

2. Floor and Joints:
   a. Free of debris and excessive dirt, dust, clay, and mud.
   b. Dry.
3. Floor Flatness and Levelness: as indicated in Section 03 3000 - Cast-in-Place Concrete.
4. Concrete Compressive Strength: as indicated in Section 03 3000 - Cast-in-Place Concrete or structural drawings/notes.
5. Lightweight Concrete: Not allowed
6. Concrete Curing: Minimum 8 days water cured
7. Concrete Adjacent to Floor Penetrations: Troweled flat and level with surrounding concrete.
8. Concrete Adjacent to Drains, Clean-Outs, Etc: Finish level to the top of the structure.

3.02 SURFACE PREPARATION

A. Cut joints to prep and clean, fill joints, scrape joints, and complete necessary patching.

B. Protection: Protect surrounding areas and adjacent surfaces from the following:
   1. Minimal accumulation of dust from grinding and polishing.
   2. Contact with overspray of concrete densifier.
   3. Contact with overspray of concrete sealer.

C. Apply insulation under any sheetrock, cut flush.

D. Surface Preparation: Prepare surfaces in accordance with installer's instructions.

E. Clean Surfaces: Remove laitance, glaze, efflorescence, dirt, dust, debris, oil, grease, curing agents, form release agents, bond breakers, paint, coatings and other surface contaminants which could adversely affect installation of polished concrete floor system.
   1. Utilize non-powered, hand-held tools and only mild cleaning chemicals that will not damage or mar the actual concrete surface, remove any and all remaining saw cut residue, form glue, texture overspray, paint drippings and any other built-up material on the floor surface.
   2. Power-sweep entire floor area with dust-free equipment.
   3. Treat all oil spots with oil emulsifier and oil absorbent materials in order to remove oils from below the surface. Scrub oil spot areas and remove liquids with vacuum.
   4. Scrub the entire floor with an automatic scrubber capable of a minimum of 80 pounds head pressure, each head to be equipped with cleaning combo or light grit brushes and a neutral pH cleaning detergent that is compatible with the liquid densifier/sealer. Remove liquid as the floor is scrubbed. Scrub the floor a second and final time with clean water only and remove the liquid as the floor is scrubbed. Allow slab to air dry.

3.03 INSTALLATION

A. Install polished concrete floor system in accordance with installer's instructions at locations indicated on the Drawings.

B. Polish concrete floors prior to walls being constructed.

C. Polished Concrete Floor System, General:
   1. Mount diamond tooling of appropriate grit and bond to all grinding heads on “Diamond Polishing Machinery” so as to assure that machinery is operating at full and balanced grinding capacity.
   2. Polish/grind the concrete floor at a rate to allow for an even scratch pattern.
   3. Each polishing/grinding pass must overlap 50 percent of the previous polishing/grinding pass.
   4. All polishing/grinding passes shall be made in the same direction, either longitudinal or latitudinal, until the entire given area to be polished/ground has been covered.
   5. Achieve maximum refinement with each pass before proceeding to finer grit tools.

6. Clean floor thoroughly after each pass using dust extraction equipment properly fitted with squeegee attachment or walk-behind auto-scrubber suitable to remove all visible loose debris and dust.

D. Initial Grinding Steps:
   1. 16 grit or aggressive diamond tooling to expose large aggregate
   2. Corresponding grit to remove scratch pattern (cross hatch as necessary)
   3. Edge with corresponding grits up to transitional diamonds – inside corner grind with triangle multitool.

E. Grouting:
   1. Mix grout to match color of adjacent concrete surfaces
   2. Fill surface imperfections including, but not limited to, holes, surface damage, small and micro cracks, air holes, pop-outs, and voids with grout to eliminate micro pitting in finished work.
   3. Grind grout into pore structure of surface until color differences between concrete surface and filled surface are not reasonably noticeable when viewed from 20 feet away under lighting conditions that will be present during occupancy.

F. Honing (Second Phase of Grinding Steps):
   1. 50 grit resin bonded diamond tooling.
   2. Edge with 200 grit resin bonded diamond tooling.
   3. 200 grit resin bonded diamond tooling.
   4. Edge with 400 grit resin bonded diamond tooling.
   5. 400 grit resin bonded diamond tooling.

G. Clean/let floor dry, fill in any noticeable pop outs or patches needing additional filling.

H. Liquid Densifier Treatment: Apply, and finish penetrating liquid densifier floor treatment according to manufacturer's written instructions.
   1. Thoroughly clean surface to remove any slurry, dust or other surface debris.
   2. Allow floor slab to air dry minimum of 12 hours from any previous polishing steps or staining applications involving moisture, before applying liquid densifier.
   3. Apply liquid densifier in strict accordance with the directions of the manufacturer. Spray, squeegee or roll on liquid to clean, dry concrete surface at a rate no greater than 225 square feet per gallon. The liquid should be scrubbed into the surface with a mechanical scrubber. Keep the surface wet a minimum of 30 minutes with the densifier during the application process. When the product thickens, but not more than 60 minutes after initial application, the surface shall then be squeegeed or vacuumed to remove all excess liquid.
   4. Allow liquid densifier 12 hours of drying time before proceeding to next polishing step.

I. Diamond Polishing:
   1. Edge with 800 grit resin bonded diamond tooling.
   2. Polish with 800 grit resin bonded diamond tooling.
   3. Edge with 1500 grit resin bonded diamond tooling.
   4. Polish with 1500 grit resin bonded diamond tooling.

J. Guard or Surface Treatment:
   1. Apply at approximately 1,000-1,500 sf/gallon

K. Burnish floor with high speed burnisher and 3500 grit pad or similar

L. Dust mop/clean floor as necessary without water
   1. Apply sub-surface sealers or similar if applicable – floor can be cleaned prior to this with water.
   2. Burnish with white pad as needed.

M. Final clean any remaining slurry and dust from surrounding areas, walls, doors, door frames, corners, etc.

N. Do not install joint fillers until a minimum of 28 days after concrete placement; 3-6 months preferred.

3.04 ACCEPTANCE

A. Upon completion, the quality of the various special floor finishes shall meet and match the qualities, color renditions, sheens and types of finished surfaces of the mock ups, which were reviewed and approved as quality control guides.

3.05 FIELD QUALITY CONTROL

A. Inspect completed polished concrete floor system with Owner, Contractor, Architect and Installer.

B. Review procedures with Architect to correct unacceptable areas of completed polished concrete floor system.

3.06 PROTECTION

A. Protect completed polished concrete floor system from damage until Substantial Completion.
   1. All recommendations listed under Field Conditions in Part 1 apply to finished floors.
   2. Immediately remove mortar splatter, spilled liquids, oil, grease, paint, coatings and other surface contaminants which could adversely affect completed polished concrete floor system.

B. Repair damaged areas of completed polished concrete floor system to satisfaction of Architect.

END OF SECTION

SECTION 03 4100
PRECAST STRUCTURAL CONCRETE

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Non-insulated wall panels.

B. Beams.

C. Slabs.

D. Stadia Seating Sections

E. Accessories.

1.2 RELATED SECTIONS

A. Division 01 – General Requirements.

B. Section 03 3000 – Cast-in-Place Concrete.

C. Section 03 4500 – Precast Architectural Concrete.

D. Section 04 2000 – Unit Masonry.

E. Section 05 1200 – Structural Steel Framing.

F. Section 05 5000 – Metal Fabrications.

1.3 REFERENCE STANDARDS

A. Reference the “Latest Edition” of all Standards unless noted otherwise.

B. ACI – American Concrete Institute International.

C. ACI 318 – Building Code Requirements for Structural Concrete.

D. AWS – American Welding Society.

E. ICC (IBC) – 2021 International Building Code.

F. PCI – Precast/Prestressed Concrete Institute.

G. PCI MNL-116 – Manual for Quality Control for Plants and Production of Precast and Prestressed Concrete Products.

H. PCI MNL-135 – Tolerance Manual for Precast and Prestressed Concrete Construction.

1.4 ADMINISTRATIVE REQUIREMENTS

A. Coordination: Coordinate openings sizes and locations, attachment of related items, and other work related to the fabrication and installation of precast concrete units, including the following:

1. Cast-in Electrical Devices: Cast-in Electrical Devices: Coordinate the location of cast in electrical conduit and junction boxes. Provide panel layout drawings and elevations to Electrical Contractor a minimum of one week prior to casting. Notify Electrical Contractor a minimum of 48 hours prior to casting so they can to travel to site, and provide and install electrical items in casting forms.
2. Mechanical and Plumbing Penetrations.

B. Sequencing: Furnish loose connection hardware and anchorage items to be embedded in or attached to other construction without delaying the work. Provide setting diagrams, templates, instructions, and directions, as required, for installation.

C. Preinstallation Meeting: Conduct a preinstallation meeting a minimum of two weeks prior to installation of precast concrete. Require attendance of related trades and the Architect. Review the following items:

1. Review shop drawings and installation details.
2. Anchor and weld plate locations.
3. Opening locations including those cut in the field.
4. Limitations on field cutting and core drilling.

5. Site access requirements and obstructions including but not limited:
    a. Access roads and maintenance thereof.
    b. Protection and repair of existing paving.
    c. Dewatering of footing trenches.
    d. Job site snow removal.
    e. Job site debris removal.
    f. Overhead obstructions including power lines.
6. Cold weather grouting requirements and expectations.
7. Cleaning responsibilities and expectations.

1.5 PERFORMANCE REQUIREMENTS

A. Delegated Design: Engage a qualified professional engineer to design precast concrete units.

B. Structural Performance: Provide precast concrete units and connections capable of withstanding design loads within limits and under conditions indicated on Drawings.

1. Loading Requirements: As indicated on the drawings.
2. Fire Resistance Ratings per 2021 International Building Code: As indicated on the drawings.

1.6 ACTION SUBMITTALS

A. See Section 01 3000 – Administrative Requirements; submittal procedures.

B. Shop Drawings: Include layout plans with unit locations, bearing and top of unit elevations, overall dimensions, building cross sections, wall sections, details, and opening locations.

1. Separately elevate and dimension each type of unit. Indicate location of each unit on overall layout by using the same identification mark placed on the actual unit.
2. Detail head/jamb/sill for each type of cast-in window and door opening including blocking and finish intentions.
3. Indicate all cast-in openings 12 inches or larger in dimension. Label each opening as “cast-in”. Generally note all other non-cast-in openings are to be cut in the field by related trades after approval by precaster’s engineer.
4. Indicate welded connections by AWS standard symbols and show size, length, and type of each weld.
5. Indicate locations of and detail hardware and anchorage devices to be cast-in to precast units with relationship to structure.
6. Indicate locations of and detail hardware and anchorage devices to be embedded into or attached to structure or other construction with relationship to structure.
7. Schedule loose hardware and anchorage devices to be installed by others; Include in schedule: identification marks, item descriptions, and total quantities.
8. Indicate locations of and detail lifting and handling devices. Use side or edge devices at all locations to minimize unsightly patching at exposed faces. Any face locations must be preapproved by the Architect.
9. Indicate sections and details showing quantities and position of reinforcing steel and related items including special reinforcement.
10. Indicate shim sizes and grouting sequence.
11. Handling procedures, sequence of erection, and bracing plan.

C. Delegated Design Submittals: Comprehensive Engineering, signed and sealed by a professional engineer responsible for its preparation who is registered in the state in which the project is located. Include all dead, live, and other applicable loads used in the design. Indicate loading on shop drawings.

D. Design Modifications: If design modifications are proposed to meet performance requirements and field conditions, notify the Architect immediately and submit design calculations and drawings. Do not adversely affect the appearance, durability or strength of units when modifying details or materials. Maintain the general design concept when altering size of units and alignment.

E. Samples: Provide Owner/Architect with samples representing the finish color and texture of exposed surfaces when requested. Samples to be a minimum of 12 by 12 by 2 inches in size. Owner/Architect to verify finish meets or exceeds the expectation of the design intent.

F. Test Reports: At the request of the Owner/Architect provide test reports for concrete and other structural materials tested during fabrication including cement mill reports, mix reports, cylinder break reports.

1.7 INFORMATIONAL SUBMITTALS

A. Welding Certificates

B. Material Test Reports for aggregates

C. Material Certificates: Signed by manufacturers certifying that each of the following items complies with requirements.

1. Cementitious materials.
2. Reinforcing materials and prestressing tendons.
3. Admixtures.
4. Bearing pads.
5. Structural-steel shapes and hollow structural sections.
6. Other components specified in Contract Documents with applicable standards.

D. Field quality-control test and special inspections reports.

1.8 QUALITY ASSURANCE

A. Single Source Requirement: Provide precast concrete of this section and the following sections by one manufacturer:

1. Section 03 4100 – Precast Structural Concrete

B. Designer Qualifications: Precast concrete units to be designed under the direct supervision of a Professional Structural Engineer licensed in the state where the project resides and be directly employed by precast fabricator to assure that quality and structural integrity is being scrutinized on a daily basis.

C. Fabricator Qualifications: A firm that specializes in manufacturing the types of precast concrete specified in good standing in the PCI Plant Certification Program, and that complies with the following requirements: No Exceptions. No other plant certification will be accepted.

1. Assumes responsibility for engineering precast concrete units to comply with performance requirements. This responsibility includes preparation of Shop Drawings and Comprehensive Engineering analysis by a qualified Professional Engineer.
2. Participates in PCI's Plant Certification program at the time of bidding and through the construction process, and is designated a PCI-certified plant for Group C, Category C4 – Prestressed deflected-Strand Structural Members.
3. Certification shall be maintained throughout the production of the precast concrete units. Production shall immediately stop if at any time the fabricator's certification is revoked, regardless of the status of completion of contracted work. Production will not be allowed to re-start until the necessary corrections are made and certification has been re-established. In the event certification(s) can not be re-established in a timely manner, causing project delays, the fabricator, at no additional cost, will contract out the remainder of the units to be manufactured at a PCI certified plant.
4. Has sufficient production capacity to produce required units without delaying the Work.
5. Is registered with and approved by authorities having jurisdiction.

D. Erector Qualifications: PCI Certified, approved by the precast concrete manufacturer, and having a minimum of 5 years experience in the erection of precast concrete similar to the requirements of this project. Erector's workman shall be properly trained to handle and erect precast units.

E. Design Standards: Comply with ACI 318 and the design recommendations of PCI MNL 120, "PCI Design Handbook – Precast and Prestressed Concrete," applicable to types of structural precast concrete units indicated.

F. Quality-Control Standard: For manufacturing procedures and testing requirements and quality control recommendations for types of units required, comply with PCI MNL 116, "Manual for Quality Control for Plants and Production of Structural Concrete Products."

1. Comply with camber and dimensional tolerances of PCI MNL 135, "Tolerance Manual for Precast and Prestressed Concrete Construction."

G. Welder Qualifications: AWS Certified, approved by the precast concrete manufacturer, and having a minimum of 5 years experience in the erection of precast concrete similar to the requirements of this project. Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code – Steel"; and AWS D1.4, "Structural Welding Code – Reinforcing Steel."

H. Pollution Control Regulations: Comply with all pollution control regulations in fabricating and finishing of all products. Protection of air and ground water is the utmost importance.

1. Capture all water runoff and filter air as necessary in the fabrication process in compliance with all state and federal pollution control agencies.

1.9 DELIVERY, STORAGE, AND HANDLING

A. General Requirement: All lifting and handling, transportation and delivery, storage and support, and erection of precast panels to be performed by qualified personnel using methods and equipment approved by manufacturer.

B. Identification: Label each unit with date of production and mark indicating unit location on the shop drawings.

C. Lifting and Handling: Lift and handle units at all times by lifting points indicated on the shop drawings. Lift with manufacturer approved lifting devices. Lifting devices to have a minimum safety factor of 5 to 1.

D. Transportation and Delivery: Transport units in accordance with manufacturer requirements.

E. Storage and Support: At all times store and support units off ground with identification marks clearly visible and so lifting devices are accessible and undamaged. Separate stacked units by batten across full width of each bearing point. Do not use stacked precast units for storage of other units or equipment.

1.10 FIELD CONDITIONS

A. Construction Manager shall prepare and maintain site free of obstructions as required by precast erector for the work of this section.

B. Cold Weather Grouting: Provide written procedures to address cold weather grouting to Owner/Architect prior to the erection process.

1.11 WARRANTY

A. Provide twelve-month guarantee for workmanship, materials, and satisfactory performance from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Precast Concrete:

1. Taracon Precast: www.taraconprecast.com
2. Wells Concrete Products: www.wellsconcrete.com.
3. Gage Brothers: www.gagebrothers.com
4. Molin Concrete Products: www.molin.com

5. Substitutions: See Section 01 6000 – Product Requirements; including the following requirements:
   a. Manufacturer and plant must be PCI Certified. No Exceptions.
   b. Manufacturer must submit product information including typical details, proposed product construction, handling information, etc. for approval by Architect.
   c. Manufacturer must obtain written approval of project Architect prior to submitting bid.
   d. Manufacturer must obtain written approval of Construction Manager prior to submitting bid.
   e. Prequalified Precaster must have in-house engineering capabilities. No others permitted without being prequalified.
   f. Precast Erector shall be PCI Certified.

2.2 PRECAST UNITS

A. Flat Non-Insulated Wall Panels:
   1. Size/Shape/Profile: As indicated.
   2. Panel Width: 10’-0” unless noted otherwise.
   3. Overall Thickness: 8 inch thick unless noted otherwise.
   4. Form Side Finish: Grade B (PCI), refer to description below.
   5. Form Side Color: Gray.
   6. Screed Side Finish: Standard Float (Warehouse Grade), refer to description below.
   7. Screed Side Color: Gray.

B. Beams, Spandrels, Girders, and Purlins:
   1. Size/Shape/Profile: As indicated on the drawings.
   2. Screed Side: Match Form Side.
   3. Form Sides: Grade B (PCI), refer to description below.
   4. Concrete Color: Gray.

C. Stadia Seating Sections.
   1. Size/Shape/Profile: As indicated on the drawings.
   2. Screed Side: As indicated under “By Description” below.
   3. Form Sides: Grade B (PCI), refer to description below.
   4. Ends: Recess strands and coat with ZRC.
   5. Concrete Color: Gray.

D. Form Side Finishes “By PCI”:
   1. Grade B (PCI): All air holes over 1/4 inch in size should be filled. Air holes between 1/8 and 1/4 inch in width that occur in high concentration (more than one per 2 square inches) should be filled. Surface blemishes due to holes or dents in form should be repaired. Discoloration should be permitted at form joints.

E. Screed Side Finishes “By Description”:
   1. Standard Float (Warehouse Grade): Screed or float finish uniformed surfaces: Strike off and consolidate concrete with vibrating screeds to a uniform finish, float finish, if required. Hand screed at projections. Normal color variations, minor indentations, minor chips, and spalls are permitted. No major imperfections, honeycombing, or defects are permitted.

2.3 MATERIALS

A. All materials shall comply with the specifications, standards and codes quoted herein. The Architect/Engineer upon request shall be furnished satisfactory certification that all material incorporated in the precast concrete products comply with the requirements herein specified.

B. Forms: Material that will provide smooth/anticipated finish that meets the expectations of the Owner/Architect.

C. Form Release Agent: Non-staining type that will not impair anticipated finishes of the Owner/Architect and that will not inhibit field installed coatings, sealants, and adhesives.

D. Portland Cement: ASTM C150 - Type I or III: ASTM C150.

E. Other Cementitious Materials: Ground granulated blast furnace slag: ASTM C 989.

F. Admixtures:

1. Air entraining admixtures: ASTM C260.
2. Water reducing, retarding, accelerating admixtures: ASTM C494.

G. Aggregates: ASTM C33 except that coarse aggregates for precast concrete surfaces exposed to damp conditions shall contain zero iron oxides.

1. Light weight aggregate for structural components: ASTM C330.

H. Water: Potable or free from foreign materials in amounts harmful to concrete and embedded steel.

I. Reinforcing Steel: Reinforcing steel or mesh will be selected from the following materials to conform to precaster's design unless otherwise indicated on the drawings. Reinforcing bars shall not be welded without specific approval of Architect/Engineer.

1. Bars:
   a. Deformed billet steel: ASTM A615.
   b. Deformed rail steel: ASTM A616.
   c. Deformed axle steel: ASTM A617.
   d. Deformed low-alloy steel: ASTM A706.
2. Wire: Cold drawn steel: ASTM A82.
3. Wire fabric:
   a. Welded steel: ASTM A 185.
   b. Welded deformed steel: ASTM A497.

J. Strand: Uncoated, 7-wire, Stress-Relieved Strand: ASTM A416-Grade 250K or 270K.

K. Anchors and Inserts:

1. Materials:
   a. Structural Steel: ASTM A36.
      1) Shop Primer: Manufacturer's standards.
         a) Location: Items protected by sealants or finish coatings.
      2) Hot Dipped Galvanized: ASTM A153.
         a) Location: Items left exposed unless otherwise indicated. Cold galvanize field welds.
      3) Zinc-rich Coating: MIL-P-2135, self curing, one component, sacrificial.
         a) Location: As indicated.
      4) Cadmium Coating (Electroplated).
         a) Location: As indicated.
   b. Stainless Steel: ASTM A666, type 304.
      1) Location: As indicated.

L. Other Items Cast-In to Precast Units:

1. Other Items: As indicated on the drawings.
2. Locations: As indicated on the drawings.

2.4 ACCESSORIES

A. Cement Grout: Type I (ASTM C150 / C150M), “Dry Pack”, portland cement, sand and water having a minimum of 3,000 psi compressive strength at 28 days. (Approximately 3 to 1 sand/cement ratio.)

B. Bearing Pads: (Selection will be made by precast designer unless indicated otherwise.)

1. Unless noted otherwise on the plans, Elastomeric Bearing Pads conforming to Division 2, Section 25 of AASHTO Standard Specifications for Highway Bridges shall be used.
2. The PCI Design Handbook, Second Edition, Part 5.1 through Part 5.5 shall be used for the design of bearing pads.
3. Teraflouroethylene (TFE) reinforced with glass fibers and applied to stainless or structural steel plates.

C. Sealants:

1. Refer to Section 07 9200 - Joint Sealants; Precast to precast products.
2. Refer to Section 07 8400 – Firestopping; Installation to be performed by a licensed contractor (Not Precast Erector) in the area in which the project is located.
3. Tremco; Dymeric 240 FC: www.tremcosealants.com.
4. BASF Sonneborn; Sonolastic NP2: www.buildingsystems.basf.com.
5. Backer Rod: Denver Foam or equivalent. www.backerrod.com.
6. Provide products compatible with adjacent work.

D. Backer Rod for Sealants: Denver Foam by www.backerrod.com, open cell polyurethane, unless noted otherwise.

E. Galvanized Sheet Materials: Per ASTM A 653/A 653M; G90 zinc coating.

F. Welding Materials: Per AWS D1.1/D1.1M, “Structural Welding Code – Steel”; compatible with materials being welded.

G. Welded Studs: Per AWS D1.1/D1.1M, “Structural Welding Code – Steel”; compatible with materials being welded.

H. Pipe Sleeves:

1. 3/4” Conduit or PVC pipe.
2. Location to be 4'-0" to 6'-0" on center, verify layout with electrical engineer.
3. Pipe sleeves to be capped.

I. Anchor Bolts: As designed by precast manufacturer, cast-in place by others.

J. Attachment Plates: As designed by precast manufacturer, cast-in place by others.

K. Other Load Bearing Loose Steel Items: As designed by precast manufacturer.

2.5 FABRICATION

A. Stadia Camber as designed by precaster in accordance with design loads.

B. Pre-stress all precast units.

C. Cast-in preservative treated 2x wood blocking at perimeter of window and man door openings. Wood nailers shall provide adequate backing for installation of window and door units. Return face finish to edge of blocking/insulation.

D. Cast solid concrete edges at the perimeter of sectional/overhead door type openings unless noted otherwise; 2 inch thick minimum. Return face finish to interior side of panel.

E. Cast-in bent steel plates at perimeter of sectional/overhead door type openings for attachment of door hardware. Continuously weld splices and grind smooth to a point that they are capable of being concealed by field painting.

F. All reinforcing steel shall have minimum cover as required by code and shall be accurately located as indicated on the approved shop drawings. Metal chairs, with or without coatings, shall not be permitted in the finished face.

G. All of the fabrication procedures shall be carried out under a fully protective overhead and sidewall covering, with a constant temperature of between 50 to 80 F being maintained except during the curing cycle.

2.6 FABRICATION TOLERANCES

A. Fabricate units in accordance with MNL-116 and MNL 135-00 and as follows:

1. Length: Plus or minus 1/8 inch for every 10 feet in length or 1/2 inch, whichever is greater.
2. Width: Plus or minus 1/8 inch for items 48 inch or less; 1/4 inch for items 48 to 120 inches, and 1/2 inches maximum for items over 120 inches and more.
3. Cross Sectional Dimensions: Plus or minus 1/8 inch for items 48 inch or less; 1/4 inch for items 48 to 120 inches, and 1/2 inches maximum for items over 120 inches and more.
4. Cast-in Anchors and Inserts: Plus or minus 1 inch from centerline location indicated on shop drawings.
5. Horizontal Alignment (Sweep): Plus or minus 1/3 inch for every 10 feet in length or 1/2 inch, whichever is greater.
6. Vertical Alignment (End Squareness): Plus or minus 1/8 inch for every 12 inches in height or 1/4 inch, whichever is greater.
7. Camber: Variation between units is plus or minus 1/4 inch for every 10 feet in length or 1/2 inch, whichever is greater.
8. Blockouts: Plus or minus 1 inch from centerline location indicated on shop drawings.

2.7 CONCRETE MIXES

A. 28-day compressive strength: Minimum of 5,000 psi.

B. Use of calcium chloride, chloride ions or other salts is not permitted.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify site is free of obstructions and ready to receive the work. Obstructions include but are not limited to dewatering of footing trenches, jobsite snow removal, site debris, overhead obstructions, including power lines.

B. Verify access roads have been prepared to handle all weather conditions and are acceptable to precast concrete installer.

C. Do not begin the work of this section unless preparations by the site contractor are complete and the site contractor understands and agrees to maintain acceptable conditions until precast installation is complete. Beginning the work of this section is acceptance of existing conditions.

3.2 PREPARATION

A. Furnish loose connection hardware and anchorage devices for precast concrete members to be embedded in or attached to the building structural frame or foundation before starting that Work. Provide locations, setting diagrams, templates and instructions for the proper installation of each anchorage device.

B. Preparation: Construction Manager (Buyer) shall be responsible for the following items:

1. Removal of all obstructions including but not limited to power lines and wires that may be hazardous to precaster’s personnel and other items required for precast installation.
2. All-weather access roads for precaster's trucks and cranes. Refer to precaster's proposal/quotation for more defined access requirements.
3. Grid locations, building corners, finish floor elevations, top of door elevations and other survey points/lines/elevations for accurate installation of precast units.

4. True and level bearing surfaces on all field placed bearing walls and other field placed supporting units.
5. Placement and accurate alignment of anchor bolts, plates, or dowels in column footings, grade beams, and other field placed supporting units.
6. All shoring required for composite beams and slabs. Shoring shall have a minimum load factor of 1.5 x (dead load plus construction loads).
7. Repair all concrete and bituminous surfaces damaged during precast installation. Examine surfaces with precaster before and after precast installation and coordinate efforts to minimize damage.
8. Requirements For long span DTs - No shipping of long span units shall occur during road postings. Precaster's crane and trucks will erect from the interior side of the building at area's requiring long span units. Trucks and cranes will operate under their own power. Maximum grade on which erection will occur to be 4 percent. Haul roads to be approximately level transverse and 14 percent maximum longitudinal grade.

3.3 ERECTION

A. Precast installer shall be PCI Certified Erector in good standing with PCI.

B. Precast Unit Curing Procedures: Contact precaster for other minimum curing requirements.

C. Erection Shall Be Defined As:

1. Placing, aligning, and leveling the precast units in final positions in the structure on the designated supporting surfaces.
2. Connection of precast units to each other, or to supporting structural units as indicated on the shop drawings.
3. Removal of lifting hooks, if necessary.
4. Cleaning and sealing of "Precast" to "Precast" joints. Joints include:
   a. Precast to precast including joints between interior and exterior units.
   b. Precast to bearing.
5. Sealing of "Precast" to "Other Materials" and joints that require "Firestopping" are NOT considered part of erection unless indicated otherwise.

D. Field Welding: Complete field welding using qualified personnel, equipment, and welding materials that are compatible to the base material.

E. Grouting:

1. Pack grout between bottom of precast walls and their bearing surfaces filling the entire area free of voids. Rake joints back at locations where backer rod and sealant is to be installed.
2. Construction Manager Responsibility: Construction Manager shall be responsible for providing "shelters/tarps" and "temp heat" for grouting when temperatures are below 40 degrees for a 24 hour period.

F. Patching:

1. All exposed connections shall be recessed and patched as per the intended use of the space these are exposed to.

3.4 TOLERANCES

A. Erect precast units level, plumb, square, true, and in alignment without exceeding the non- cumulative erection tolerances of PCI MNL 135. Position units so that dimensional errors do not accumulate and so joints remain aligned and uniform as erection progresses. Level out variations between adjacent units by jacking, loading, or any other feasible method as recommended by the manufacturer and acceptable to the Architect/Engineer.

B. In the event that precast units cannot be adjusted to conform to design or tolerance criteria, cease work and advise Architect. Execute modifications as directed by the Architect prior to resuming work.

3.5 SEALANT INSTALLATION

A. Construction Manager/Owner shall coordinate with the precast erector sealing of precast joints where required. The general contractor accepts responsibility if the precast joints above the roof deck and below grade are not sealed due to poor coordination/site conditions. The precast erector shall accept responsibility if precast joints are not sealed but were coordinated in a timely fashion by the Construction Manager/Owner.

B. Install backer rod and sealant according to product manufacturer's instructions.

3.6 FIELD REPAIR AND CLEANING OF PRECAST UNITS

A. Repairs by Precast Erector: Repair chipping, spalling, cracking, and other damages to precast units after delivery to the jobsite. After installation and repairs are completed, all further damage is the responsibility of, and at the cost of, the Construction Manager. Consult with precaster for repairs of structural precast units.

B. Cleaning by Construction Manager: Clean exposed surfaces that are soiled during shipping, installation, and remaining construction operations, prior to Substantial Completion. Clean in accordance with precast manufacturer's recommendations.

3.7 INSPECTION AND ACCEPTANCE

A. Final inspection and acceptance of erected precast/prestressed concrete shall be made by Architect/Engineer to verify conformance with plans and specifications.

3.8 PROTECTION

A. Construction Manager to protect precast units from remaining construction operations.

END OF SECTION

SECTION 04 2000
UNIT MASONRY

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Concrete masonry units.
   2. Lintels.
   3. Mortar and grout materials.
   4. Reinforcement.
   5. Ties and anchors.
   6. Accessories.
   7. Mortar and grout mixes.

B. Products Installed but not Furnished under This Section:
   1. Steel lintels in unit masonry.
   2. Steel shelf angles for supporting unit masonry.

1.2 DEFINITIONS

A. CMU(s): Concrete masonry unit(s).

B. Reinforced Masonry: Masonry containing reinforcing steel in grouted cells.

1.3 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings: For the following:
   1. Masonry Units: Indicate sizes, profiles, coursing, and locations of special shapes.
   2. Reinforcing Steel: Indicate bending, lap lengths, and placement of unit masonry reinforcing bars. Comply with ACI 315R. Indicate elevations of reinforced walls.

C. Samples for Verification: For each type and color of the following:
   1. Accessories embedded in masonry.

D. Delegated Design Submittals: For masonry anchors and ties, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

1.5 INFORMATIONAL SUBMITTALS

A. List of Materials Used in Constructing Mockups: List generic product names together with manufacturers, manufacturers' product names, model numbers, lot numbers, batch numbers, source of supply, and other information as required to identify materials used. Include mix proportions for mortar and grout and source of aggregates.
   1. Submittal is for information only. Receipt of list does not constitute approval of deviations from the Contract Documents unless such deviations are specifically brought to the attention of Architect and approved in writing.

B. Material Certificates: For each type of the following:
   1. Masonry units.

a. Include data on material properties.

b. For masonry units used in structural masonry, include data and calculations establishing average net-area compressive strength of units.

2. Integral water repellent used in CMUs.

3. Cementitious materials. Include name of manufacturer, brand name, and type.

4. Mortar admixtures.

5. Preblended, dry mortar mixes. Include description of type and proportions of ingredients.

6. Grout mixes. Include description of type and proportions of ingredients.

7. Reinforcing bars.

8. Joint reinforcement.

9. Anchors, ties, and metal accessories.

C. Mix Designs: For each type of mortar and grout. Include description of type and proportions of ingredients.

1. Include test reports for mortar mixes required to comply with property specification. Test in accordance with ASTM C109/C109M for compressive strength, ASTM C1506 for water retention, and ASTM C91/C91M for air content.

2. Include test reports, in accordance with ASTM C1019, for grout mixes required to comply with compressive strength requirement.

D. Statement of Compressive Strength of Masonry: For each combination of masonry unit type and mortar type, provide statement of average net-area compressive strength of masonry units, mortar type, and resulting net-area compressive strength of masonry determined in accordance with TMS 602.

E. Cold-Weather Procedures: Detailed description of methods, materials, and equipment to be used to comply with requirements.

1.6 QUALITY ASSURANCE

A. Qualifications:

1. Installers: All masonry flashing installers must complete the International Masonry Institute Flashing Upgrade training course.

2. Delegated Design Engineer: A professional engineer who is legally qualified to practice in state where Project is located and who is experienced in providing engineering services of the type indicated.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Store masonry units on elevated platforms in a dry location. If units are not stored in an enclosed location, cover tops and sides of stacks with waterproof sheeting, securely tied. If units become wet, do not install until they are dry.

B. Store cementitious materials on elevated platforms, under cover, and in a dry location. Do not use cementitious materials that have become damp.

C. Store aggregates where grading and other required characteristics can be maintained and contamination avoided.

D. Deliver preblended, dry mortar mix in moisture-resistant containers. Store preblended, dry mortar mix in delivery containers on elevated platforms in a dry location or in covered weatherproof dispensing silos.

E. Store masonry accessories, including metal items, to prevent corrosion and accumulation of dirt and oil.

1.8 FIELD CONDITIONS

A. Protection of Masonry: During construction, cover tops of walls, projections, and sills with waterproof sheeting at end of each day's work. Cover partially completed masonry when construction is not in progress.

1. Extend cover a minimum of 24 inches down both sides of walls, and hold cover securely in place.
2. Where one wythe of multiwythe masonry walls is completed in advance of other wythes, secure cover a minimum of 24 inches down face next to unconstructed wythe, and hold cover in place.

B. Do not apply uniform floor or roof loads for at least 12 hours and concentrated loads for at least three days after building masonry walls or columns.

C. Stain Prevention: Prevent grout, mortar, and soil from staining the face of masonry to be left exposed or painted. Immediately remove grout, mortar, and soil that come in contact with such masonry.

1. Protect base of walls from rain-splashed mud and from mortar splatter by spreading coverings on ground and over wall surface.
2. Protect sills, ledges, and projections from mortar droppings.
3. Protect surfaces of window and door frames, as well as similar products with painted and integral finishes, from mortar droppings.
4. Turn scaffold boards near the wall on edge at the end of each day to prevent rain from splashing mortar and dirt onto completed masonry.

D. Cold-Weather Requirements: Do not use frozen materials or materials mixed or coated with ice or frost. Do not build on frozen substrates. Remove and replace unit masonry damaged by frost or by freezing conditions. Comply with cold-weather construction requirements contained in TMS 602.

1. Cold-Weather Cleaning: Use liquid cleaning methods only when air temperature is 40 deg F and higher and will remain so until masonry has dried, but not less than seven days after completing cleaning.

E. Hot-Weather Requirements: Comply with hot-weather construction requirements contained in TMS 602.

PART 2 - PRODUCTS

2.1 SOURCE LIMITATIONS

A. Obtain exposed masonry units from single manufacturer.

B. For exposed masonry units and cementitious mortar components, obtain each color and grade from single source with resources to provide materials of consistent quality in appearance and physical properties.

2.2 PERFORMANCE REQUIREMENTS

A. Provide structural unit masonry that develops indicated net-area compressive strengths at 28 days.

1. Determine net-area compressive strength of masonry from average net-area compressive strengths of masonry units and mortar types (unit-strength method) in accordance with TMS 602.

2. Determine net-area compressive strength of masonry by testing masonry prisms in accordance with ASTM C1314.

2.3 UNIT MASONRY, GENERAL

A. Masonry Standard: Comply with TMS 602, except as modified by requirements in the Contract Documents.

B. Defective Units: Referenced masonry unit standards may allow a certain percentage of units to contain chips, cracks, or other defects exceeding limits stated. Do not use units where such defects are exposed in the completed Work.

C. Fire-Resistance Ratings: Comply with requirements for fire-resistance-rated assembly designs indicated.

1. Where fire-resistance-rated construction is indicated, use the equivalent thickness method for masonry units in accordance with ACI 216.1.

2.4 CONCRETE MASONRY UNITS

A. Shapes: Provide shapes indicated and as follows, with exposed surfaces matching exposed faces of adjacent units unless otherwise indicated.

1. Provide special shapes for lintels, corners, jambs, sashes, movement joints, headers, bonding, and other special conditions.

2. Provide square-edged units for outside corners unless otherwise indicated.

B. CMUs: ASTM C90, .

1. Unit Compressive Strength: Provide units with minimum average net-area compressive strength of 2100 psi.

2. Size (Width): Manufactured to dimensions 3/8 inch less than nominal dimensions.

3. Exposed Faces: Provide color and texture matching the range represented by Architect's sample.

2.5 LINTELS

A. Masonry Lintels: Prefabricated or built-in-place masonry lintels made from bond beam CMUs matching adjacent CMUs in color, texture, and density classification, with reinforcing bars placed as indicated and filled with coarse grout. Cure precast lintels before handling and installing. Temporarily support built-in-place lintels until cured.

2.6 MORTAR AND GROUT MATERIALS

A. Portland Cement: ASTM C150/C150M, Type I or II, except Type III may be used for cold-weather construction. Provide natural color or white cement as required to produce mortar color indicated.

1. Alkali content will not be more than 0.1 percent when tested in accordance with ASTM C114.

B. Hydrated Lime: ASTM C207, Type S.

C. Portland Cement-Lime Mix: Packaged blend of portland cement and hydrated lime containing no other ingredients.

D. Masonry Cement: ASTM C91/C91M.

E. Mortar Pigments: Natural and synthetic iron oxides and chromium oxides, compounded for use in mortar mixes and complying with ASTM C979/C979M. Use only pigments with a record of satisfactory performance in masonry mortar.

F. Aggregate for Mortar: ASTM C144.

1. For mortar that is exposed to view, use washed aggregate consisting of natural sand or crushed stone.

G. Aggregate for Grout: ASTM C404.

H. Cold-Weather Admixture: Nonchloride, noncorrosive, accelerating admixture complying with ASTM C494/C494M, Type C, and recommended by manufacturer for use in masonry mortar of composition indicated.

I. Water: Potable.

2.7 REINFORCEMENT

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

B. Reinforcing Bar Positioners: Wire units designed to fit into mortar bed joints spanning masonry unit cells and to hold reinforcing bars in center of cells. Units are formed from 0.148-inch steel wire, hot-dip galvanized after fabrication. Provide units designed for number of bars indicated.

C. Masonry-Joint Reinforcement, General: ASTM A951/A951M.

1. Exterior Walls: Hot-dip galvanized carbon steel.
2. Wire Size for Side Rods: 0.148-inch diameter.
3. Wire Size for Cross Rods: 0.148-inch diameter.
4. Spacing of Cross Rods, Tabs, and Cross Ties: Not more than 16 inches o.c.
5. Provide in lengths of not less than 10 ft., with prefabricated corner and tee units.

D. Masonry-Joint Reinforcement for Single-Wythe Masonry: Ladder or truss type with single pair of side rods.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   a. Hohmann & Barnard, Inc.
   b. Wire-Bond.

2.8 TIES AND ANCHORS

A. General: Ties and anchors extend at least 1-1/2 inches into veneer but with at least a 5/8-inch cover on outside face.

B. Materials: Provide ties and anchors specified in this article that are made from materials that comply with the following unless otherwise indicated:

1. Hot-Dip Galvanized, Carbon-Steel Wire: ASTM A1064/A1064M, with ASTM A153/A153M, Class B-2 coating.
2. Stainless Steel Wire: ASTM A580/A580M, Type 304.

C. Adjustable Masonry-Veneer Anchors:

1. General: Provide anchors that allow vertical adjustment but resist a 100 lbf load in both tension and compression perpendicular to plane of wall without deforming or developing play in excess of 1/16 inch.
2. Contractor's Option: Unless otherwise indicated, provide any of the adjustable masonry-veneer anchors specified.
3. Masonry-Veneer Anchors; Single-Barrel Screw with Double-Pintle Wingnut: Self-drilling, single-barrel screw with wingnut head thermally resistant wingnut head thermally resistant clip designed to receive double-pintle wire tie. Screw has a smooth barrel the same thickness as insulation with factory-installed gasketed washer to seal at face of insulation and sheathing and a coating to reduce thermal conductivity.

a. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1) Heckmann Building Products, Inc.

2) Hohmann & Barnard, Inc.

2.9 ACCESSORIES

A. Compressible Filler: Premolded filler strips complying with ASTM D1056, Grade 2A1; compressible up to 35 percent; of width and thickness indicated; formulated from neoprene.

B. Preformed Control-Joint Gaskets: Made from styrene-butadiene-rubber compound, complying with ASTM D2000, Designation M2AA-805 and designed to fit standard sash block and to maintain lateral stability in masonry wall; size and configuration as indicated.

C. Proprietary Acidic Masonry Cleaner: Manufacturer's standard-strength cleaner designed for removing mortar/grout stains, efflorescence, and other new construction stains from new masonry without discoloring or damaging masonry surfaces. Use product expressly approved for intended use by cleaner manufacturer and manufacturer of masonry units being cleaned.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Diedrich Technologies, Inc.; a Hohmann & Barnard company.

b. EaCo Chem, Inc.

c. PROSOCO, Inc.

2.10 MORTAR AND GROUT MIXES

A. General: Do not use admixtures, including pigments, air-entraining agents, accelerators, retarders, water-repellent agents, antifreeze compounds, or other admixtures unless otherwise indicated.

1. Do not use calcium chloride in mortar or grout.

2. Use portland cement-lime mortar unless otherwise indicated.

3. Add cold-weather admixture (if used) at same rate for all mortar that will be exposed to view, regardless of weather conditions, to ensure that mortar color is consistent.

B. Mortar for Unit Masonry: Comply with ASTM C270, Property Specification. Provide the following types of mortar for applications stated unless another type is indicated or needed to provide required compressive strength of masonry.

1. For masonry below grade or in contact with earth, use Type M.

2. For reinforced masonry, use Type M.

3. For exterior, above-grade, load-bearing, nonload-bearing walls, and parapet walls; for interior load-bearing walls; for interior nonload-bearing partitions; and for other applications where another type is not indicated, use Type N.

4. For interior nonload-bearing partitions, Type O may be used instead of Type N.

C. Pigmented Mortar: Use colored cement product or select and proportion pigments with other ingredients to produce color required. Do not add pigments to colored cement products.

1. Pigments do not exceed 10 percent of portland cement by weight.

2. Pigments do not exceed 5 percent of masonry cement or mortar cement by weight.

D. Grout for Unit Masonry: Comply with ASTM C476.

1. Use grout of type indicated or, if not otherwise indicated, of type (fine or coarse) that will comply with TMS 602 for dimensions of grout spaces and pour height.

2. Proportion grout in accordance with ASTM C476, Table 1 or paragraph 4.2.1.2 for specified 28-day compressive strength indicated, but not less than 2000 psi.
3. Provide grout with a slump of 8 to 11 inches as measured in accordance with ASTM C143/C143M.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
   1. For the record, prepare written report, endorsed by Installer, listing conditions detrimental to performance of the Work.
   2. Verify that foundations are within tolerances specified.
   3. Verify that reinforcing dowels are properly placed.
   4. Verify that substrates are free of substances that impair mortar bond.

B. Before installation, examine rough-in and built-in construction for piping systems to verify actual locations of piping connections.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION, GENERAL

A. Thickness: Build cavity and composite walls and other masonry construction to full thickness shown. Build single-wythe walls to actual widths of masonry units, using units of widths indicated.

B. Build chases and recesses to accommodate items specified in this and other Sections.

C. Leave openings for equipment to be installed before completing masonry. After installing equipment, complete masonry to match construction immediately adjacent to opening.

D. Use full-size units without cutting if possible. If cutting is required to provide a continuous pattern or to fit adjoining construction, cut units with motor-driven saws; provide clean, sharp, unchipped edges. Allow units to dry before laying unless wetting of units is specified. Install cut units with cut surfaces and, where possible, cut edges concealed.

E. Select and arrange units for exposed unit masonry to produce a uniform blend of colors and textures. Mix units from several pallets or cubes as they are placed.

F. Matching Existing Masonry: Match coursing, bonding, color, and texture of existing masonry.

G. Wetting of Brick: Wet brick before laying if initial rate of absorption exceeds 30 g/30 sq. in. per minute when tested in accordance with ASTM C67/C67M. Allow units to absorb water so they are damp but not wet at time of laying.

3.3 TOLERANCES

A. Dimensions and Locations of Elements:
   1. For dimensions in cross section or elevation, do not vary by more than plus 1/2 inch or minus 1/4 inch.
   2. For location of elements in plan, do not vary from that indicated by more than plus or minus 1/2 inch.
   3. For location of elements in elevation, do not vary from that indicated by more than plus or minus 1/4 inch in a story height or 1/2 inch total.

B. Lines and Levels:

1. For bed joints and top surfaces of bearing walls, do not vary from level by more than 1/4 inch in 10 ft., or 1/2-inch maximum.
2. For conspicuous horizontal lines, such as lintels, sills, parapets, and reveals, do not vary from level by more than 1/8 inch in 10 ft., 1/4 inch in 20 ft., or 1/2-inch maximum.
3. For vertical lines and surfaces, do not vary from plumb by more than 1/4 inch in 10 ft., 3/8 inch in 20 ft., or 1/2-inch maximum.
4. For conspicuous vertical lines, such as external corners, door jambs, reveals, and expansion and control joints, do not vary from plumb by more than 1/8 inch in 10 ft., 1/4 inch in 20 ft., or 1/2-inch maximum.
5. For lines and surfaces, do not vary from straight by more than 1/4 inch in 10 ft., 3/8 inch in 20 ft., or 1/2-inch maximum.
6. For vertical alignment of exposed head joints, do not vary from plumb by more than 1/4 inch in 10 ft., or 1/2-inch maximum.
7. For faces of adjacent exposed masonry units, do not vary from flush alignment by more than 1/16 inch except due to warpage of masonry units within tolerances specified for warpage of units.

C. Joints:

1. For bed joints, do not vary from thickness indicated by more than plus or minus 1/8 inch, with a maximum thickness limited to 1/2 inch.
2. For exposed bed joints, do not vary from bed-joint thickness of adjacent courses by more than 1/8 inch.
3. For head and collar joints, do not vary from thickness indicated by more than plus 3/8 inch or minus 1/4 inch.
4. For exposed head joints, do not vary from thickness indicated by more than plus or minus 1/8 inch. Do not vary from adjacent bed-joint and head-joint thicknesses by more than 1/8 inch.
5. For exposed bed joints and head joints of stacked bond, do not vary from a straight line by more than 1/16 inch from one masonry unit to the next.

3.4 LAYING MASONRY WALLS

A. Lay out walls in advance for accurate spacing of surface bond patterns with uniform joint thicknesses and for accurate location of openings, movement-type joints, returns, and offsets. Avoid using less-than-half-size units, particularly at corners, jambs, and, where possible, at other locations.

B. Bond Pattern for Exposed Masonry: Unless otherwise indicated, lay exposed masonry in bond pattern indicated on Drawings; do not use units with less-than-nominal 4-inch horizontal face dimensions at corners or jambs.

C. Lay concealed masonry with all units in a wythe in running bond or bonded by lapping not less than 4 inches. Bond and interlock each course of each wythe at corners. Do not use units with less-than-nominal 4-inch horizontal face dimensions at corners or jambs.

D. Stopping and Resuming Work: Stop work by stepping back units in each course from those in course below; do not tooth. When resuming work, clean masonry surfaces that are to receive mortar, remove loose masonry units and mortar, and wet brick if required before laying fresh masonry.

E. Built-in Work: As construction progresses, build in items specified in this and other Sections. Fill in solidly with masonry around built-in items.

F. Fill space between steel frames and masonry solidly with mortar unless otherwise indicated.

G. Where built-in items are to be embedded in cores of hollow masonry units, place a layer of metal lath, wire mesh, or plastic mesh in the joint below, and rod mortar or grout into core.

H. Fill cores in hollow CMUs with grout 24 inches under bearing plates, beams, lintels, posts, and similar items unless otherwise indicated.

3.5 MORTAR BEDDING AND JOINTING

A. Lay CMUs as follows:

1. Bed face shells in mortar and make head joints of depth equal to bed joints.
2. Bed webs in mortar in all courses of piers, columns, and pilasters.
3. Bed webs in mortar in grouted masonry, including starting course on footings.
4. Fully bed entire units, including areas under cells, at starting course on footings where cells are not grouted.
5. Fully bed units and fill cells with mortar at anchors and ties as needed to fully embed anchors and ties in mortar.

B. Lay solid masonry units with completely filled bed and head joints; butter ends with sufficient mortar to fill head joints and shove into place. Do not deeply furrow bed joints or slush head joints.

C. Set trim units in full bed of mortar with full vertical joints. Fill dowel, anchor, and similar holes.

1. Clean soiled surfaces with fiber brush and soap powder and rinse thoroughly with clear water.
2. Allow cleaned surfaces to dry before setting.
3. Wet joint surfaces thoroughly before applying mortar.
4. Rake out mortar joints for pointing with sealant.

D. Rake out mortar joints at to a uniform depth of 1/4 inch and point with epoxy mortar to comply with epoxy-mortar manufacturer's written instructions.

E. Tool exposed joints slightly concave when thumbprint hard, using a jointer larger than joint thickness unless otherwise indicated.

F. Cut joints flush where indicated to receive air barriers unless otherwise indicated.

3.6 MASONRY-JOINT REINFORCEMENT

A. General: Install entire length of longitudinal side rods in mortar with a minimum cover of 5/8 inch on exterior side of walls, 1/2 inch elsewhere. Lap reinforcement a minimum of 6 inches.

1. Space reinforcement not more than 16 inches o.c.
2. Space reinforcement not more than 8 inches o.c. in foundation walls and parapet walls.
3. Provide reinforcement not more than 8 inches above and below wall openings and extending 12 inches beyond openings in addition to continuous reinforcement.

B. Interrupt joint reinforcement at control and expansion joints unless otherwise indicated.

C. Provide continuity at wall intersections by using prefabricated T-shaped units.

D. Provide continuity at corners by using prefabricated L-shaped units.

E. Cut and bend reinforcing units as directed by manufacturer for continuity at[**corners,**] returns, offsets, column fireproofing, pipe enclosures, and other special conditions.

3.7 ANCHORING MASONRY TO STRUCTURAL STEEL AND CONCRETE

A. Anchor masonry to structural steel and concrete, where masonry abuts or faces structural steel or concrete, to comply with the following:

1. Provide an open space not less than 1 inch wide between masonry and structural steel or concrete unless otherwise indicated. Keep open space free of mortar and other rigid materials.
2. Anchor masonry with anchors embedded in masonry joints and attached to structure.
3. Space anchors as indicated, but not more than 24 inches o.c. vertically and 36 inches o.c. horizontally.

3.8 CONTROL AND EXPANSION JOINTS

A. General: Install control- and expansion-joint materials in unit masonry as masonry progresses. Do not allow materials to span control and expansion joints without provision to allow for in-plane wall or partition movement.

B. Form control joints in concrete masonry using one of the following methods:

1. Fit bond-breaker strips into hollow contour in ends of CMUs on one side of control joint. Fill resultant core with grout, and rake out joints in exposed faces for application of sealant.
2. Install preformed control-joint gaskets designed to fit standard sash block.
3. Install interlocking units designed for control joints. Install bond-breaker strips at joint. Keep head joints free and clear of mortar, or rake out joint for application of sealant.
4. Install temporary foam-plastic filler in head joints, and remove filler when unit masonry is complete for application of sealant.

C. Form expansion joints in brick as follows:

1. Build flanges of metal expansion strips into masonry. Lap each joint 4 inches in direction of water flow. Seal joints below grade and at junctures with horizontal expansion joints if any.
2. Build flanges of factory-fabricated, expansion-joint units into masonry.
3. Build in compressible joint fillers where indicated.
4. Form open joint full depth of brick wythe and of width indicated, but not less than 3/8 inch for installation of sealant and backer rod specified in Section 07 9200 "Joint Sealants."

D. Provide horizontal, pressure-relieving joints by either leaving an airspace or inserting a compressible filler of width required for installing sealant and backer rod specified in Section 07 9200 "Joint Sealants," but not less than 3/8 inch.

1. Locate horizontal, pressure-relieving joints beneath shelf angles supporting masonry.

3.9 LINTELS

A. Install steel lintels where indicated.

B. Provide or lintels where indicated and where openings of more than 12 inches for brick-size units and 24 inches for block-size units are indicated without structural steel or other supporting lintels.

C. Provide minimum bearing of 8 inches at each jamb unless otherwise indicated.

3.10 REINFORCED UNIT MASONRY

A. Temporary Formwork and Shores: Construct formwork and shores as needed to support reinforced masonry elements during construction.

1. Construct formwork to provide shape, line, and dimensions of completed masonry as indicated. Make forms sufficiently tight to prevent leakage of mortar and grout. Brace, tie, and support forms to maintain position and shape during construction and curing of reinforced masonry.
2. Do not remove forms and shores until reinforced masonry members have hardened sufficiently to carry their own weight and that of other loads that may be placed on them during construction.

B. Placing Reinforcement: Comply with requirements in TMS 602.

C. Grouting: Do not place grout until entire height of masonry to be grouted has attained enough strength to resist grout pressure.

1. Comply with requirements in TMS 602 for cleanouts and for grout placement, including minimum grout space and maximum pour height.
2. Limit height of vertical grout pours to not more than 60 inches.

3.11 FIELD QUALITY CONTROL

A. Testing Agency: Engage a qualified testing agency to perform tests and inspections. Allow inspectors access to scaffolding and work areas as needed to perform tests and inspections. Retesting of materials that fail to comply with specified requirements will be at Contractor's expense.

B. Inspections: Special inspections in accordance with Level 2 in TMS 402.

1. Begin masonry construction only after inspectors have verified proportions of site-prepared mortar.
2. Place grout only after inspectors have verified compliance of grout spaces and of grades, sizes, and locations of reinforcement.
3. Place grout only after inspectors have verified proportions of site-prepared grout.

C. Testing Prior to Construction: One set of tests.

D. Testing Frequency: One set of tests for each 5000 sq. ft. of wall area or portion thereof.

E. Clay Masonry Unit Test: For each type of unit provided, in accordance with ASTM C67/C67M for compressive strength.

F. Concrete Masonry Unit Test: For each type of unit provided, in accordance with ASTM C140/C140M for compressive strength.

G. Mortar Aggregate Ratio Test (Proportion Specification): For each mix provided, in accordance with ASTM C780.

H. Mortar Test (Property Specification): For each mix provided, in accordance with ASTM C780. Test mortar for mortar air content and compressive strength.

I. Grout Test (Compressive Strength): For each mix provided, in accordance with ASTM C1019.

J. Prism Test: For each type of construction provided, in accordance with ASTM C1314 at 28 days.

3.12 REPAIRING, POINTING, AND CLEANING

A. Remove and replace masonry units that are loose, chipped, broken, stained, or otherwise damaged or that do not match adjoining units. Install new units to match adjoining units; install in fresh mortar, pointed to eliminate evidence of replacement.

B. Pointing: During the tooling of joints, enlarge voids and holes, except weep holes, and completely fill with mortar. Point up joints, including corners, openings, and adjacent construction, to provide a neat, uniform appearance. Prepare joints for sealant application, where indicated.

C. In-Progress Cleaning: Clean unit masonry as work progresses by dry brushing to remove mortar fins and smears before tooling joints.

D. Final Cleaning: After mortar is thoroughly set and cured, clean exposed masonry as follows:

1. Remove large mortar particles by hand with wooden paddles and nonmetallic scrape hoes or chisels.
2. Test cleaning methods on sample wall panel; leave one-half of panel uncleaned for comparison purposes. Obtain Architect's approval of sample cleaning before proceeding with cleaning of masonry.
3. Protect adjacent stone and nonmasonry surfaces from contact with cleaner by covering them with liquid strippable masking agent or polyethylene film and waterproof masking tape.
4. Wet wall surfaces with water before applying cleaners; remove cleaners promptly by rinsing surfaces thoroughly with clear water.
5. Clean brick by bucket-and-brush hand-cleaning method described in BIA Technical Notes 20.
6. Clean concrete masonry by applicable cleaning methods indicated in NCMA TEK 8-4A.
7. Clean masonry with a proprietary acidic masonry cleaner applied according to manufacturer's written instructions.

3.13 MASONRY WASTE DISPOSAL

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

END OF SECTION

SECTION 05 1200
STRUCTURAL STEEL FRAMING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Structural-steel materials.
2. Shrinkage-resistant grout.

1.2 DEFINITIONS

A. Structural Steel: Elements of the structural frame indicated on Drawings and as described in ANSI/AISC 303.

1.3 COORDINATION

A. Coordinate selection of shop primers with topcoats to be applied over them. Comply with paint and coating manufacturers' written recommendations to ensure that shop primers and topcoats are compatible with one another.

B. Coordinate installation of anchorage items to be embedded in or attached to other construction without delaying the Work. Provide setting diagrams, sheet metal templates, instructions, and directions for installation.

1.4 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1.5 ACTION SUBMITTALS

A. Product Data:

1. Structural-steel materials.
2. High-strength, bolt-nut-washer assemblies.
3. Shear stud connectors.
4. Anchor rods.
5. Threaded rods.
6. Shrinkage-resistant grout.

B. Shop Drawings: Show fabrication of structural-steel components.

1. Include details of cuts, connections, splices, camber, holes, and other pertinent data.
2. Include embedment Drawings.
3. Indicate welds by standard AWS symbols, distinguishing between shop and field welds, and show size, length, and type of each weld. Show backing bars that are to be removed and supplemental fillet welds where backing bars are to remain.
4. Indicate type, size, and length of bolts, distinguishing between shop and field bolts. Identify pretensioned and slip-critical, high-strength bolted connections.
5. Indicate locations and dimensions of protected zones.
6. Identify demand-critical welds.
7. Identify members not to be shop primed.

1.6 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Installer fabricator.

B. Welding certificates.

C. Paint Compatibility Certificates: From manufacturers of topcoats applied over shop primers, certifying that shop primers are compatible with topcoats.

D. Mill test reports for structural-steel materials, including chemical and physical properties.

E. Product Test Reports: For the following:

1. Bolts, nuts, and washers, including mechanical properties and chemical analysis.
2. Direct-tension indicators.
3. Tension-control, high-strength, bolt-nut-washer assemblies.

F. Source quality-control reports.

1.7 QUALITY ASSURANCE

A. Fabricator Qualifications: A qualified fabricator that participates in the AISC Quality Certification Program and is designated an AISC-Certified Plant, Category BU or is accredited by the IAS Fabricator Inspection Program for Structural Steel (Acceptance Criteria 172).

1. Substitutions: See Section 01 6000 – Product Requirements; including the following requirements:
   a. Fabricator must have a documented quality control manual and procedure, documented certified welders and third party inspection reports of fabricated steel.
   b. Fabricator must submit a list of project references indicating a minimum five years documented experience on projects of similar size for approval by Architect.
   c. Fabricator must obtain written approval of project Architect prior to submitting bid.

B. Installer Qualifications: A qualified erector specializing in performing Work of this section, with a minimum five years documented experience. Work shall be performed by qualified steelworkers and in accordance with Section 7, AISC Code of Standard Practice.

C. Welding Qualifications: Qualify procedures and personnel in accordance with AWS D1.1/D1.1M.

1. Welders and welding operators performing work on bottom-flange, demand-critical welds are to pass the supplemental welder qualification testing, as required by AWS D1.8/D1.8M. FCAW-S and FCAW-G are to be considered separate processes for welding personnel qualification.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Store materials to permit easy access for inspection and identification. Keep steel members off ground and spaced by using pallets, dunnage, or other supports and spacers. Protect steel members and packaged materials from corrosion and deterioration.

1. Do not store materials on structure in a manner that might cause distortion, damage, or overload to members or supporting structures. Repair or replace damaged materials or structures as directed.

B. Store fasteners in a protected place in sealed containers with manufacturer's labels intact.

1. Fasteners may be repackaged provided Owner's testing and inspecting agency observes repackaging and seals containers.
2. Clean and relubricate bolts and nuts that become dry or rusty before use.
3. Comply with manufacturers' written recommendations for cleaning and lubricating ASTM F3125/F3125M, Grade F1852 bolt assemblies and for retesting bolt assemblies after lubrication.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Comply with applicable provisions of the following specifications and documents:

1. ANSI/AISC 303.
2. ANSI/AISC 341.
3. ANSI/AISC 360.
4. RCSC's "Specification for Structural Joints Using High-Strength Bolts."

B. Connection Design Information:

1. Option 1: Connection designs have been completed and connections indicated on the Drawings.

2.2 STRUCTURAL-STEEL MATERIALS

A. W-Shapes: ASTM A992/A992M.

B. Channels, Angles, M-Shapes: ASTM A36/A36M.

C. Plate and Bar: ASTM A36/A36M and ASTM A572/A572M, Grade 50.

D. Cold-Formed Hollow Structural Sections: ASTM A500/A500M, Grade C structural tubing.

E. Welding Electrodes: Comply with AWS requirements.

2.3 BOLTS AND CONNECTORS

A. High-Strength A325 Bolts, Nuts, and Washers: ASTM F3125/F3125M, Grade A325, Type 1, heavy-hex steel structural bolts; ASTM A563, Grade DH, heavy-hex carbon-steel nuts; and ASTM F436/F436M, Type 1, hardened carbon-steel washers; all with plain finish.

1. Direct-Tension Indicators: ASTM F959/F959M, Type 325-1, compressible-washer type with plain finish.

B. High-Strength A490 Bolts, Nuts, and Washers: ASTM F3125/F3125M, Grade A490, Type 1, heavy-hex steel structural bolts or Grade F2280 tension-control, bolt-nut-washer assemblies with splined ends; ASTM A563, Grade DH, heavy-hex carbon-steel nuts; and ASTM F436/F436M, Type 1, hardened carbon-steel washers; all with plain finish.

1. Direct-Tension Indicators: ASTM F959/F959M, Type 490-1, compressible-washer type with plain finish.

C. Tension-Control, High-Strength Bolt-Nut-Washer Assemblies: ASTM F3125/F3125M, Grade F1852, Type 1, heavy-hex round head assemblies, consisting of steel structural bolts with splined ends; ASTM A563, Grade DH, heavy-hex carbon-steel nuts; and ASTM F436/F436M, Type 1, hardened carbon-steel washers.

1. Finish: Plain

2.4 RODS

A. Unheaded Anchor Rods: ASTM F1554, Grade 36.

1. Configuration: Straight.
2. Nuts: ASTM A563 heavy-hex carbon steel.
3. Plate Washers: ASTM A36/A36M carbon steel.
4. Washers: ASTM F436, Type 1, hardened carbon steel.
5. Finish: Plain.

B. Headed Anchor Rods: ASTM F1554, Grade 55 , straight.

1. Nuts: ASTM A563 heavy-hex carbon steel.
2. Plate Washers: ASTM A36/A36M carbon steel.
3. Washers: ASTM F436, Type 1, hardened carbon steel.
4. Finish: Plain.

2.5 PRIMER

A. Steel Primer:

1. Fabricator's standard lead- and chromate-free, nonasphaltic, rust-inhibiting primer complying with MPI#79 and compatible with topcoat.

2.6 SHRINKAGE-RESISTANT GROUT

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

2.7 FABRICATION

A. Structural Steel: Fabricate and assemble in shop to greatest extent possible. Fabricate in accordance with ANSI/AISC 303 and to ANSI/AISC 360.

1. Camber structural-steel members where indicated.
2. Fabricate beams with rolling camber up.
3. Identify high-strength structural steel in accordance with ASTM A6/A6M and maintain markings until structural-steel framing has been erected.
4. Mark and match-mark materials for field assembly.
5. Complete structural-steel assemblies, including welding of units, before starting shop-priming operations.

B. Thermal Cutting: Perform thermal cutting by machine to greatest extent possible.

1. Plane thermally cut edges to be welded to comply with requirements in AWS D1.1/D1.1M.

C. Bolt Holes: Cut, drill, or punch standard bolt holes perpendicular to metal surfaces.

D. Finishing: Accurately finish ends of columns and other members transmitting bearing loads.

E. Cleaning: Clean and prepare steel surfaces that are to remain unpainted in accordance with SSPC-SP 3.

F. Holes: Provide holes required for securing other work to structural steel and for other work to pass through steel members.

1. Cut, drill, or punch holes perpendicular to steel surfaces. Do not thermally cut bolt holes or enlarge holes by burning.
2. Baseplate Holes: Cut, drill, mechanically thermal cut, or punch holes perpendicular to steel surfaces.
3. Weld threaded nuts to framing and other specialty items indicated to receive other work.

2.8 SHOP CONNECTIONS

A. Weld Connections: Comply with AWS D1.1/D1.1M and AWS D1.8/D1.8M for tolerances, appearances, welding procedure specifications, weld quality, and methods used in correcting welding work.

1. Assemble and weld built-up sections by methods that maintain true alignment of axes without exceeding tolerances in ANSI/AISC 303 for mill material.

2.9 SHOP PRIMING

A. Shop prime steel surfaces, except the following:

1. Surfaces embedded in concrete or mortar. Extend priming of partially embedded members to a depth of 2 inches.
2. Surfaces to be field welded.
3. Surfaces of high-strength bolted, slip-critical connections.
4. Surfaces to receive sprayed fire-resistive materials (applied fireproofing).
5. Galvanized surfaces unless indicated to be painted.
6. Corrosion-resisting (weathering) steel surfaces.
7. Surfaces enclosed in interior construction.

B. Surface Preparation of Steel: Clean surfaces to be painted. Remove loose rust and mill scale and spatter, slag, or flux deposits. Prepare surfaces in accordance with the following specifications and standards:

1. SSPC-SP 2.
2. SSPC-SP 3.

C. Priming: Immediately after surface preparation, apply primer in accordance with manufacturer's written instructions and at rate recommended by SSPC to provide a minimum dry film thickness of 1.5 mils. Use priming methods that result in full coverage of joints, corners, edges, and exposed surfaces.

1. Stripe paint corners, crevices, bolts, welds, and sharp edges.
2. Apply two coats of shop paint to surfaces that are inaccessible after assembly or erection. Change color of second coat to distinguish it from first.

2.10 SOURCE QUALITY CONTROL

A. Testing Agency: Engage a qualified testing agency to perform shop tests and inspections.

1. Allow testing agency access to places where structural-steel work is being fabricated or produced to perform tests and inspections.
2. Bolted Connections: Inspect shop-bolted connections in accordance with RCSC's "Specification for Structural Joints Using High-Strength Bolts."
3. Welded Connections: Visually inspect shop-welded connections in accordance with AWS D1.1/D1.1M and the following inspection procedures, at testing agency's option:
    a. Liquid Penetrant Inspection: ASTM E165/E165M.
    b. Magnetic Particle Inspection: ASTM E709; performed on root pass and on finished weld. Cracks or zones of incomplete fusion or penetration are not accepted.
    c. Ultrasonic Inspection: ASTM E164.
    d. Radiographic Inspection: ASTM E94/E94M.
4. Prepare test and inspection reports.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify, with certified steel erector present, elevations of concrete- and masonry-bearing surfaces and locations of anchor rods, bearing plates, and other embedments for compliance with requirements.

1. Prepare a certified survey of existing conditions. Include bearing surfaces, anchor rods, bearing plates, and other embedments showing dimensions, locations, angles, and elevations.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

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

1. Do not remove temporary shoring supporting composite deck construction and structural-steel framing until cast-in-place concrete has attained its design compressive strength.

3.3 ERECTION

A. Set structural steel accurately in locations and to elevations indicated and in accordance with ANSI/AISC 303 and ANSI/AISC 360.

B. Baseplates, Bearing Plates, and Leveling Plates: Clean concrete- and masonry-bearing surfaces of bond-reducing materials, and roughen surfaces prior to setting plates. Clean bottom surface of plates.

1. Set plates for structural members on wedges, shims, or setting nuts as required.
2. Weld plate washers to top of baseplate.
3. Snug-tighten anchor rods after supported members have been positioned and plumbed. Do not remove wedges or shims but, if protruding, cut off flush with edge of plate before packing with grout.
4. Promptly pack shrinkage-resistant grout solidly between bearing surfaces and plates, so no voids remain. Neatly finish exposed surfaces; protect grout and allow to cure. Comply with manufacturer's written installation instructions for grouting.

C. Maintain erection tolerances of structural steel within ANSI/AISC 303.

D. Align and adjust various members that form part of complete frame or structure before permanently fastening. Before assembly, clean bearing surfaces and other surfaces that are in permanent contact with members. Perform necessary adjustments to compensate for discrepancies in elevations and alignment.

1. Level and plumb individual members of structure. Slope roof framing members to slopes indicated on Drawings.
2. Make allowances for difference between temperature at time of erection and mean temperature when structure is completed and in service.

E. Splice members only where indicated.

F. Do not use thermal cutting during erection.

G. Do not enlarge unfair holes in members by burning or using drift pins. Ream holes that must be enlarged to admit bolts.

3.4 FIELD CONNECTIONS

A. High-Strength Bolts: Install high-strength bolts in accordance with RCSC's "Specification for Structural Joints Using High-Strength Bolts" for bolt and joint type specified.

1. Joint Type: Snug tightened.

B. Weld Connections: Comply with AWS D1.1/D1.1M and AWS D1.8/D1.8M for tolerances, appearances, welding procedure specifications, weld quality, and methods used in correcting welding work.

1. Comply with ANSI/AISC 303 and ANSI/AISC 360 for bearing, alignment, adequacy of temporary connections, and removal of paint on surfaces adjacent to field welds.
2. Remove backing bars or runoff tabs [where indicated], back gouge, and grind steel smooth.
3. Assemble and weld built-up sections by methods that maintain true alignment of axes without exceeding tolerances in ANSI/AISC 303 for mill material.

3.5 REPAIR

A. Touchup Painting:

1. Immediately after erection, clean exposed areas where primer is damaged or missing, and paint with the same material as used for shop painting to comply with SSPC-PA 1 for touching up shop-painted surfaces.
    a. Clean and prepare surfaces by SSPC-SP 2 hand-tool cleaning or SSPC-SP 3 power-tool cleaning.

3.6 FIELD QUALITY CONTROL

A. Special Inspections: Engage a special inspector to perform the following special inspections:

1. Verify structural-steel materials and inspect steel frame joint details.
2. Verify weld materials and inspect welds.
3. Verify connection materials and inspect high-strength bolted connections.

B. Testing Agency: Engage a qualified testing agency to perform tests and inspections.

1. Bolted Connections: Inspect and test bolted connections in accordance with RCSC's "Specification for Structural Joints Using High-Strength Bolts."
2. Welded Connections: Visually inspect field welds in accordance with AWS D1.1/D1.1M.
    a. In addition to visual inspection, test and inspect field welds in accordance with AWS D1.1/D1.1M and the following inspection procedures, at testing agency's option:
        1) Liquid Penetrant Inspection: ASTM E165/E165M.
        2) Magnetic Particle Inspection: ASTM E709; performed on root pass and on finished weld. Cracks or zones of incomplete fusion or penetration are not accepted.
        3) Ultrasonic Inspection: ASTM E164.
        4) Radiographic Inspection: ASTM E94/E94M.

END OF SECTION

SECTION 05 3100
STEEL DECKING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Noncomposite form deck.

B. Related Requirements:

1. Section 03 3000 - Cast-in-Place Concrete: for normal-weight and lightweight structural concrete fill over steel deck.
2. Section 13 3419 – Metal Building Systems.

1.2 ACTION SUBMITTALS

A. Submit under provisions of Section 01 3000 - Administrative Requirements - Administrative Requirements.

B. Product Data: Submit manufacturer’s specifications, section properties, load tables, diaphragm shear tables, dimensions, finishes, and noise reduction coefficients (for acoustic only).

1. Noncomposite form deck.

C. Shop Drawings:

1. Include layout and types of deck panels, anchorage details, reinforcing channels, pans, cut deck openings, special jointing, accessories, and attachments to other construction.

1.3 INFORMATIONAL SUBMITTALS

A. Welding certificates.

1.4 QUALITY ASSURANCE

A. Manufacturer Qualifications: Member in good standing of Steel Deck Institute (SDI).

B. Welding Qualifications: Qualify procedures and personnel in accordance with SDI QA/QC and the following welding codes:

1. AWS D1.1/D1.1M.
2. AWS D1.3/D1.3M.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Protect steel deck from corrosion, deformation, and other damage during delivery, storage, and handling.

B. Store products in accordance with SDI MOC3. Stack steel deck on platforms or pallets and slope to provide drainage. Protect with a waterproof covering and ventilate to avoid condensation.

1. Protect and ventilate acoustical cellular roof deck with factory-installed insulation to maintain insulation free of moisture.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. AISI Specifications: Comply with calculated structural characteristics of steel deck in accordance with AISI S100.

B. Fire-Resistance Ratings: Comply with ASTM E119; 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 listings of another qualified testing agency.

C. Deck provided shall meet the minimum design gage and yield strength specified on the drawings, or meet minimum specified section properties at specified yield strength.

D. Deck shall be multi-span whenever possible and as indicated on the drawings.

1. Floor and form decks shall not require shoring during the concrete placement procedure.

2.2 MANUFACTURERS

A. Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. New Millennium Building Systems, LLC.

2. Vulcraft; Nucor Corporation, Verco Group.

B. Requests for substitutions will be considered in accordance with provisions of Section 01 6000 "Product Requirements."

2.3 MATERIALS AND FINISH

A. Sheet steel for uncoated or phosphatized top/painted bottom deck shall conform to ASTM A 1008 / A 1008M with a minimum yield strength of 50 ksi unless otherwise noted, or other structural sheet steels or high strength low alloy steels in accordance with AISI S100, Section A2.

1. Primer-painted finish on both the top and bottom sides, in the Manufacturer's standard color.

B. Sheet steel for galvanized deck shall conform to ASTM A 653/A 653M Structural Steel, with a minimum yield strength of 50 ksi unless otherwise noted, or other galvanized structural sheet steels or high strength low alloy steels in accordance with AISI S100, Section A2.

1. Galvanized coating shall comply with ASTM A 653/A 653M with G60 zinc coating.

2.4 NONCOMPOSITE FORM DECK

A. Fabrication of Noncomposite Form Deck: Fabricate ribbed-steel sheet noncomposite deck panels used as a form to comply with SDI NC, with the minimum section properties indicated, and with the following:

1. Profile Depth: 1-1/2 inches.

2. Design Uncoated-Steel Thickness: 0.0358 inch.

3. Side Laps: Overlapped or interlocking seam at Contractor's option.

2.5 ACCESSORIES

A. Provide manufacturer's standard accessory materials for deck that comply with requirements indicated.

B. Mechanical Fasteners: Corrosion-resistant, low-velocity, power-actuated or pneumatically driven carbon-steel fasteners; or self-drilling, self-threading screws.

C. Side-Lap Fasteners: Corrosion-resistant, hexagonal washer head; self-drilling, carbon-steel screws, No. 10 minimum diameter.

D. Flexible Closure Strips: Vulcanized, closed-cell, synthetic rubber.

E. Sheet steel for accessories shall conform to ASTM A 653/A 653M, Structural Steel for structural accessories, ASTM A 653/A 653M Commercial Steel for non-structural accessories, or ASTM A 1008 / A 1008M for either structural or non-structural accessories. Other structural sheet steels or high strength low alloy steels shall be permitted in accordance with AISI S100, Section A2.

F. Miscellaneous Sheet Metal Deck Accessories: Steel sheet, minimum yield strength of 33,000 psi, not less than 0.0359-inch design uncoated thickness, of same material and finish as deck; of profile indicated or required for application.

G. Pour Stops and Girder Fillers: Steel sheet, minimum yield strength of 33,000 psi, of same material and finish as deck, and of thickness and profile recommended by SDI standards for overhang and slab depth.

H. Column Closures, End Closures, Z-Closures, and Cover Plates: Steel sheet, of same material, finish, and thickness as deck unless otherwise indicated.

I. Piercing Hanger Tabs: Piercing steel sheet hanger attachment devices for use with floor deck.

J. Flat Sump Plates: Single-piece steel sheet, 0.0747 inch thick, of same material and finish as deck. For drains, cut holes in the field.

K. Recessed Sump Pans: Single-piece steel sheet, 0.0747 inch thick, of same material and finish as deck, with 3-inch- wide flanges and sloped recessed pans of 1-1/2-inch minimum depth. For drains, cut holes in the field.

L. Galvanizing Repair Paint: ASTM A780/A780M.

M. Repair Paint: Manufacturer's standard rust-inhibitive primer of same color as primer.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine supporting frame and field conditions for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION, GENERAL

A. Install deck panels and accessories in accordance with SDI C, SDI NC, and SDI RD, as applicable; manufacturer's written instructions; and requirements in this Section.

B. Install temporary shoring before placing deck panels if required to meet deflection limitations.

C. Locate deck bundles to prevent overloading of supporting members.

D. Place deck panels on supporting frame and adjust to final position with ends accurately aligned and bearing on supporting frame before being permanently fastened. Do not stretch or contract side-lap interlocks.

E. Place deck panels flat and square and fasten to supporting frame without warp or deflection.

F. Cut and neatly fit deck panels and accessories around openings and other work projecting through or adjacent to deck.

G. Provide additional reinforcement and closure pieces at openings as required for strength, continuity of deck, and support of other work.

H. Comply with AWS requirements and procedures for manual shielded metal arc welding, appearance and quality of welds, and methods used for correcting welding work.

I. Mechanical fasteners may be used in lieu of welding to fasten deck. Locate mechanical fasteners and install in accordance with deck manufacturer's written instructions.

3.3 INSTALLATION OF FLOOR DECK

A. Fasten floor-deck panels to steel supporting members by arc spot (puddle) welds of the surface diameter indicated and as follows:

1. Weld Diameter: 5/8 inch, nominal, unless noted otherwise.
2. Weld Spacing:
    a. Space and locate welds as indicated.

B. Side-Lap and Perimeter Edge Fastening: Fasten side laps and perimeter edges of panels between supports, at intervals not exceeding the lesser of one-half of the span or 36 inches, and as follows:

1. Mechanically fasten with self-drilling, No. 10 diameter or larger, carbon-steel screws.
2. Mechanically clinch or button punch at 12 inches on center.
3. Unless noted otherwise on the drawings.

C. End Bearing: Install deck ends over supporting frame with a minimum end bearing of 2 inches for deck profiles 2 inches or less and 2-1/2 inches for 3 inch deck profiles, with end joints as follows:

1. End Joints: Butted.

D. Pour Stops and Girder Fillers: Weld steel sheet pour stops and girder fillers to supporting structure in accordance with SDI recommendations unless otherwise indicated.

E. Floor-Deck Closures: Weld steel sheet column closures, cell closures, and Z-closures to deck in accordance with SDI recommendations, to provide tight-fitting closures at open ends of ribs and sides of deck.

F. Install piercing hanger tabs at 14 inches apart in both directions, within 9 inches of walls at ends, and not more than 12 inches from walls at sides unless otherwise indicated.

3.4 REPAIR

A. Galvanizing Repairs: Prepare and repair damaged galvanized coatings on both surfaces of deck with galvanized repair paint in accordance with ASTM A780/A780M and manufacturer's written instructions.

3.5 FIELD QUALITY CONTROL

A. Testing Agency: Engage a qualified testing agency to perform tests and inspections.

B. Tests and Inspections:

1. Special inspections and qualification of welding special inspectors for cold-formed steel floor and roof deck in accordance with quality-assurance inspection requirements of SDI QA/QC.
    a. Field welds and other deck fasteners will be subject to inspection.
2. Steel decking will be considered defective if it does not pass tests and inspections.
3. Shear Stud Connectors: In addition to visual inspection, test and inspect field-welded shear connectors in accordance with requirements in AWS D1.1/D1.1M for stud welding and as follows:
    a. Perform bend tests if visual inspections reveal either a less-than-continuous 360-degree flash or welding repairs to any shear connector.
    b. Conduct tests in accordance with requirements in AWS D1.1/D1.1M on additional shear connectors if weld fracture occurs on shear connectors that are already tested.

C. Prepare test and inspection reports.

END OF SECTION

SECTION 05 4000
COLD-FORMED METAL FRAMING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Exterior non-load-bearing wall framing.
2. Interior non-load-bearing wall framing.
3. Ceiling joist framing.
4. Soffit framing.

B. Related Requirements:

1. Section 05 5000 "Metal Fabrications" for miscellaneous steel shapes, masonry shelf angles, and connections used with cold-formed metal framing.
2. Section 09 2116 "Gypsum Board Assemblies" for standard, interior non-load-bearing, metal-stud framing, with height limitations and ceiling-suspension assemblies.

1.2 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1.3 ACTION SUBMITTALS

A. Product Data: For the following:

1. Cold-formed steel framing materials.
2. Exterior non-load-bearing wall framing.
3. Interior non-load-bearing wall framing.
4. Vertical deflection clips.
5. Single deflection track.
6. Ceiling joist framing.
7. Soffit framing.
8. Post-installed anchors.
9. Power-actuated anchors.
10. Sill sealer gasket.

B. Shop Drawings:

1. Include layout, spacings, sizes, thicknesses, and types of cold-formed steel framing; fabrication; and fastening and anchorage details, including mechanical fasteners.
2. Indicate reinforcing channels, opening framing, supplemental framing, strapping, bracing, bridging, splices, accessories, connection details, and attachment to adjoining work.

C. Delegated Design Submittal: For cold-formed steel framing indicated to comply with design loads, include structural analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

1.4 INFORMATIONAL SUBMITTALS

A. Welding certificates.

B. Product Certificates: For each type of code-compliance certification for studs and tracks.

C. Product Test Reports: For each listed product, for tests performed by manufacturer and witnessed by a qualified testing agency.

1. Steel sheet.
2. Expansion anchors.
3. Power-actuated anchors.
4. Mechanical fasteners.
5. Vertical deflection clips.
6. Horizontal drift deflection clips
7. Miscellaneous structural clips and accessories.

D. Research Reports:

1. For nonstandard cold-formed steel framing , from ICC-ES or other qualified testing agency acceptable to authorities having jurisdiction.
2. For sill sealer gasket/termite barrier, showing compliance with ICC-ES AC380.

1.5 QUALITY ASSURANCE

A. Engineering Responsibility: Preparation of Shop Drawings, design calculations, and other structural data by a qualified professional engineer.

B. 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 cold-formed metal framing that are similar to those indicated for this Project in material, design, and extent.

C. Testing Agency Qualifications: Qualified according to ASTM E329 for testing indicated.

D. Code-Compliance Certification of Studs and Tracks: Provide documentation that framing members are certified according to the product-certification program of the Steel Stud Manufacturers Association.

E. Welding Qualifications: Qualify procedures and personnel according to the following:

1. AWS D1.1/D1.1M, "Structural Welding Code - Steel."
2. AWS D1.3/D1.3M, "Structural Welding Code - Sheet Steel."

1.6 DELIVERY, STORAGE, AND HANDLING

A. Protect and store cold-formed steel framing from corrosion, moisture staining, deformation, and other damage during delivery, storage, and handling as required in AISI S202.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

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

1. ClarkDietrich.
2. Custom Stud.
3. MarinoWARE.
4. SCAFCO Steel Stud Company.
5. Steel Construction Systems.

6. The Steel Network, Inc.
7. United Metal Products, Inc.

2.2 PERFORMANCE REQUIREMENTS

A. Delegated Design: Engage a qualified professional engineer, as defined in Section 01 4000 "Quality Requirements," to design cold-formed steel framing.

B. Structural Performance: Provide cold-formed steel framing capable of withstanding design loads within limits and under conditions indicated.

1. Design Loads: As indicated on Drawings.
2. Deflection Limits: Design framing systems to withstand design loads without deflections greater than the following:
   a. Exterior Non-Load-Bearing Framing: Horizontal deflection of 1/240 of the wall height. Horizontal deflection of l/600 at areas of brick finish.
   b. Interior Non-Load-Bearing Framing: Horizontal deflection of 1/240 of the wall height under a horizontal load of 5 lbf/sq. ft.. Horizontal deflection of l/600 at areas of brick finish.
   c. Ceiling and Soffit Joist Framing: Vertical deflection of 1/240 of the span for live loads and 1/180 for total loads of the span.
3. Design framing systems to provide for movement of framing members located outside the insulated building envelope without damage or overstressing, sheathing failure, connection failure, undue strain on fasteners and anchors, or other detrimental effects when subject to a maximum ambient temperature change of 120 deg F.
4. Design framing system to maintain clearances at openings, to allow for construction tolerances, and to accommodate live load deflection of primary building structure as follows:
   a. Upward and downward movement of 2 inch.
5. Design exterior non-load-bearing wall framing to accommodate horizontal deflection without regard for contribution of sheathing materials.

C. Cold-Formed Steel Framing Standards: Unless more stringent requirements are indicated, framing complies with AISI S100 and AISI S240.

D. Fire-Resistance Ratings: Comply with ASTM E119; 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 acceptable to authorities having jurisdiction.

2.3 COLD-FORMED STEEL FRAMING MATERIALS

A. Framing Members, General: Comply with AISI S200 and ASTM C955, Section 8 for conditions indicated.

B. Steel Sheet: ASTM A1003/A1003M, Structural Grade, Type H, metallic coated, of grade and coating designation as follows:

1. Grade: As required by structural performance.
2. Coating: G60, A60, AZ50, or GF30.

C. Steel Sheet for Clips: ASTM A653/A653M, structural steel, zinc coated, of grade and coating as follows:

1. Grade: As required by structural performance.

2. Coating: G60.

2.4 EXTERIOR NON-LOAD-BEARING WALL FRAMING

A. Steel Studs: Manufacturer's standard C-shaped steel studs, of web depths indicated, punched, with stiffened flanges, and as follows:

1. Minimum Base-Metal Thickness: 0.0428 inch.
2. Flange Width: 1-5/8 inches, minimum.
3. Section Properties: As required by design.

B. Steel Track: Manufacturer's standard U-shaped steel track, of web depths indicated, unpunched, with unstiffened flanges, and as follows:

1. Minimum Base-Metal Thickness: Matching steel studs.
2. Flange Width: 1-1/4 inches

C. Vertical Deflection Clips, Exterior: Manufacturer's standard bypass head clips, capable of accommodating upward and downward vertical displacement of primary structure through positive mechanical attachment to stud web.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
   a. ClarkDietrich.
   b. SCAFCO Steel Stud Company.
   c. Simpson Strong-Tie Co., Inc.
   d. Steeler, Inc.

2.5 INTERIOR NON-LOAD-BEARING WALL FRAMING

A. Steel Studs: Manufacturer's standard C-shaped steel studs, of web depths indicated, punched, with stiffened flanges, and as follows:

1. Section Properties: As required by design.

B. Steel Track: Manufacturer's standard U-shaped steel track, of web depths indicated, unpunched, with unstiffened flanges, and as follows:

1. Flange Width: 1-1/4 inches.

C. Vertical Deflection Clips, Interior: Manufacturer's standard clips, capable of accommodating upward and downward vertical displacement of primary structure through positive mechanical attachment to stud web.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
   a. ClarkDietrich.
   b. SCAFCO Steel Stud Company.
   c. Simpson Strong-Tie Co., Inc.

D. Single Deflection Track: Manufacturer's single, deep-leg, U-shaped steel track; unpunched, with unstiffened flanges, of web depth to contain studs while allowing free vertical movement, with flanges designed to support horizontal loads and transfer them to the primary structure, and as follows:

1. Minimum Base-Metal Thickness: 0.0428 inch.

2.6 CEILING JOIST FRAMING

A. Steel Ceiling Joists: Manufacturer's standard C-shaped steel sections, of web depths indicated, punched with standard holes, with stiffened flanges, and as follows:

1. Minimum Base-Metal Thickness: 0.0329 inch

2.7 SOFFIT FRAMING

A. Interior Soffit Frame: Manufacturer's standard C-shaped steel sections, of web depths indicated, with stiffened flanges, and as follows:

1. Minimum Base-Metal Thickness: 0.0329 inch

B. Exterior Soffit Frame: Manufacturer's standard C-shaped steel sections, of web depths indicated, with stiffened flanges, and as follows:

1. Minimum Base-Metal Thickness: 0.0329 inch

2.8 FRAMING ACCESSORIES

A. Fabricate steel-framing accessories from ASTM A1003/A1003M, Structural Grade, Type H, metallic coated steel sheet, of same grade and coating designation used for framing members.

B. Provide accessories of manufacturer's standard thickness and configuration, unless otherwise indicated, as follows:

1. Supplementary framing.
2. Bracing, bridging, and solid blocking.
3. Web stiffeners.
4. Anchor clips.
5. End clips.
6. Foundation clips.
7. Gusset plates.
8. Stud kickers and knee braces.
9. Joist hangers and end closures.
10. Hole-reinforcing plates.
11. Backer plates.

2.9 ANCHORS, CLIPS, AND FASTENERS

A. Steel Shapes and Clips: ASTM A36/A36M, zinc coated by hot-dip process according to ASTM A123/A123M.

B. Anchor Bolts: ASTM F1554, Grade 36 Grade 55, threaded carbon-steel hex-headed bolts, headless, hooked bolts, headless bolts, with encased end threaded, carbon-steel nuts, and flat, hardened-steel washers; zinc coated by hot-dip process according to ASTM A153/A153M, Class C mechanically deposition according to ASTM B695, Class 50.

C. Post-Installed Anchors: Fastener systems with bolts of same basic metal as fastened metal, if visible, unless otherwise indicated; with working capacity greater than or equal to the design load, according to an evaluation report acceptable to authorities having jurisdiction, based on as appropriate for the substrate.

1. Uses: Securing cold-formed steel framing to structure.

D. Power-Actuated Anchors: Fastener systems with working capacity greater than or equal to the design load, according to an evaluation report acceptable to authorities having jurisdiction, based on ICC-ES AC70.

E. Mechanical Fasteners: ASTM C1513, corrosion-resistant-coated, self-drilling, self-tapping, steel drill screws.

1. Head Type: Low-profile head beneath sheathing; manufacturer's standard elsewhere.

F. Welding Electrodes: Comply with AWS standards.

2.10 MISCELLANEOUS MATERIALS

A. Galvanizing Repair Paint: ASTM A780/A780M MIL-P-21035B SSPC-Paint 20.

B. Nonmetallic, Nonshrink Grout: Factory-packaged, nonmetallic, noncorrosive, nonstaining grout, complying with ASTM C1107/C1107M, and with a fluid consistency and 30-minute working time.

C. Shims: Load-bearing, high-density, multimonomer, nonleaching plastic; or cold-formed steel of same grade and metallic coating as framing members supported by shims.

D. Sill Sealer Gasket: Closed-cell neoprene foam, 1/4 inch thick, selected from manufacturer's standard widths to match width of bottom track or rim track members as required.

2.11 FABRICATION

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

1. Fabricate framing assemblies using jigs or templates.

2. Cut framing members by sawing or shearing; do not torch cut.

3. Fasten cold-formed steel framing members by welding, screw fastening, clinch fastening, pneumatic pin fastening, or riveting as standard with fabricator. Wire tying of framing members is not permitted.

a. Comply with AWS D1.3/D1.3M requirements and procedures for welding, appearance and quality of welds, and methods used in correcting welding work.

b. Locate mechanical fasteners and install according to Shop Drawings, with screws penetrating joined members by no fewer than three exposed screw threads.

4. Fasten other materials to cold-formed steel framing by welding, bolting, pneumatic pin fastening, or screw fastening, according to Shop Drawings.

B. Reinforce, stiffen, and brace framing assemblies to withstand handling, delivery, and erection stresses. Lift fabricated assemblies by means that prevent damage or permanent distortion.

C. Tolerances: Fabricate assemblies level, plumb, and true to line to a maximum allowable variation of 1/8 inch in 10 feet and as follows:

1. Spacing: Space individual framing members no more than plus or minus 1/8 inch from plan location. Cumulative error are not to exceed minimum fastening requirements of sheathing or other finishing materials.

2. Squareness: Fabricate each cold-formed steel framing assembly to a maximum out-of-square tolerance of 1/8 inch.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, conditions, and abutting structural framing for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Before sprayed fire-resistive materials are applied, attach continuous angles, supplementary framing, or tracks to structural members indicated to receive sprayed fire-resistive materials.

B. After applying sprayed fire-resistive materials, remove only as much of these materials as needed to complete installation of cold-formed framing without reducing thickness of fire-resistive materials below that required to obtain fire-resistance ratings indicated. Protect remaining fire-resistive materials from damage.

C. Install load-bearing shims or grout between the underside of load-bearing wall bottom track and the top of foundation wall or slab at locations with a gap larger than 1/4 inch to ensure a uniform bearing surface on supporting concrete or masonry construction.

D. Install sill sealer gasket at the underside of wall bottom track or rim track and at the top of foundation wall or slab at stud or joist locations.

3.3 INSTALLATION, GENERAL

A. Cold-formed steel framing may be shop or field fabricated for installation, or it may be field assembled.

B. Install cold-formed steel framing according to AISI S200, AISI S202, and manufacturer's written instructions unless more stringent requirements are indicated.

C. Install shop- or field-fabricated, cold-formed framing and securely anchor to supporting structure.

1. Screw, bolt, or weld wall panels at horizontal and vertical junctures to produce flush, even, true-to-line joints with maximum variation in plane and true position between fabricated panels not exceeding 1/16 inch.

D. Install cold-formed steel framing and accessories plumb, square, and true to line, and with connections securely fastened.

1. Cut framing members by sawing or shearing; do not torch cut.
2. Fasten cold-formed steel framing members by welding, screw fastening, clinch fastening, or riveting. Wire tying of framing members is not permitted.
    a. Comply with AWS D1.3/D1.3M requirements and procedures for welding, appearance and quality of welds, and methods used in correcting welding work.
    b. Locate mechanical fasteners, install according to Shop Drawings, and comply with requirements for spacing, edge distances, and screw penetration.

E. Install framing members in one-piece lengths unless splice connections are indicated for track or tension members.

F. Install temporary bracing and supports to secure framing and support loads equal to those for which structure was designed. Maintain braces and supports in place, undisturbed, until entire integrated supporting structure has been completed and permanent connections to framing are secured.

G. Do not bridge building expansion joints with cold-formed steel framing. Independently frame both sides of joints.

H. Install insulation, specified in Section 07 2100 "Thermal Insulation," in framing-assembly members, such as headers, sills, boxed joists, and multiple studs at openings, that are inaccessible on completion of framing work.

I. Fasten hole-reinforcing plate over web penetrations that exceed size of manufacturer's approved or standard punched openings.

3.4 INSTALLATION OF EXTERIOR NON-LOAD-BEARING WALL FRAMING

A. Install continuous tracks sized to match studs. Align tracks accurately and securely anchor to supporting structure.

B. Fasten both flanges of studs to top and bottom track unless otherwise indicated. Space studs as follows:

1. Stud Spacing: As required by design, 16 inches maximum.

C. Set studs plumb, except as needed for diagonal bracing or required for nonplumb walls or warped surfaces and similar requirements.

D. Isolate non-load-bearing steel framing from building structure to prevent transfer of vertical loads while providing lateral support.

1. Install single deep-leg deflection tracks and anchor to building structure.
2. Connect vertical deflection clips to bypassing studs and anchor to building structure.
3. Connect drift clips to cold-formed steel framing and anchor to building structure.

E. Install horizontal bridging in wall studs, spaced vertically in rows indicated on Shop Drawings but not more than 48 inches apart. Fasten at each stud intersection.

1. Channel Bridging: Cold-rolled steel channel, welded or mechanically fastened to webs of punched studs.
2. Strap Bridging: Combination of flat, taut, steel sheet straps of width and thickness indicated and stud-track solid blocking of width and thickness to match studs. Fasten flat straps to stud flanges and secure solid blocking to stud webs or flanges.
3. Bar Bridging: Proprietary bridging bars installed according to manufacturer's written instructions.

F. Top Bridging for Single Deflection Track: Install row of horizontal bridging within 12 inches of single deflection track. Install a combination of bridging and stud or stud-track solid blocking of width and thickness matching studs, secured to stud webs or flanges.

1. Install solid blocking at centers indicated on Shop Drawings.

G. Install miscellaneous framing and connections, including stud kickers, web stiffeners, clip angles, continuous angles, anchors, and fasteners, to provide a complete and stable wall-framing system.

3.5 INSTALLATION OF INTERIOR NONLOADBEARING WALL FRAMING

A. Install continuous tracks sized to match studs. Align tracks accurately and securely anchor to supporting structure.

B. Fasten both flanges of studs to[top and] bottom track unless otherwise indicated. Space studs as follows:

1. Stud Spacing: As required by design, 24 inches maximum.

C. Set studs plumb, except as needed for diagonal bracing or required for nonplumb walls or warped surfaces and similar requirements.

D. Isolate non-load-bearing steel framing from building structure to prevent transfer of vertical loads while providing lateral support.

1. Install single deep-leg deflection tracks and anchor to building structure.
2. Connect vertical deflection clips to studs and anchor to building structure.
3. Connect drift clips to cold-formed steel metal framing and anchor to building structure.

E. Install horizontal bridging in wall studs, spaced vertically in rows indicated on Shop Drawings but not more than 48 inches apart. Fasten at each stud intersection.

1. Channel Bridging: Cold-rolled steel channel, welded or mechanically fastened to webs of punched studs.
2. Strap Bridging: Combination of flat, taut, steel sheet straps of width and thickness indicated and stud-track solid blocking of width and thickness to match studs. Fasten flat straps to stud flanges and secure solid blocking to stud webs or flanges.
3. Bar Bridging: Proprietary bridging bars installed according to manufacturer's written instructions.

F. Top Bridging for Single Deflection Track: Install row of horizontal bridging within 12 inches of single deflection track. Install a combination of bridging and stud or stud-track solid blocking of width and thickness matching studs, secured to stud webs or flanges.

1. Install solid blocking at centers indicated on Shop Drawings.

G. Install miscellaneous framing and connections, including stud kickers, web stiffeners, clip angles, continuous angles, anchors, and fasteners, to provide a complete and stable wall-framing system.

3.6 INSTALLATION TOLERANCES

A. Install cold-formed steel framing level, plumb, and true to line to a maximum allowable tolerance variation of 1/8 inch in 10 feet and as follows:

1. Space individual framing members no more than plus or minus 1/8 inch from plan location. Cumulative error are not to exceed minimum fastening requirements of sheathing or other finishing materials.

3.7 REPAIR

A. Galvanizing Repairs: Prepare and repair damaged galvanized coatings on fabricated and installed cold-formed steel framing with galvanized repair paint according to ASTM A780/A780M and manufacturer's written instructions.

3.8 FIELD QUALITY CONTROL

A. Testing: Engage a qualified independent testing and inspecting agency to perform field tests and inspections and prepare test reports.

B. Field and shop welds will be subject to testing and inspecting.

C. Testing agency will report test results promptly and in writing to Contractor and Architect.

D. Cold-formed steel framing will be considered defective if it does not pass tests and inspections.

E. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.

3.9 PROTECTION

A. Provide final protection and maintain conditions, in a manner acceptable to manufacturer and Installer, that ensure that cold-formed steel framing is without damage or deterioration at time of Substantial Completion.

END OF SECTION

SECTION 05 5000
METAL FABRICATIONS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Shop fabricated steel and stainless steel items, including:
   1. Bollards.
   2. Support for ceiling-hung MEP items
   3. Support for overhead door components
   4. Overhead door jamb plates

B. Miscellaneous angles, channels, tubes, plates, brackets and fasteners, as required to complete the project, including but not limited to:
   1. Shelf angles
   2. Jamb angles and plates
   3. Loose angle lintels
   4. Edger for depressed slabs.

C. Slotted Channel Adjustable Framing System

D. Anchor bolts, steel pipe sleeves, slotted-channel inserts, and wedge-type inserts indicated to be cast into concrete or built into unit masonry.

1.02 RELATED REQUIREMENTS

A. Section 03 3000 - Cast-in-Place Concrete: Placement of metal fabrications in concrete.

B. Section 03 4100 - Precast Structural Concrete: Placement of metal fabrication in precast structural concrete.

C. Section 04 2000 - Unit Masonry: Placement of metal fabrications in masonry.

D. Section 05 1200 - Structural Steel Framing: Structural steel column anchor bolts.

E. Section 05 2100 - Steel Joist Framing: Structural joist bearing plates, including anchorage.

F. Section 05 3100 - Steel Decking: Bearing plates for metal deck bearing, including anchorage.

G. Section 05 5100 - Metal Stairs.

H. Section 06 1000 - Rough Carpentry: concealed blocking or substrate for items specified in this section.

I. Section 09 9123 - Interior Painting: Paint finish.

J. Section 09 9600 - High-Performance Coatings: finish indicated as "HPC"

1.03 REFERENCE STANDARDS

A. ASTM A36/A36M - Standard Specification for Carbon Structural Steel.

B. ASTM A53/A53M - Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless.

C. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.

D. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware.

E. ASTM A283/A283M - Standard Specification for Low and Intermediate Tensile Strength Carbon Steel Plates.

F. ASTM A307 - Standard Specification for Carbon Steel Bolts, Studs, and Threaded Rod 60 000 PSI Tensile Strength.

G. ASTM A500/A500M - Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes.

H. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.

I. ASTM A1011/A1011M - Standard Specification for Steel, Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, and Ultra-High Strength.

J. AWS A2.4 - Standard Symbols for Welding, Brazing, and Nondestructive Examination.

K. AWS D1.1/D1.1M - Structural Welding Code - Steel.

L. SSPC-Paint 15 - Steel Joist Shop Primer/Metal Building Primer.

M. SSPC-Paint 20 - Zinc-Rich Coating (Type I - Inorganic, and Type II - Organic).

N. SSPC-SP 2 - Hand Tool Cleaning.

1.04 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Shop Drawings: provide for fabricated items listed in 1.01A above.
1. Indicate profiles, sizes, connection attachments, reinforcing, anchorage, size and type of fasteners, and accessories. Include erection drawings, elevations, and details where applicable.
2. Indicate welded connections using standard AWS A2.4 welding symbols. Indicate net weld lengths.
3. Where installing items to existing precast concrete, concrete or masonry, propose connections not detailed for structural engineer approval.

1.05 QUALITY ASSURANCE

A. Design members and connections under direct supervision of a Professional Structural Engineer experienced in design of this Work and licensed in the State in which the Project is located.

B. Fabricate steel items in accordance with AISC "Steel Construction Manual."

PART 2 PRODUCTS

2.01 MATERIALS - STEEL

A. Recycled Content: Provide steel products with a recycled content of not less than 25 percent.

B. Steel Sections: ASTM A36/A36M.

C. Steel Tubing: ASTM A500/A500M Grade B cold-formed structural tubing.

D. Plates: ASTM A283/A283M.

E. Pipe: ASTM A53/A53M, Grade B Schedule 40, black finish.

F. Slotted Channel Framing: ASTM A653/A653M, Grade 33.

G. Slotted Channel Fittings: ASTM A1011/A1011M.

H. Bolts, Nuts, and Washers: ASTM A307, galvanized to ASTM A153/A153M where connecting galvanized components.

I. Welding Materials: AWS D1.1/D1.1M; type required for materials being welded.

J. Shop and Touch-Up Primer: SSPC-Paint 15, complying with VOC limitations of authorities having jurisdiction.

K. Touch-Up Primer for Galvanized Surfaces: SSPC-Paint 20, Type I - Inorganic, complying with VOC limitations of authorities having jurisdiction.

L. Anchoring Devices:
1. Anchor Rods: Anchor rods used with structural steel members shall be plain steel rods conforming to ASTM F1554 (Grade 36), complete with suitable nuts and washers, unless noted otherwise.
2. Expansion Bolts: Expansion anchors shall consist of one-piece wedge type carbon steel anchor bolts with heavy-duty nuts and washers. All components shall be zinc plated in accordance with ASTM B633.
a. Structural Applications
1) Acceptable products must have a valid and current ICC report, as listed at www.icc-es.org <http://www.icc-es.org>.

b. Non-Structural Applications
   1) Acceptable Manufacturers and products: Hilti Fastening Systems- Kwik Bolt III Anchor; ITW Red Head Mechanical Anchoring Systems - Trubolt Wedge Anchor; Powers Fastening Inc - Power-Stud Anchor; (or approved equivalent)

3. Epoxy Adhesive Anchoring System: Epoxy anchoring shall consist of a threaded rod and the epoxy adhesive cartridge.
   a. Structural Applications
      1) Acceptable products must have a valid and current ICC report, as listed at www.icc-es.org <http://www.icc-es.org>.
   b. Non-Structural Applications
   c. Acceptable Manufacturers and products: Hilti Fastening System - HIT RE 500; ITW Red Head Adhesive Anchoring Systems - Epcon C6 Adhesive; Powers Fastening Inc. - PE1000+; (or approved equivalent.

M. Grout: Non-shrink, non-metallic aggregate type, complying with ASTM C 1107/C 1107M and capable of developing a minimum compressive strength of 5,000 psi at 28 days.

2.02 FABRICATION

A. General: Provide steel framing and supports not specified in other Sections as needed to complete the work.

B. Fabricate units from steel shapes, plates, bars of welded construction unless otherwise indicated. Fabricate to sizes, shapes and profiles indicated and as necessary to receive adjacent construction.

C. Fit and shop assemble items in largest practical sections, for delivery to site.

D. Fabricate items with joints tightly fitted and secured.

E. Continuously seal joined members by continuous welds, where welding is indicated.

F. 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.

G. Exposed Mechanical Fastenings: Flush countersunk screws or bolts; unobtrusively located; consistent with design of component, except where specifically noted otherwise.

H. Furnish components required for anchorage of fabrications. Fabricate anchors and related components of same material and finish as fabrication, except where specifically noted otherwise.

I. Welded Joints: Cope components at connections to provide close fit, or use fittings designed for this purpose. Weld all around at connections, including at fittings. Weld corners and seams continuously where visible or where exposed to moisture, even if intermittent or stitch welds are structurally adequate, and to comply with the following:
   1. Exterior Components: Continuously seal joined pieces by continuous welds. Drill condensate drainage holes at bottom of members at locations that will not encourage water intrusion.
   2. Interior Components: Continuously seal joined pieces by continuous welds.
   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.

2.03 FABRICATED ITEMS

A. Bollards: Steel pipe, Schedule 80, 0.432-inch wall thickness, concrete filled, crowned steel plate cap.
   1. Size: diameter and hieght above grade/pavement as indicated on Drawings.
   2. Finish: Zinc-rich primer for field finish.
   3. Bollard Sleeve/Cover: Provide manufacturer's thermoplastic 1/8 inch (3 mm) thick HDPE cover with UV inhibitors.
      a. Size: coordinate sleeve diameter and height prior to production of bollard.
      b. Sleeve Configuration: domed cap, smooth finish.
      c. Color: yellow with white horizontal reflective stripes
      d. Manufacturers:
         1) Beacon Industries
         2) Global Industries; www.globalindustries.com

3) IdealShield; www.idealshield.com
4) Innoplast ; www.innoplast.com
5) Reliance Foundry; www.reliance-foundry.com
6) ULine; www.uline.com
7) Substitutions: See Section 01 60 00 - Product Requirements.

B. Ledge Angles, Shelf Angles, Channels, and Plates Not Attached to Structural Framing: For support of metal decking and other non-structural members; prime paint finish.
1. Items used at the exterior to be galvanized.

C. Lintels: As detailed or as scheduled in Structural Notes; prime paint for field finish.
1. Size loose lintels to provide bearing length at each side of opening to be 1/12 its length, but not less 8 inches, unless noted otherwise.
2. Fabricate loose steel lintels from steel angles and shapes of size indicated for openings and recesses in masonry walls at locations indicated. Fabricate in single lengths for each opening unless otherwise indicated. Weld adjoining members together to form a single unit where indicated.

D. Door Frames for Overhead Door Openings: Steel plate and angle sections; thickness and depths as detailed; galvanized finish for High Performance Coating finish.

E. Support Framing for Overhead Door Operator: angles, unistrut or as recommended by manufacturer.

F. Support for Ceiling-hung MEP items: As detailed, prime paint finish. If not detailed, use slotted channel adjustable framing system

G. Slotted Channel Framing: Fabricate channels and fittings from structural steel complying with the referenced standards; factory-applied, rust-inhibiting thermoset acrylic enamel finish.
1. Product: System of channel members and bolted connections fabricated to support loads without welded connections.
2. Fittings and accessories shall be fabricated from hot rolled, pickled and oiled steel plates meeting the requirements of ASTM A 575.
3. Nuts and screws shall be Unified and American coarse screw thread meeting the requirements of ASTM A 576 GR1015 (nut), and ASTM A 307 and SAE J429 GR2 (screw).
4. Nuts and screws shall be electro-galvanized (EG) coated to commercial standards meeting the requirements of ASTM B 633 Type III SC1 finish.
5. Finish: Adjustable framing shall be pre-finished with Unistrut's Perma-Green II; B-Line's Dura Green; or equal. All miscellaneous accessories, brackets, and fittings shall match framing.
6. Manufacturer: Unistrut Corporation Unistrut; B-Line Systems, Inc. Powerstruct; or equal.

2.04 FINISHES - STEEL

A. Prime paint steel items.
1. Exceptions: Galvanize items to be embedded in concrete, items to be imbedded in masonry, and concealed exterior items.
2. Exceptions: Do not prime surfaces in direct contact with concrete, where field welding is required, and items to be covered with sprayed fireproofing.

B. Prepare surfaces to be primed in accordance with SSPC-SP2.

C. Clean surfaces of rust, scale, grease, and foreign matter prior to finishing.

D. Prime Painting: One coat.

E. Galvanizing of Structural Steel Members: Galvanize after fabrication to ASTM A123/A123M requirements. Provide minimum 1.7 oz/sq ft galvanized coating.

F. Galvanizing of Non-structural Items: Galvanize after fabrication to ASTM A123/A123M requirements.

2.05 FABRICATION TOLERANCES

A. Squareness: 1/8 inch maximum difference in diagonal measurements.

B. Maximum Offset Between Faces: 1/16 inch.

C. Maximum Misalignment of Adjacent Members: 1/16 inch.

D. Maximum Bow: 1/8 inch in 48 inches.

E. Maximum Deviation From Plane: 1/16 inch in 48 inches.

PART 3 EXECUTION

3.01 EXAMINATION

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

B. Examine substrates and site area for conditions that might prevent satisfactory installation.

C. Verify that dimensions of supporting structure are within plus/minus 1/8 inch of dimensions shown on shop drawings.

D. Verify that all adjacent painting, roofing, masonry work, and other work that might damage prefinished items has been completed prior to installation.

3.02 PREPARATION

A. Clean and strip primed steel items to bare metal where site welding is required.

B. Furnish setting templates to the appropriate entities for steel items required to be cast into concrete or embedded in masonry.

C. Remove all mill scale, rust, grease, foreign matter and surface imperfections from steel components that will be painted to ensure a smooth, even appearance of finish.

3.03 INSTALLATION

A. Install premanufactured items in accordance with manufacturer's installation instructions.

B. Install items plumb and level, accurately fitted, free from distortion or defects.

C. Provide for erection loads, and for sufficient temporary bracing to maintain true alignment until completion of erection and installation of permanent attachments.

D. Anchor units to structure as indicated on the drawings.

E. Field weld components as indicated on shop drawings.
   1. Perform field welding in accordance with AWS D1.1/D1.1M.

F. Obtain approval prior to site cutting or making adjustments not scheduled.

G. After erection, prime welds, abrasions, and surfaces not shop primed or galvanized, except surfaces to be in contact with concrete.

H. Fastening to In-Place Construction: Provide anchorage devices and fasteners where metal fabrications are required to be fastened to in-place construction. Provide threaded fasteners for use with concrete and masonry inserts, toggle bolts, through bolts, lag bolts, wood screws, and other connectors. Grout voids as required to result in secure installation.

I. Touch-up damaged finish coating using material provided by manufacturer to match original coating.

3.04 TOLERANCES

A. Maximum Variation From Plumb: 1/4 inch per story or 10 feet, non-cumulative.

B. Maximum Offset From True Alignment: 1/4 inch in 10 feet.

C. Maximum Out-of-Position: 1/4 inch in 48 inches.

3.05 CLEANING

A. Clean exterior surfaces of dust and debris; follow manufacturer's cleaning instructions for the finish used.

3.06 PROTECTION

A. Protect items after installation to prevent damage due to other work until Date of Substantial Completion

END OF SECTION

SECTION 05 5100
METAL STAIRS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Stairs with concrete treads.

B. Structural steel stair framing and supports.

1.02 RELATED REQUIREMENTS

A. Section 03 3000 - Cast-in-Place Concrete: Concrete fill in stair pans and landings; mesh reinforcement for landings.

B. Section 03 3000 - Cast-in-Place Concrete: Placement of metal anchors or hardware in concrete.

C. Section 04 2000 - Unit Masonry: Placement of metal fabrications in masonry.

D. Section 05 1200 - Structural Steel Framing; Learning Stair framing and support items.

E. Section 05 5000 - Metal Fabrications - miscellaneous anchorage items.

F. Section 09 9123 - Interior Painting: Paint finish.

1.03 REFERENCE STANDARDS

A. AISC 207 - Standard for Certification Programs.

B. ASTM A6/A6M - Standard Specification for General Requirements for Rolled Structural Steel Bars, Plates, Shapes, and Sheet Piling.

C. ASTM A36/A36M - Standard Specification for Carbon Structural Steel.

D. ASTM A53/A53M - Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless.

E. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware.

F. ASTM A283/A283M - Standard Specification for Low and Intermediate Tensile Strength Carbon Steel Plates.

G. ASTM A500/A500M - Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes.

H. ASTM A501/A501M - Standard Specification for Hot-Formed Welded and Seamless Carbon Steel Structural Tubing.

I. ASTM A1008/A1008M - Standard Specification for Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, Required Hardness, Solution Hardened, and Bake Hardenable.

J. ASTM A1011/A1011M - Standard Specification for Steel, Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, and Ultra-High Strength.

K. ASTM F3125/F3125M - Standard Specification for High Strength Structural Bolts and Assemblies, Steel and Alloy Steel, Heat Treated, Inch Dimensions 120 ksi, 144 ksi, and 150 ksi Minimum Tensile Strength, and Metric Dimensions 830 MPa and 1040 MPa Minimum Tensile Strength.

L. AWS A2.4 - Standard Symbols for Welding, Brazing, and Nondestructive Examination.

M. AWS D1.1/D1.1M - Structural Welding Code - Steel.

N. SSPC-Paint 15 - Steel Joist Shop Primer/Metal Building Primer.

O. SSPC-SP 2 - Hand Tool Cleaning.

1.04 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide product data for handrail brackets.

C. Shop Drawings: Indicate profiles, sizes, connection attachments, reinforcing, anchorage, size and type of fasteners, and accessories.
   1. Indicate welded connections using standard AWS A2.4 welding symbols. Indicate net weld lengths.
   2. Include the design engineer's stamp or seal on each sheet of shop drawings for stair and guardrail components.

D. Design Data: As required by authorities having jurisdiction.

1.05 QUALITY ASSURANCE

A. Structural Designer Qualifications: Professional Structural Engineer experienced in design of this work and licensed in the State in which the Project is located, or personnel under direct supervision of such an engineer.

B. Welder Qualifications: Welding processes and welding operators qualified in accordance with AWS D1.1/D1.1M and dated no more than 12 months before start of scheduled welding work.

C. Fabricator Qualifications:
   1. A qualified steel fabricator that is certified by the American Institute for Steel Construction (AISC) under AISC 207.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Custom Metal Stair Fabricators:
   1. any fabricator meeting the requirements of Section 05 5000 - Metal Fabrications.

B. Prefabricated Metal Stairs:
   1. Alfab, Inc.: www.alfabinc.com.
   2. American Stair, Inc.: www.americanstair.com.
   3. FS Industries, www.fsindustries.com
   4. Lapeyre Stair, Inc: www.lapeyrestair.com/#sle.
   5. McGregor Industries
   6. Pacific Stair Corporation: www.pacificstair.com.
   7. Sharon Stairs; www.duvinage.com/sharon_stairs
   8. Substitutions: See Section 01 6000 - Product Requirements.

2.02 METAL STAIRS - GENERAL

A. Metal Stairs: Provide stairs of the design specified, complete with landing platforms, vertical and horizontal supports, railings, and guards, fabricated accurately for anchorage to each other and to building structure.
   1. Regulatory Requirements: Provide stairs and railings that comply with most stringent requirements of local, state, and federal regulations; where requirements of Contract Documents exceed those of regulations, comply with Contract Documents.
   2. Handrails: Comply with applicable accessibility requirements of ADA Standards.
   3. Structural Design: Provide complete stair and railing assemblies complying with the applicable local code.
   4. Dimensions: As indicated on drawings.
   5. Shop assemble components; disassemble into largest practical sections suitable for transport and access to site.
   6. No sharp or rough areas on exposed travel surfaces and surfaces accessible to touch.
   7. Separate dissimilar metals using paint or permanent tape.

B. Metal Jointing and Finish Quality Levels:
   1. Commercial: Exposed joints as inconspicuous as possible, whether welded or mechanical; underside of stair not covered by soffit IS considered exposed to view.
      a. Welded Joints: Intermittently welded on back side if exposed to view, filled with body putty, and sanded smooth and flush.
      b. Welds Exposed to View: Ground smooth and flush.

c. Mechanical Joints: Butted tight, flush, and hairline.
d. Bolts Exposed to View: Countersunk flat or oval head bolts; no exposed nuts.
e. Exposed Edges and Corners: Eased to small uniform radius.
f. Metal Surfaces to be Painted: Sanded or ground smooth, suitable for satin or matte finish.

C. Fasteners: Same material or compatible with materials being fastened; type consistent with design and specified quality level.

D. Anchors and Related Components: Same material and finish as item to be anchored, except where specifically indicated otherwise; provide all anchors and fasteners required.

2.03 METAL STAIRS WITH CONCRETE TREADS

A. Jointing and Finish Quality Level: Commercial, as defined above.

B. Risers: Closed.

C. Treads: Metal pan with field-installed concrete fill.
1. Concrete Depth: 2 inches, minimum.
2. Tread Pan Material: Steel sheet.
3. Tread Pan Thickness: As required by design; 14 gauge, 0.075 inch minimum.
4. Pan Anchorage to Stringers: Continuously welded, from top or bottom.
5. Concrete Reinforcement: Welded wire mesh.
6. Concrete Finish: Steel troweled.

D. Risers: Same material and thickness as tread pans.
1. Nosing Depth: Not more than 1-1/2 inch overhang.

E. Stringers: shape as detailed, if not detailed, manufacturer's standard for install conditions.
1. Stringer Depth: as required, not less than 10 inches.
2. End Closure: Sheet steel of same thickness as risers welded across ends.

F. Landings: Same construction as treads, supported and reinforced as required to achieve design load capacity.

G. Railings: Steel mesh railings, See Section 05 7300 - Decorative Metal Railings.

H. Finish: Shop- or factory-prime painted.

I. Under Side of Stair: Exposed to view, to be finished same as specified for other exposed to view surfaces.

2.04 MATERIALS

A. Recycled Content: Provide steel products with a recycled content of not less than 25 percent.

B. Steel Sections: ASTM A36/A36M.

C. Steel Tubing: ASTM A500/A500M or ASTM A501/A501M structural tubing, round and shapes as indicated.

D. Steel Plates: ASTM A6/A6M or ASTM A283/A283M.

E. Pipe: ASTM A 53/A 53M Grade B Schedule 40, black finish.

F. Ungalvanized Steel Sheet: Hot- or cold-rolled, except use cold-rolled where finished work will be exposed to view.
1. Hot-Rolled Steel Sheet: ASTM A1011/A1011M, Designation CS (commercial steel).
2. Cold-Rolled Steel Sheet: ASTM A1008/A1008M, Designation CS (commercial steel).

G. Concrete Fill: See Section 03 3000.

2.05 ACCESSORIES

A. Non-slip Abrasive Strips: Black abrasive bars set in black mastic, equal to Balco AB-1.

B. Steel Bolts, Nuts, and Washers: ASTM F3125/F3125M, Type 1, and galvanized to ASTM A153/A153M where connecting galvanized components.

C. Welding Materials: AWS D1.1/D1.1M; type required for materials being welded.

D. Shop and Touch-Up Primer: SSPC-Paint 15, and comply with VOC limitations of authorities having jurisdiction.

2.06 FABRICATION

A. Assemble railings in the shop to greatest extent possible to minimize field splicing and assembly. Disassemble units only as necessary for shipping and handling limitations. Clearly mark units for reassembly and coordinated installation. Use connections that maintain structural value of joined pieces.

B. Form changes in direction by mitering, shop-welding and grinding or by inserting prefabricated mitered elbow fittings of angles indicated.

C. Design and fabricate railings to eliminate or minimize field welding. Form field connections with concealed sleeves secured with epoxy or countersunk set screws.

D. Connections: Fabricate railings with shop-welded connections.
   1. Welded Connections: Cope components at connections to provide close fit, or use fittings designed for this purpose. Weld all around at connections, including at fittings.
   2. At exposed connections, finish exposed welds to comply with NOMMA's "Voluntary Joint Finish Standards" for Type 1 welds: no evidence of a welded joint.
   3. Form changes in direction by mitering, welding and grinding or by inserting prefabricated mitered elbow fittings of angles indicated.
   4. Close exposed ends of hollow railing members with prefabricated end fittings.

2.07 SHOP FINISHING

A. Clean surfaces of rust, scale, grease, and foreign matter prior to finishing.

B. Do not prime surfaces in direct contact with concrete or where field welding is required.

C. Prime Painting: Use specified shop- and touch-up primer.
   1. Preparation of Steel: In accordance with SSPC-SP 2 Hand Tool Cleaning.
   2. Number of Coats: One.

PART 3 EXECUTION

3.01 EXAMINATION

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

3.02 PREPARATION

A. When field welding is required, clean and strip primed steel items to bare metal.

B. Supply items required to be cast into concrete and embedded in masonry with setting templates.

3.03 INSTALLATION

A. Install components plumb and level, accurately fitted, free from distortion or defects.

B. Provide anchors, plates, angles, hangers, and struts required for connecting stairs to structure.

C. Allow for erection loads, and for sufficient temporary bracing to maintain true alignment until completion of erection and installation of permanent attachments.

D. Provide welded field joints where specifically indicated on shop drawings. Perform field welding in accordance with AWS D1.1/D1.1M.

E. Other field joints may be either welded or bolted provided the result complies with the limitations specified for jointing quality levels.

F. Obtain approval prior to site cutting or creating adjustments not scheduled.

G. After erection, prime welds, abrasions, and surfaces not shop primed or galvanized, except surfaces to be in contact with concrete.

3.04 TOLERANCES

A. Maximum Variation From Plumb: 1/4 inch per story, non-cumulative.

B. Maximum Offset From True Alignment: 1/4 inch.

END OF SECTION

SECTION 05 5133
METAL LADDERS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Shop-fabricated metal ladders.
   1. Prefabricated ladders are also acceptable.

B. Prefabricated ship ladders.

1.02 RELATED REQUIREMENTS

A. Section 05 5100 - Metal Stairs.

B. Section 05 5213 - Pipe and Tube Railings.

C. Section 09 9123 - Interior Painting: Paint finish.

1.03 REFERENCE STANDARDS

A. ANSI A14.3 - American National Standard for Ladders - Fixed - Safety Requirements.

B. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.

C. ASTM A36/A36M - Standard Specification for Carbon Structural Steel.

D. ASTM A53/A53M - Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless.

E. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware.

F. ASTM A283/A283M - Standard Specification for Low and Intermediate Tensile Strength Carbon Steel Plates.

G. ASTM A307 - Standard Specification for Carbon Steel Bolts, Studs, and Threaded Rod 60 000 PSI Tensile Strength.

H. ASTM A500/A500M - Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes.

I. AWS A2.4 - Standard Symbols for Welding, Brazing, and Nondestructive Examination.

J. AWS D1.1/D1.1M - Structural Welding Code - Steel.

K. SSPC-Paint 15 - Steel Joist Shop Primer/Metal Building Primer.

L. SSPC-SP 2 - Hand Tool Cleaning.

1.04 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide manufacturer's data sheets on each ladder safety system product to be used, including installation instructions.

C. Shop Drawings:
   1. Indicate profiles, sizes, connection attachments, reinforcing, anchorage, size and type of fasteners, and accessories. Include erection drawings, elevations, and details where applicable.
   2. Indicate welded connections using standard AWS A2.4 welding symbols. Indicate net weld lengths.

PART 2 PRODUCTS

2.01 MATERIALS - STEEL

A. Steel Sections: ASTM A36/A36M.

B. Steel Tubing: ASTM A500/A500M Grade B cold-formed structural tubing.

C. Plates: ASTM A283/A283M.

D. Pipe: ASTM A53/A53M, Grade B Schedule 40, black finish.

E. Mechanical Fasteners: Same material or compatible with materials being fastened; type consistent with design and specified quality level.

F. Bolts, Nuts, and Washers: ASTM A307, galvanized to ASTM A153/A153M where connecting galvanized components.

G. Welding Materials: AWS D1.1/D1.1M; type required for materials being welded.

H. Shop and Touch-Up Primer: SSPC-Paint 15, complying with VOC limitations of authorities having jurisdiction.

2.02 FABRICATION

A. Fit and shop assemble items in largest practical sections, for delivery to site.

B. Fabricate items with joints tightly fitted and secured.

C. Continuously seal joined members by continuous welds.

D. Grind exposed joints flush and smooth with adjacent finish surface. Make exposed joints butt tight, flush, and hairline. Ease exposed edges to small uniform radius.

E. Supply components required for anchorage of fabrications. Fabricate anchors and related components of same material and finish as fabrication, except where specifically noted otherwise.

2.03 FABRICATED LADDERS

A. Ladders: metal and configuration as follows; in compliance with ANSI A14.3 and OSHA; with mounting brackets and attachments; specified finish.

B. Configuration: fixed wall ladders

C. Material:
   1. Interior: steel, primed for field painting.

D. Mounting:
   1. Off-floor mount fixing bracket, heavy duty wall fixing bracket for ladders mounted to the wall only.

E. Construction: see Drawings for ladder construction.
   1. Capacity: 330 lbs.

F. Ladder Fabrication:
   1. Weld (steel) or airline rivet (aluminum) all components.
      a. 1/4 inch by 3/4 inch stainless steel bolt with nut and lock washer used to fasten bracket to ladder rail.
      b. #12 by 1-1/2 inch H.H. stainless steel self-tapping screws used to fasten aluminum serrated rungs to aluminum ladder rail as shown in drawings.
   2. Furnish ladder with mounting brackets, one every four feet minimum.
   3. Install top of the top rung, level with top of access/egress level or landing platform, served by the ladder stepping-off surface. Extend side rails 42-inches above top landing.
   4. Bottom rung height 12 inches maximum from roof surface.

2.04 PREFABRICATED LADDERS

A. Contractor's option to provide prefabrication ladders in lieu of custom fabricating them.

B. Prefabricated Ladder: Welded metal unit complying with ANSI A14.3; factory fabricated to greatest degree practical and in the largest components possible.
   1. Components: Manufacturer's standard rails, rungs, treads, handrails. returns, platforms and safety devices complying with the requirements of the MATERIALS article of this section.
   2. Fixed ladders more than 20' in height shall be provided with ladder safety devices.
   3. Materials: Carbon steel; ASTM A1011/A1011M Grade 36, minimum.
   4. Finish: Powder coat; color to be selected by Architect from manufacturer's standard range.
   5. Finish: Manufacturer's standard hot-dipped galvanizing; comply with ASTM A153/A153M.
   6. Manufacturers:
      a. ACL Industries; www.acl-industries.com

b. Alaco Ladder Company; www.alaco.com
c. Cotterman; www.cotterman.com
d. FixFast USA (aluminum): www.fixfastusa.com
e. FS Industries; www.fsindustries.com
f. Industrial Ladder & Scaffolding, Inc.: www.anyladder.com/#sle.
g. O'Keeffe's Inc: www.okeeffes.com/#sle.
h. Precision Ladders, LLC; www.precisionladders.com
i. Royalite Manufacturing, Inc; www.royalite-mfg.com
j. Substitutions: See Section 01 6000 - Product Requirements.

C. Prefabricated Ship Ladder: Welded metal unit complying with ANSI A14.3; factory fabricated to greatest degree practical and in the largest components possible.
1. Components: Manufacturer's standard rails, rungs, treads, handrails. returns, platforms and safety devices complying with the requirements of the MATERIALS article of this section.
2. Materials: Aluminum; 6063 alloy, T52 temper.
3. Incline: 75 degrees.
4. Finish: Mill finish aluminum.

2.05 FINISHES - STEEL

A. Prime paint steel items.

B. Prepare surfaces to be primed in accordance with SSPC-SP2.

C. Clean surfaces of rust, scale, grease, and foreign matter prior to finishing.

D. Prime Painting: One coat.

E. Galvanizing of Non-structural Items: Galvanize after fabrication to ASTM A123/A123M requirements.

2.06 FINISHES - ALUMINUM

A. Apply one coat of bituminous paint to concealed aluminum surfaces in contact with cementitious or dissimilar materials.

2.07 FABRICATION TOLERANCES

A. Squareness: 1/8 inch maximum difference in diagonal measurements.

B. Maximum Offset Between Faces: 1/16 inch.

C. Maximum Misalignment of Adjacent Members: 1/16 inch.

D. Maximum Bow: 1/8 inch in 48 inches.

E. Maximum Deviation From Plane: 1/16 inch in 48 inches.

PART 3 EXECUTION

3.01 EXAMINATION

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

3.02 PREPARATION

A. Clean and strip primed steel items to bare metal where site welding is required.

B. Supply setting templates to the appropriate entities for steel items required to be cast into concrete or embedded in masonry.

3.03 INSTALLATION

A. Install items plumb and level, accurately fitted, free from distortion or defects.

B. Provide for erection loads, and for sufficient temporary bracing to maintain true alignment until completion of erection and installation of permanent attachments.

C. Field weld components as indicated on shop drawings.

D. Perform field welding in accordance with AWS D1.1/D1.1M.

E. Obtain approval prior to site cutting or making adjustments not scheduled.

F. After erection, prime welds, abrasions, and surfaces not shop primed , except surfaces to be in contact with concrete.

3.04 TOLERANCES

A. Maximum Variation From Plumb: 1/4 inch per story, non-cumulative.

B. Maximum Offset From True Alignment: 1/4 inch.

C. Maximum Out-of-Position: 1/4 inch.

END OF SECTION

SECTION 05 5213
PIPE AND TUBE RAILINGS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Stadia railings and guardrails.

1.02 RELATED REQUIREMENTS

A. Section 03 3000 - Cast-in-Place Concrete: Placement of anchors in concrete.

B. Section 09 9123 - Interior Painting: Paint finish.

1.03 REFERENCE STANDARDS

A. AISC 207 - Standard for Certification Programs.

B. ASTM A53/A53M - Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless.

C. ASTM A500/A500M - Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes.

D. ASTM A780/A780M - Standard Practice for Repair of Damaged and Uncoated Areas of Hot-Dip Galvanized Coatings.

E. ASTM E935 - Standard Test Methods for Performance of Permanent Metal Railing Systems and Rails for Buildings.

F. AWS A2.4 - Standard Symbols for Welding, Brazing, and Nondestructive Examination.

G. AWS B2.1/B2.1M - Specification for Welding Procedure and Performance Qualification.

H. AWS D1.1/D1.1M - Structural Welding Code - Steel.

I. SSPC-Paint 15 - Steel Joist Shop Primer/Metal Building Primer.

1.04 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Shop Drawings: Indicate profiles, sizes, connection attachments, anchorage, size and type of fasteners, and accessories.
   1. Indicate welded connections using standard AWS A2.4 welding symbols. Indicate net weld lengths.
   2. Include the design engineer's seal and signature on each sheet of shop drawings.

C. Welders' Qualification Statement: Welders' certificates in accordance with AWS B2.1/B2.1M and dated within the previous 12 months.

1.05 QUALITY ASSURANCE

A. Structural Designer Qualifications: Professional Structural Engineer experienced in design of this work and licensed in the State in which the Project is located, or personnel under direct supervision of such an engineer.

B. Welder Qualifications: Welding processes and welding operators qualified within previous 12 months.

C. Fabricator Qualifications:
   1. A qualified steel fabricator that is certified by the American Institute for Steel Construction (AISC) under AISC 207.

PART 2 PRODUCTS

2.01 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.
   1. Top Rails and Wall Rails: 1-1/2 inches diameter, round.
   2. Intermediate Rails: 1-1/2 inches diameter, round.
   3. Posts: 1-1/2 inches diameter, round.
   4. Handrail Brackets: Manufacturer's standard steel brackets fastened to pipe (not welded).

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.
   1. For anchorage to concrete, provide inserts to be cast into concrete, for bolting anchors.

G. Provide welding fittings to join lengths, seal open ends, and conceal exposed mounting bolts and nuts, including but not limited to elbows, T-shapes, splice connectors, flanges, escutcheons, and wall brackets.

H. Welded and Brazed Joints: Make visible joints butt tight, flush, and hairline; use methods that avoid discoloration and damage of finish; grind smooth, polish, and restore to required finish.
   1. Ease exposed edges to a small uniform radius.
   2. Welded Joints:
      a. Carbon Steel: Perform welding in accordance with AWS D1.1/D1.1M.

2.02 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. Non-Weld Mechanical Fittings: Slip-on, galvanized malleable iron castings, for Schedule 40 pipe, with flush setscrews for tightening by standard hex wrench, no bolts or screw fasteners.

D. Shop and Touch-Up Primer: SSPC-Paint 15, complying with VOC limitations of authorities having jurisdiction.

2.03 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.

E. Weld connections that cannot be shop welded due to size limitations.
   1. Weld in accordance with AWS D1.1/D1.1M.
   2. Match shop welding and bolting.
   3. Clean welds, bolted connections, and abraded areas.
   4. Touch up shop primer and factory-applied finishes.

5. Repair galvanizing with galvanizing repair paint per ASTM A780/A780M.

PART 3 EXECUTION

3.01 EXAMINATION

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

3.02 PREPARATION

A. Supply items required to be cast into concrete with setting templates, for installation as work of other sections.

3.03 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Install components plumb and level, accurately fitted, free from distortion or defects, with tight joints.

C. Anchor railings securely to structure.

D. Conceal anchor bolts and screws whenever possible. Where not concealed, use flush countersunk fastenings.

3.04 TOLERANCES

A. Maximum Variation From Plumb: 1/4 inch 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 05 7300
DECORATIVE METAL RAILINGS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Railing systems.

1.02 RELATED REQUIREMENTS

A. Section 03 3000 - Cast-in-Place Concrete: Placement of anchors in concrete.

B. Section 05 5100 - Metal Stairs.

C. Section 06 2000 - Finish Carpentry: Wood components for railings and structural inserts.

D. Section 09 2116 - Gypsum Board Assemblies: Placement of backing plates and wood blocking in stud wall construction.

E. Section 09 9123 - Interior Painting: Steel finish.

1.03 REFERENCE STANDARDS

A. ADA Standards - 2010 ADA Standards for Accessible Design.

B. ASTM A36/A36M - Standard Specification for Carbon Structural Steel.

C. ASTM A53/A53M - Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless.

D. ASTM A276/A276M - Standard Specification for Stainless Steel Bars and Shapes.

E. ASTM A501/A501M - Standard Specification for Hot-Formed Welded and Seamless Carbon Steel Structural Tubing.

F. ASTM A554 - Standard Specification for Welded Stainless Steel Mechanical Tubing.

G. ASTM A666/A666M - Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar.

H. ASTM A1008/A1008M - Standard Specification for Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, Required Hardness, Solution Hardened, and Bake Hardenable.

I. ASTM A1011/A1011M - Standard Specification for Steel, Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, and Ultra-High Strength.

J. ASTM E935 - Standard Test Methods for Performance of Permanent Metal Railing Systems and Rails for Buildings.

K. ASTM F3125/F3125M - Standard Specification for High Strength Structural Bolts and Assemblies, Steel and Alloy Steel, Heat Treated, Inch Dimensions 120 ksi, 144 ksi, and 150 ksi Minimum Tensile Strength, and Metric Dimensions 830 MPa and 1040 MPa Minimum Tensile Strength.

L. AWS D1.1/D1.1M - Structural Welding Code - Steel.

M. NAAMM AMP 500-06 - Metal Finishes Manual.

N. SSPC-Paint 15 - Steel Joist Shop Primer/Metal Building Primer.

1.04 ADMINISTRATIVE REQUIREMENTS

A. Preinstallation Meeting: Convene preinstallation meeting one week before starting work of this section. Attendees include:
   1. Contractor.
   2. Manufacturer's representative or fabricator.
   3. Architect.
   4. Owner's representative.
   5. Other subcontractors of adjacent work.

1.05 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements for submittal procedures.

B. Product Data: Submit manufacturer's product data, including description of materials, components, finishes, fabrication details, glass, anchors, and accessories.

C. Shop Drawings: Indicate railing system elevations and sections, details of profile, dimensions, sizes, connection attachments, anchorage, size and type of fasteners, and accessories. Indicate anchor and joint locations, brazed connections, transitions, and terminations.

D. Samples: Submit one of each item below for each type and condition shown.
   1. Infill: 12-inch by 12 inches, with specified finish.
   2. Provide corner section of guardrail system, approximately 16-inches by 16-inches, including base assembly, infill, fittings, top rail, handrail and bracket, illustrating each type of material and finish.

E. Delegated Design Documents: Drawings and calculations sealed by Designer.
   1. Calculations: Submit calculations from a licensed structural engineer showing compliance with specified design and performance requirements for:
      a. Guardrail Assemblies.
      b. Other assemblies as indicated.

F. Executed warranty.

1.06 QUALITY ASSURANCE

A. Structural Designer Qualifications: Professional Structural Engineer experienced in design of this work and licensed in the State in which the Project is located or personnel under direct supervision of engineer.

B. Product Options: Information on Drawings and in Specifications establishes requirements for system's aesthetic effects and performance characteristics. 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 modify intended aesthetic effects, as judged solely by Architect, except with Architect's approval. If modifications are proposed, submit comprehensive explanatory data to Architect for review.

C. Field Measurements: Verify actual locations of walls and other construction contiguous with railings by field measurements before fabrication and indicate measurements on Shop Drawings

D. Coordinate installation of anchorages for railings. 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

E. Schedule installation so wall attachments are made only to completed walls. Do not support railings temporarily by any means that do not suit structural performance requirements.

1.07 DELIVERY, STORAGE, AND HANDLING

A. See Section 01 7419 - Construction Waste Management and Disposal for packaging waste requirements.

B. Deliver materials in factory-provided protective coverings and packaging.

C. Protect materials against damage during transit, delivery, storage, and installation at site.

D. Inspect materials upon delivery for damage. Replace damaged items.

E. Prior to installation, store materials and components under cover in dry location.

1.08 WARRANTY

A. Manufacturer's Warranty: Manufacturer's standard 1-year warranty against defects in materials, fabrication, finishes, and installation commencing on Date of Substantial Completion; complete forms in Owner's name and register with manufacturer.

PART 2 PRODUCTS

2.01 RAILING SYSTEMS

A. General: Factory- or shop-fabricated to suit project conditions, for proper connection to building structure, and in largest sizes practical for delivery to site.

B. Performance Requirements:
   1. Comply with ADA Standards.
   2. Structural Requirements: Design and fabricate railings and anchorages to resist loads without failure, damage, or permanent set.
      a. Handrail and Top Rails: Applying loads simultaneously not required:
         1) Distributed Load: 50 lbf/ft minimum, applied horizontally and vertically at top of handrail.
         2) Concentrated Load: 200 lbf, minimum, when applied to handrail horizontally and vertically.
      b. Infill:
         1) Concentrated Load: 50 lbf, minimum, when applied to infill horizontally and vertically.

C. Assembly: Use slip-on, nonweld mechanical fittings, flanges, escutcheons, and wall brackets to join lengths, seal open ends, and conceal exposed mounting bolts and nuts.

D. Joints: Machined smooth with hairline seams; tightly fitted and secured.

E. Field Connections: Provide sleeves to accommodate site assembly and installation.

F. Metal Railing: Engineered, post-supported railing system with metal infill.
   1. Configuration: Guardrail with separate handrail.
   2. Top Rail: 1-1/2-inch wide wood cap as detailed on drawings.
   3. Grip Rail: Round, stainless steel, 1-1/2-inch diameter.
      a. Wall returns and changes in direction: Mitered, welded and ground, with eased corners, unless otherwise indicated.
      b. Comply with ADA Standards
   4. Decorative Flanges for Embedded Posts: Circular, collared cover plate without screw holes.
   5. Wall-Mounted Components: Support railing with 1-1/2-inch clearance from wall or as noted otherwise in drawings using the following:
      a. Underslung Support Brackets: Supports at 60 inches, maximum.
      b. Wall Return without Support: Terminates 1/4 inch from side wall.
   6. Handrail Brackets: post and wall mount
   7. Fasteners: Concealed.
   8. Infill at Metal Railings: Metal mesh panels.
      a. Metal Infill Panels: Welded wire mesh; 1/8-inch diameter steel wire, 2- by 2-inches pattern and 1/8-inch thick steel sheet hem with manufacturer's standard factory-applied coating.
      b. Mounting: Welded to frame.
   9. End and Intermediate Posts: As shown on drawings.
      a. Horizontal Spacing: As indicated on drawings.
      b. Mounting: Welded.

2.02 MATERIALS

A. Stainless Steel Components: ASTM A666/A666M, Type 304.
   1. Stainless Steel Tubing: ASTM A554, Type 304, 16-gauge, 0.0625-inch minimum metal thickness, 1-1/4-inch diameter.
   2. Stainless Steel Bars, Shapes and Moldings: ASTM A276/A276M, Type 304.

B. Steel Components:
   1. Sections, Shapes, Plate and Bar: ASTM A36/A36M.
   2. Tubing: ASTM A501/A501M structural tubing, round and shapes as indicated.
   3. Pipe: ASTM A53/A53M Grade B, Schedule 40, black finish.

4. Ungalvanized Steel Sheet: Hot- or cold-rolled; use cold-rolled where finished work is exposed to view.
   a. Hot-Rolled Steel Sheet: ASTM A1011/A1011M, Designation CS (commercial steel).
   b. Cold-Rolled Steel Sheet: ASTM A1008/A1008M, Designation CS (commercial steel).
5. Bolts, Nuts, and Washers: ASTM F3125/F3125M, Type 1, plain.
6. Welding Materials: AWS D1.1/D1.1M.

2.03 FABRICATION

A. Welded and Brazed Joints: Make visible joints butt tight, flush, and hairline; use methods that avoid discoloration and damage of finish; grind smooth, polish, and restore to required finish.
   1. Ease exposed edges to small uniform radius.
   2. Welded Joints:
      a. Carbon Steel: Perform welding in accordance with AWS D1.1/D1.1M.

2.04 FINISHES

A. General: Comply with NAAMM AMP 500-06.
   1. Complete mechanical finishes before fabrication. After fabrication, finish joints, bends, abrasions, and surface blemishes to match sheet.
   2. Protect mechanical finishes on exposed surfaces from damage.
   3. Apply organic and anodic finishes to formed metal after fabrication.
   4. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of abutting or adjacent pieces are acceptable if they are within one-half of the range of approved Samples. Variations in appearance of other components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.
   5. Provide exposed fasteners with finish matching appearance, including color and texture, of railings.

B. Steel Finishes:
   1. Primer: Compatible with organic coating; shop-applied.

2.05 ACCESSORIES

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

B. Anchors and Fasteners: Provide anchors, fasteners, and other attachment devices required to attach to structure, made of same materials as railing components unless otherwise indicated; where exposed fasteners are unavoidable provide flush countersunk fasteners.
   1. Exposed Fasteners: Flush countersunk screws or bolts; consistent with design of railing; provide only where exposed fasteners are unavoidable.
   2. Anchorage to Concrete: Provide inserts cast into concrete for bolt anchors. See Section 03 3000.
   3. Anchorage to Stud Walls: Provide backing plates or wood blocking for bolt anchors. See Section 09 2116.

C. Bituminous Coating: Cold-applied asphalt mastic, noncorrosive compound free of asbestos, sulfur, and other deleterious impurities; 0.015-inch dry film thickness per coat.

D. Shop and Touch-Up Primer: SSPC-Paint 15; comply with VOC limitations of authorities having jurisdiction.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that substrate and site conditions are acceptable and ready to receive work.

B. Verify field dimensions of locations and areas to receive work.

C. Notify Architect immediately of conditions that would prevent satisfactory installation.

D. Do not proceed with work until detrimental conditions are corrected.

E. Furnish components to be installed in other work to installer of that other work, including but not limited to blocking, sleeves, inserts, anchor bolts, embedded plates, and supports for attachment of anchors.

3.02 PREPARATION

A. Protection of In-Place Conditions: Protect existing work before proceeding with installation.

B. Review installation drawings before beginning installation. Coordinate diagrams, templates, instructions, and directions for installation of anchorages and fasteners.

C. Clean surfaces to receive railings. Remove materials and substances detrimental to installation.

3.03 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Install components plumb and level, accurately fitted, free from distortion or defects, and with tight joints, except where necessary for expansion.

C. Anchor securely to structure.

D. Conceal anchor bolts and screws whenever possible. Where not concealed, use flush countersunk fastenings.

E. Weld connections that cannot be shop welded due to size limitations.
   1. Weld in accordance with AWS D1.1/D1.1M.
   2. Match shop welding and bolting.
   3. Clean welds, bolted connections, and abraded areas.
   4. Touch up shop primer and factory-applied finishes.

F. Isolate dissimilar materials with bituminous coating, bushings, grommets, or washers to prevent electrolytic corrosion.

3.04 TOLERANCES

A. Maximum Variation From Plumb: 1/4 inch per floor level, noncumulative.

B. Maximum Offset From True Alignment: 1/4 inch.

C. Maximum Out-of-Position: 1/4 inch.

3.05 CLEANING

A. See Section 01 7000 - Execution and Closeout Requirements for additional requirements.

B. Remove protective film from exposed metal surfaces.

C. Metal: Clean exposed metal finishes with potable water and mild detergent in accordance with manufacturer recommendations; do not use abrasive materials or chemicals, detergents, or other substances that may damage material or finish.

3.06 PROTECTION

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

B. Repair damage to exposed, making finishes indistinguishable from undamaged areas.

C. Replace finishes and components that have irreparable damage. Ensure damaged areas are indistinguishable from undamaged finishes and surfaces.

END OF SECTION

SECTION 06 1000
ROUGH CARPENTRY

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Preservative treated wood materials.

B. Fire retardant treated wood materials.

C. Communications and electrical room mounting boards.

D. Concealed wood blocking, nailers, and supports.

1.02 RELATED REQUIREMENTS

A. Section 05 5000 - Metal Fabrications: concealed steel support items.

B. Section 06 1600 - Sheathing 06 16 00 - Sheathing.

C. Section 09 9123 - Interior Painting: Field-applied intumescent finish over exposed communications and electrical room mounting boards.

1.03 REFERENCE STANDARDS

A. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials.

B. AWPA U1 - Use Category System: User Specification for Treated Wood.

C. PS 1 - Structural Plywood.

D. PS 20 - American Softwood Lumber Standard.

1.04 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements for submittal procedures.

B. Product Data: Provide technical data on construction panel materials.

1. Include data for fire-retardant treatment from chemical treatment manufacturer and certification by treating plant that treated materials comply with requirements. Include physical properties of treated materials, both before and after exposure to elevated temperatures when tested according to ASTM D5516.
2. Include data for wood preservative treatment from chemical treatment manufacturer and certification by treating plant that treated materials comply with requirements. Indicate type of preservative used, net amount of preservative retained, and chemical treatment manufacturer's written instructions for handling, storing, installing, and finishing treated material.

C. Manufacturer's Certificate: Certify that wood products supplied for rough carpentry meet or exceed specified requirements.

1.05 QUALITY ASSURANCE

A. Lumber: Comply with PS 20 and approved grading rules and inspection agencies.

B. Fire-Retardant Treated Wood: Mark each piece of wood with producer's stamp indicating compliance with specified requirements.

C. Preservative-Treated Wood: Provide lumber and plywood marked or stamped by an ALSC-accredited testing agency, certifying level and type of treatment in accordance with AWPA standards.

1.06 DELIVERY, STORAGE, AND HANDLING

A. General: Cover wood products to protect against moisture. Support stacked products to prevent deformation and to allow air circulation.

B. Fire Retardant Treated Wood: Prevent exposure to precipitation during shipping, storage, and installation.

PART 2 PRODUCTS

2.01 GENERAL REQUIREMENTS

A. Dimension Lumber: Comply with PS 20 and requirements of specified grading agencies.
   1. Species: Douglas Fir-Larch, unless otherwise indicated.
   2. If no species is specified, provide species graded by the agency specified; if no grading agency is specified, provide lumber graded by grading agency meeting the specified requirements.
   3. Grading Agency: Grading agency whose rules are approved by the Board of Review, American Lumber Standard Committee at www.alsc.org, and who provides grading service for the species and grade specified; provide lumber stamped with grade mark unless otherwise indicated.
   4. Lumber of other species or grades is acceptable provided structural and appearance characteristics are equivalent to or better than products specified.

B. Engineered wood products containing added urea-formaldehyde are not permitted.

2.02 DIMENSION LUMBER FOR CONCEALED APPLICATIONS

A. Sizes: Nominal sizes as indicated on drawings, S4S.

B. Moisture Content: S-dry or MC19.

C. Fire-retardant treated.

D. Miscellaneous Framing, Blocking, Nailers, Grounds, and Furring:
   1. Lumber: S4S, No. 1 or Construction Grade.
   2. Boards: Standard or No. 3.

2.03 CONSTRUCTION PANELS

A. Communications and Electrical Room Mounting Boards: PS 1 A-D plywood, or medium density fiberboard; 3/4 inch thick; flame spread index of 25 or less, smoke developed index of 450 or less, when tested in accordance with ASTM E84.

B. Concealed Backing for wall-mounted items- provide backing as required for loading from one of the following:
   1. All required to be Fire-Retardant treated.
      a. Dimension Lumber: as noted above
      b. Plywood: as noted below
      c. Fire-resistance-treated blocking and bracing in width indicated or required for loading: ClarkDietrich Building Systems LLC Danback Fire-Treated Wood Backing Plate or approved equal.

C. Plywood Applications: All fire-retardant-treated; also preservative treated when part of exterior enclosure.
   1. Plywood Concealed From View But Located Within Exterior Enclosure: PS 1, C-C Plugged or better, Exterior grade.
   2. Plywood Exposed to View But Not Exposed to Weather: PS 1, A-D, or better.
   3. Other Locations: PS 1, C-D Plugged or better.

2.04 ACCESSORIES

A. Metal and Finish of Fasteners:
   1. Untreated Wood: Unfinished steel.

B. Fasteners and Anchors:
   1. Metal and Finish: Stainless steel for high humidity and preservative-treated wood locations, unfinished steel elsewhere.
   2. Anchors: as follows:
      a. Toggle bolt type for anchorage to hollow masonry.
      b. Expansion shield and lag bolt type for anchorage to solid masonry or concrete.
      c. Bolt or ballistic fastener for anchorages to steel.
   3. Wood Screws: ASME B18.6.1.
   4. Lag Bolts: ASME B18.2.1.

5. Power Driven Fasteners: Fastener systems with an evaluation report acceptable to authorities having jurisdiction, based on ACC-ES AC70.

2.05 FACTORY WOOD TREATMENT

A. Treated Lumber and Plywood: Comply with requirements of AWPA U1 - Use Category System for wood treatments determined by use categories, expected service conditions, and specific applications.
   1. Fire-Retardant Treated Wood: Mark each piece of wood with producer's stamp indicating compliance with specified requirements.
   2. Preservative-Treated Wood: Provide lumber and plywood marked or stamped by an ALSC-accredited testing agency, certifying level and type of treatment in accordance with AWPA standards.

B. Fire Retardant Treatment:
   1. Exterior Type: AWPA U1, Category UCFB, Commodity Specification H, chemically treated and pressure impregnated; capable of providing a maximum flame spread index of 25 when tested in accordance with ASTM E84, with no evidence of significant combustion when test is extended for an additional 20 minutes both before and after accelerated weathering test performed in accordance with ASTM D2898.
      a. Kiln dry wood after treatment to a maximum moisture content of 19 percent for lumber and 15 percent for plywood.
      b. Treat all exterior rough carpentry items assocated with the rated roof.
      c. Do not use treated wood in direct contact with the ground.
   2. Interior Type A: AWPA U1, Use Category UCFA, Commodity Specification H, low temperature (low hygroscopic) type, chemically treated and pressure impregnated; capable of providing a maximum flame spread index of 25 when tested in accordance with ASTM E84, with no evidence of significant combustion when test is extended for an additional 20 minutes.
      a. Kiln dry wood after treatment to a maximum moisture content of 19 percent for lumber and 15 percent for plywood.
      b. Treat rough carpentry items as indicated .
      c. Do not use treated wood in applications exposed to weather or where the wood may become wet.

C. Preservative Treatment:
   1. Preservative Pressure Treatment of Lumber Above Grade: AWPA U1, Use Category UC3B, Commodity Specification A using waterborne preservative.
      a. Kiln dry lumber after treatment to maximum moisture content of 19 percent.
      b. Treat lumber exposed to weather.
      c. Treat lumber in contact with masonry or concrete.
      d. Treat lumber less than 18 inches above grade.
      e. Treat lumber in other locations as indicated.
   2. Preservative Pressure Treatment of Plywood Above Grade: AWPA U1, Use Category UC2 and UC3B, Commodity Specification F using waterborne preservative.
      a. Kiln dry plywood after treatment to maximum moisture content of 19 percent.
      b. Treat plywood in contact with roofing, flashing, or waterproofing.
      c. Treat plywood in contact with masonry or concrete.
      d. Treat plywood less than 18 inches above grade.
      e. Treat plywood in other locations as indicated.
   3. Preservative Pressure Treatment of Lumber in Contact with Soil: AWPA U1, Use Category UC4A, Commodity Specification A using waterborne preservative to 0.4 lb/cu ft retention.
      a. Preservative for Field Application to Cut Surfaces: As recommended by manufacturer of factory treatment chemicals for brush-application in the field.
      b. Restrictions: Do not use lumber or plywood treated with chromated copper arsenate (CCA) in exposed exterior applications subject to leaching.

PART 3 EXECUTION

3.01 PREPARATION

A. Coordinate installation of rough carpentry members specified in other sections.

3.02 INSTALLATION - GENERAL

A. Select material sizes to minimize waste.

B. Reuse scrap to the greatest extent possible; clearly separate scrap for use on site as accessory components, including: shims, bracing, and blocking.

3.03 BLOCKING, NAILERS, AND SUPPORTS

A. Provide framing and blocking members as indicated or as required to support finishes, fixtures, specialty items, and trim.

B. In metal stud walls, provide continuous blocking around aluminum openings for anchorage of frames, securely attached to stud framing.

C. In walls, provide blocking attached to studs as backing and support for wall-mounted items, unless item can be securely fastened to two or more studs or other method of support is explicitly indicated.

D. Where ceiling-mounting is indicated, provide blocking and supplementary supports above ceiling, unless other method of support is explicitly indicated.

E. Provide nonstructural framing and blocking to support the following:
   1. Cabinets and shelf supports.
   2. Wall brackets.
   3. Handrails.
   4. Grab bars.
   5. Towel and bath accessories.
   6. Wall-mounted door stops.
   7. Chalkboards, tack boards and marker boards.
   8. Wall paneling and trim.
   9. Joints of rigid wall coverings that occur between studs.
   10. Other wall- or ceiling-mounted items indicated on drawings.
   11. Wall-protection items, including corner guards.
   12. Owner-provided wall-mounted equipment, whether owner-installed or contractor-installed.

F. Coordinate installation of roofing carpentry with deck construction, framing of roof openings, and roofing assembly installation.

G. Provide wood curb at each roof opening except where specifically indicated otherwise; form corners by alternating lapping side members.

3.04 INSTALLATION OF CONSTRUCTION PANELS

A. Wall Sheathing: Secure with long dimension perpendicular to wall studs, with ends over firm bearing and staggered, using screws.

B. Communications and Electrical Room Mounting Boards: Secure with screws to studs with edges over firm bearing; space fasteners at maximum 24 inches on center on all edges and into studs in field of board.
   1. At fire-rated walls, install board over wall board indicated as part of the fire-rated assembly.
   2. Where boards are indicated as full floor-to-ceiling height, install with long edge of board parallel to studs.
   3. Install adjacent boards without gaps.
   4. Height: to 8 feet aff, unless indicated otherwise or as required by panel layout.
   5. Location: IT/Telecom and Electrical rooms as indicated on drawings.

3.05 TOLERANCES

A. Framing Members: 1/4 inch from true position, maximum.

B. Variation from Plane, Other than Floors: 1/4 inch in 10 feet maximum, and 1/4 inch in 30 feet maximum.

3.06 CLEANING

A. Waste Disposal:
   1. Comply with applicable regulations.
   2. Do not burn scrap on project site.
   3. Do not burn scraps that have been pressure treated.
   4. Do not send materials treated with pentachlorophenol, CCA, or ACA to co-generation facilities or "waste-to-energy" facilities.

B. Do not leave wood, shavings, sawdust, etc. on the ground or buried in fill.

C. Prevent sawdust and wood shavings from entering the storm drainage system.

END OF SECTION

SECTION 06 1600
SHEATHING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Sheathing.

B. Accessories.

1.02 RELATED REQUIREMENTS

A. Section 07 2600 - Vapor Retarders: Vapor retarders on inside face of studs where indicated.

B. Section 07 2700 - Air Barriers: Air barrier over sheathing.

1.03 REFERENCE STANDARDS

A. ASTM C1177/C1177M - Standard Specification for Glass Mat Gypsum Substrate for Use as Sheathing.

B. ASTM D3273 - Standard Test Method for Resistance to Growth of Mold on the Surface of Interior Coatings in an Environmental Chamber.

1.04 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements for submittal procedures.

B. Product Data: Provide technical data on panel products.

1.05 QUALITY ASSURANCE

A. Fire-Retardant Treated Wood: Mark each piece of wood with producer's stamp indicating compliance with specified requirements.

B. Preservative-Treated Wood: Provide lumber and plywood marked or stamped by an ALSC-accredited testing agency, certifying level and type of treatment in accordance with AWPA standards.

1.06 DELIVERY, STORAGE, AND HANDLING

A. General: Cover wood products to protect against moisture. Support stacked products to prevent deformation and to allow air circulation.

PART 2 PRODUCTS

2.01 GENERAL REQUIREMENTS

A. Engineered wood products containing added urea-formaldehyde are not permitted.

2.02 WALL SHEATHING

A. Wall Sheathing: Glass mat faced gypsum, ASTM C1177/C1177M, 5/8 inch Type X fire resistant.
   1. Application: exterior walls where indicated as gypsum sheathing.
   2. Mold Resistance: Score of 10, when tested in accordance with ASTM D3273.
   3. Edges: Square.
   4. Manufacturers:
      a. CertainTeed Corporation; GlasRoc Brand: www.certainteed.com/#sle.
      b. Georgia-Pacific Gypsum; DensGlass Sheathing: www.gpgypsum.com/#sle.
      c. Substitutions: See Section 01 6000 - Product Requirements.

2.03 OTHER APPLICATIONS

A. Blocking: see Section 06 1000.

2.04 ACCESSORIES

A. General: Provide fasteners of size and type indicated that comply with requirements specified in this article for material and manufacture.
   1. Provide fasteners with hot-dip zinc coating complying with ASTM A 153/A 153M.

PART 3 EXECUTION

3.01 INSTALLATION - GENERAL

A. Select material sizes to minimize waste.

B. Reuse scrap to the greatest extent possible; clearly separate scrap for use on site as accessory components, including: shims, bracing, and blocking.

3.02 INSTALLATION OF CONSTRUCTION PANELS

A. Wall Sheathing: Secure with long dimension perpendicular to wall studs, with ends over firm bearing and staggered, using screws.

3.03 TOLERANCES

A. Variation from Plane, Other than Floors: 1/4 inch in 10 feet maximum, and 1/4 inch in 30 feet maximum.

3.04 CLEANING

A. Waste Disposal:
   1. Comply with applicable regulations.
   2. Do not burn scrap on project site.
   3. Do not burn scraps that have been pressure treated.
   4. Do not send materials treated with pentachlorophenol, CCA, or ACA to co-generation facilities or “waste-to-energy” facilities.

B. Do not leave wood, shavings, sawdust, etc. on the ground or buried in fill.

C. Prevent sawdust and wood shavings from entering the storm drainage system.

END OF SECTION

SECTION 06 2000
FINISH CARPENTRY

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Finish carpentry items, including:
   1. Wood components (WD-1).
   2. Wood cap and counter for stairs.

B. Shop finishing.

C. Section 06 1053 - Miscellaneous Rough Carpentry: Support framing, grounds, and concealed blocking.

1.02 REFERENCE STANDARDS

A. ANSI/AWI 0620 - Finish Carpentry/Installation.

B. AWI 100 - Submittals.

C. AWI/AWMAC/WI (AWS) - Architectural Woodwork Standards, 2nd Edition.

D. AWMAC/WI (NAAWS) - North American Architectural Woodwork Standards.

E. NHLA G-101 - Rules for the Measurement and Inspection of Hardwood and Cypress.

1.03 ADMINISTRATIVE REQUIREMENTS

A. Coordinate the work with electrical rough-in and installation of associated and adjacent components.

B. Sequence installation to ensure utility connections are achieved in an orderly and expeditious manner.

1.04 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements for submittal procedures.

B. Product Data:
   1. Provide manufacturer's product data, storage and handling instructions for factory-fabricated units.
   2. Provide instructions for attachment hardware and finish hardware.

C. Shop Drawings: Indicate materials, component profiles, fastening methods, jointing details, and accessories.
   1. Scale of Drawings: 1-1/2 inch to 1 foot, minimum.
   2. Provide information as required by AWI 100.

1.05 QUALITY ASSURANCE

A. Fabricator Qualifications: Company specializing in fabricating the products specified in this section with minimum five years of documented experience.
   1. Company that follows AWI's "Architectural Woodwork Quality Standards".

B. Perform work in accordance with ANSI/AWI Standards unless other quality is indicated for specific items.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Accept casework on site. Inspect on arrival for damage.

B. Protect from moisture, soiling, or damage during handling and installation.

C. Handle materials and products to prevent damage to edges, ends, or surfaces.

1.07 FIELD CONDITIONS

A. Coordinate sizes and locations of framing, blocking, furring, reinforcements, utilities, and other related work to ensure that finish carpentry items can be supported and installed as indicated.

B. Locate concealed framing, blocking, and reinforcements that support cabinets by field measurements before being enclosed, and indicate measurements on Shop Drawings.

C. During and after installation of finish carpentry, maintain temperature and humidity conditions in building spaces at same levels planned for occupancy.

D. Do not deliver product until the following conditions are met:
   1. Windows and doors are installed and the building is secure and weathertight.
   2. Ceiling, overhead ductwork and lights are installed.
   3. All painting is completed and floor tile is installed.

PART 2 PRODUCTS

2.01 FINISH CARPENTRY ITEMS

A. Quality Standard: Custom Grade, in accordance with ANSI/AWI 0620, unless noted otherwise.

B. Surface Burning Characteristics: Provide materials havingANSI/AWI 0620 fire and smoke properties as required by applicable code.

C. Interior Woodwork Items:
   1. Wood components (WD-1).
   2. Wood cap and counter for stairs.

2.02 LUMBER MATERIALS

A. Hardwood Lumber: Red Oak species, Quarter sawn, maximum moisture content of 6 percent ; with vertical grain , of quality suitable for transparent finish.
   1. Application: Wood components (WD-1); Wood cap and counter for stairs.
   2. Lengths: longest available for configuration shown.
   3. Finish: stained as indicated in Finish Schedule.

2.03 FASTENINGS

A. Adhesive for Purposes Other Than Laminate Installation: Suitable for the purpose; not containing formaldehyde or other volatile organic compounds.

B. Fasteners: Of size and type to suit application; any finish in concealed locations and satin stainless steel finish in exposed locations.

C. Concealed Joint Fasteners: Threaded steel.

2.04 ACCESSORIES

A. Lumber for Shimming: Softwood lumber of pine species.

B. Wood Filler: Solvent base, tinted to match surface finish color.

2.05 FABRICATION

A. Shop assemble work for delivery to site, permitting passage through building openings.

B. When necessary to cut and fit on site, provide materials with ample allowance for cutting. Provide trim for scribing and site cutting.

2.06 SHOP FINISHING

A. Sand work smooth and set exposed nails and screws.

B. Apply wood filler in exposed nail and screw indentations.

C. On items to receive transparent finishes, use wood filler that matches surrounding surfaces and is of type recommended for the applicable finish.

D. Finish work in accordance with AWI/AWMAC/WI (AWS) or AWMAC/WI (NAAWS), Section 5 - Finishing for grade specified and as follows:
   1. Transparent:
      a. Stain:
         1) Coats: Recommended 2-3 coats.
         2) Color: as indicated on Finish Schedule.
         3) Product: Bona US; Dryfast Stain or approved equal.
      b. Sealer:
         1) Coats: Recommended 1 coat.
         2) Product: Bona US; Dryfast Sealer or approved equal.
      c. Top Coat(s): One- or two-component, water-based polyurethane.

1) Sheen: Commercial Extra Matte.
2) Product: Bona US; Traffic Go: www.bona.com/#sle or approved equal.

E. Back prime woodwork items to be field finished, prior to installation.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify adequacy of backing and support framing.

B. Verify mechanical, electrical, and building items affecting work of this section are placed and ready to receive this work.

C. See Section 06 1053 - Miscellaneous Rough Carpentry 06 1000 - Rough Carpentry for installation of recessed wood blocking.

3.02 INSTALLATION

A. Install custom fabrications in accordance with ANSI/AWI 0620 requirements for grade indicated.

B. Do not begin installation until wood materials have been fully acclimated to interior conditions.

C. Set and secure materials and components in place, plumb and level.

D. Carefully scribe work abutting other components, with maximum gaps of 1/32 inch. Do not use additional overlay trim to conceal larger gaps.

E. Install components with concealed fasteners to greatest extent possible.

F. Install hardware and accessories in accordance with manufacturer's written instructions.

3.03 TOLERANCES

A. Maximum Variation from True Position: 1/16 inch.

B. Maximum Offset from True Alignment with Abutting Materials: 1/32 inch.

END OF SECTION

SECTION 06 4100
ARCHITECTURAL WOOD CASEWORK

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Wood casework with laminate cladding (PLAM-1).

B. Custom display case.

C. Cabinet and drawer hardware, including:
   1. Pulls (CP-1).

1.02 RELATED REQUIREMENTS

A. Section 06 1000 - Rough Carpentry.

B. Section 06 2000 - Finish Carpentry: Shop fabricated custom finish carpentry work.

C. Section 08 8000 - Glazing.

D. Section 09 2216 - Non-Structural Metal Framing.

E. Section 12 3600 - Countertops.

F. Division 22 - Plumbing: coordination of drop-in sinks, plumbing fixture trim and connections.

G. Division 26 - Electrical: coordination of lighting and electrical trim and connections.

1.03 ABBREVIATIONS AND ACRONYMS

A. AWI: Architectural Woodwork Institute.

B. HPDL: High-pressure decorative laminate.

C. MDF: Medium-density fiberboard.

D. MDO: Medium-density overlay.

E. TFL: Thermally-fused laminate.

1.04 REFERENCE STANDARDS

A. ANSI A208.1 - American National Standard for Particleboard.

B. ANSI A208.2 - Medium Density Fiberboard (MDF) for Interior Applications.

C. ANSI Z97.1 - American National Standard for Safety Glazing Materials Used in Buildings - Safety Performance Specifications and Methods of Test.

D. ANSI/AWI 0400 - Factory Finishing.

E. ANSI/AWI 0620 - Finish Carpentry/Installation.

F. ANSI/AWI 0641 - Architectural Wood Casework.

G. ASTM C1036 - Standard Specification for Flat Glass.

H. ASTM C1048 - Standard Specification for Heat-Strengthened and Fully Tempered Flat Glass.

I. ASTM C1172 - Standard Specification for Laminated Architectural Flat Glass.

J. AWI 300 - Materials.

K. ANSI/AWI 0620 - Finish Carpentry/Installation.

L. ANSI/AWI 0641 - Architectural Wood Casework.

M. AWI 200 - Care and Storage.

N. BHMA A156.9 - Cabinet Hardware.

1.05 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements for submittal procedures.

B. Product Data: For each type of product demonstrating hardware design, quality and finish, including but not limited to proposed pulls, hinges, shelf standards, and locksets.

C. Shop Drawings: Include dimensions, description of materials and finishes, general construction, specific modifications, component connections, anchorage methods, hardware, and installation procedures, plus the following specific requirements.
   1. Show locations of furring size, blocking, and hanging strips, including concealed blocking and reinforcement specified in other sections.
   2. Include section drawings of typical and special casework, work surfaces and accessories.
   3. Indicate locations of plumbing and electrical service field connection by others.
   4. Provide one set of shop drawings which includes all products within this section, engineered and built by a single source manufacturer, with seamless coordination amongst all products.
   5. Show locations and sizes of cutouts and holes for items installed in plastic laminate architectural cabinets.

D. Finish Verification Samples: Submit actual samples for each of the following finish product specified.
   1. High-Pressure Decorative Laminate: Two each, 3 inch by 5 inch, of colors and finishes as indicated in Drawings.
   2. Edgebanding: Two each, of colors and thickness as indicated in Drawings and Specifications.
   3. Cabinet Pull: One physical sample of each type of hardware as indicated in Drawings.

E. Certificate: Submit labels and certificates required by quality assurance and quality control programs.

F. Informational Submittals:
   1. Test Reports: Valid AWI "Performance Quality Test Report" indicating compliance with specified ANSI/AWI 0641 Structural Performance Duty Level.

1.06 QUALITY ASSURANCE

A. Fabricator/Installer Qualifications: Company specializing in fabricating products specified in this section with minimum five years of documented experience.
   1. Company with at least one project in the past 5 years with similar types of projects, produce evidence of financial stability, bonding capacity, and adequate facilities and personnel required to perform on this project.
   2. Not required, but preferred accredited participant in the specified certification program prior to the commencement of fabrication and throughout the duration of the project.
   3. Single Source Responsibility: Provide fabrication and installation from single woodworking company.

B. Quality Certification:
   1. Manufacturer's Qualifications: Employs skilled workers who custom fabricate products similar to those required for this Project and whose products have a record of successful in-service performance.
   2. Unless otherwise indicated, comply with AWI (QCP) Woodwork Quality Certification Service/Program for grades of interior architectural woodwork, construction, finishes and other requirements: www.awiqcp.org/#sle.
   3. Comply with WI (CCP) woodwork association quality certification service/program in accordance with requirements for work specified in this section: https://woodworkinstitute.com/#sle.
   4. Submit certifications upon completion of installation that verifies this work is in compliance with specified requirements.
   5. Replace, repair, or rework all work for which certification is refused.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Do not deliver cabinets until painting and similar finish operations that might damage architectural cabinets have been completed in installation areas. Store cabinets in installation areas or in areas where environmental conditions comply with requirements specified in "Field Conditions" Article.

B. Protect finished surfaces from soiling and damage during handling and installation with a protective covering.

C. Deliver products in original packaging materials bearing product identification.

D. Store products prior to installation on flat, level, clean surfaces; elevate products above floors and protect from sunlight.

E. Store products in interior rooms with completed wet work and overhead work.

F. Accept casework on site. Inspect on arrival for damage.

1.08 FIELD CONDITIONS

A. Environmental Limitations without humidity control: Do not deliver or install cabinets until building is enclosed, wet-work is complete, and HVAC system is operating and maintaining temperature and relative humidity at levels planned for building occupants during the remainder of the construction period.
   1. Manufacturer/Supplier shall advise Contractor of temperature and humidity requirements for architectural casework instal

B. Field Measurements: Where cabinets are indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication, and indicate measurements on Shop Drawings. Coordinate fabrication schedule with construction progress to avoid delaying the work.
   1. Locate concealed framing, blocking, and reinforcements that support cabinets by field measurements before being enclosed/concealed by construction and indicate measurements on Shop Drawings.

C. Establish Dimensions: Where cabinets are indicated to fit to other construction, establish dimensions for areas where cabinets are to fit. Provide allowance for trimming at site, and coordinate construction to ensure that actual dimensions correspond to established dimensions.

PART 2 PRODUCTS

2.01 ARCHITECTURAL WOOD CASEWORK

A. Casework Finish: Wood casework with laminate cladding.

B. Provide casework and casework components in dimensions, profiles, and details shown.

C. All casework panel components must go through a supplemental sizing process after cutting, producing a panel precisely finished in size and square to within 0.010 inches, ensuring strict dimensional quality and structural integrity in the final fabricated product.

2.02 PERFORMANCE REQUIREMENTS

A. Architectural Woodwork Institute (AWI) Performance Requirements:
   1. Comply with AWI 300, ANSI/AWI 0641, ANSI/AWI 0400, and ANSI/AWI 0620 as applicable for specified casework finish, aesthetic grade, and performance duty level.
      a. Aesthetic Grade: Custom.
      b. Product Performance Duty Level: Duty Level 3.

2.03 WOOD CASEWORK WITH LAMINATE CLADDING

A. Casework Construction:
   1. Frameless Cabinet and Door Interface: Flush overlay.
   2. Door and Drawer Front Profile: Flush.
   3. Tops and bottoms are glued and doweled to cabinet sides and internal cabinet components such as fixed horizontals, rails and verticals. Minimum 6 dowels each joint for 24 inch deep cabinets and a minimum of 4 dowels each joint for 12 inch deep cabinets. Mechanical or metal hardware fasteners joining cabinet top and bottom panels to the sides will not be accepted.
      a. Tops, bottoms and sides of all cabinets are particleboard core.
   4. Cabinet Backs: 1/4 inch thick medium density fiberboard panel fully captured by the cabinet top, bottom and side panels. Finish to match cabinet interior. 3/4 inch by 4 inch particleboard rails will be placed behind the back panel at the top and bottom, and doweled to the sides utilizing 10mm hardwood fluted dowels. A third intermediate rail will be included on all cabinets taller than 56 inches. Utilize hot melt glue to further secure back and increase overall strength.
      a. Exposed back on fixed or movable cabinets: 3/4 inch thick particleboard with the exterior surface finished in VGS decorative laminate as selected.
   5. Fixed base and tall units have an individual factory-applied base, constructed of 3/4 inch thick plywood. Base is 102mm (nominal 4 inch) high unless otherwise indicated on the Drawings.

6. Base Units: Full sub-top glued and doweled to cabinet sides. Mechanical or metal hardware fasteners joining cabinet sub-top panel to the sides will not be accepted.
    a. Exception: Sink base units.
7. Sink base units are provided with open top and a stretcher at the front, attached to the sides. Back to be split removable access panel.
8. Side panels and vertical dividers shall receive adjustable shelf hardware at 32mm line boring centers. Mount door hinges, drawer slides and pull-out shelves in the line boring for consistent alignment.
9. Cabinet Body Face Frame:
    a. Exposed and Semi-Exposed Edges: 1mm PVC, machine applied.
    b. Adjustable Shelves in Cabinets:
        1) Core: Particleboard.
        2) Core Thickness: 3/4 inch up to 30 inches wide, 1 inch over 30 inches wide.
        3) Edge: 1mm PVC on all edges.
    c. Interior Finish:
        1) Units with Open Interiors: Top, bottom, back, sides, horizontal and vertical members, and adjustable shelving faces with VGS decorative laminate.
        2) Units with Closed Interiors: Top, bottom, back, sides, horizontal and vertical members, and adjustable shelving faces with TFL.
    d. Exposed Ends:
        1) Faced with high-pressure VGS decorative laminate. Use of TFL on exposed ends will not be permitted.
    e. Upper Cabinet Bottom:
        1) Faced with VGS decorative laminate.
    f. Balanced construction of all laminated panels is mandatory. Unfinished core stock surfaces, even on concealed surfaces (excluding edges), are not permitted.
10. Drawers:
    a. Sides, back and sub front: Minimum 1/2 inch thick particleboard, laminated with TFL, doweled and glued into sides. Top edge banded with 1mm PVC.
    b. Drawer bottom: Minimum 1/2 inch thick particleboard laminated with TFL, screwed directly to the bottom edges of drawer box.
11. Door/Drawer Fronts:
    a. Core: 3/4 inch thick particleboard.
    b. High-pressure VGS decorative laminate exterior, balanced with high-pressure CLS. Use of TFL on exterior or interior surfaces of door/drawer fronts will not be permitted.
    c. Edges: 3mm PVC, machine applied, external edges and outside corners machine profiled to 1/8 inch radius.
    d. Provide double doors in opening in excess of 24 inches wide.
12. Patterned Face Layout for Cabinet and Door Fronts:
    a. Custom Grade: Doors, drawer fronts and false fronts wood grain to run and match vertically within each cabinet unit.
13. Adjustable Shelf : 3/4 inch thick for shelves up to 32 inches wide and 1 inch thick for shelves more than 32 inches wide.
    a. Any shelves more than 32 inches use TFL core.

B. Display Cases
1. Quality Standard: Premium Grade in accordance with AWI, unless noted otherwise.
    a. Wall-hung cabinets for exposed interior shall be uniform in thickness for the entire elevation or connected elevations except when concealed behind a face frame component.
2. Performance Requirements and Aesthetic Performance:
    a. Premium Grade in accordance with ANSI/AWI 0641.
    b. Structural Performance: Duty Level 4, in accordance with ANSI/AWI 0641.
3. Fabricate casework, countertops and related products to dimensions, profiles, and details shown. Components and their assembly shall meet structural performance and aesthetic values.

4. In the absence of specified thickness values, all components and assemblies shall meet the minimum thickness and material requirements of those tested and used to establish the structural performance values set forth within this standard. Alternative materials and assemblies are permitted provided they meet the structural performance and aesthetic values set forth within this standard.
5. Base Support Assemblies:
    a. Material shall be a minimum of 17.5 mm (0.688”) thick with a minimum finished installed height of 101.6 mm (4”).
6. Interior of display cases to be HPL over MDF substrate.
7. Casework Construction: Frameless.
    a. Horizontal reveal between countertop's bottom edge and false fronts shall be 3.2mm (0.125 inch) to 9.5mm (0.375 inch) and shall be consistent across elevations.
8. Ends and Divisions:
    a. On wall-hung cabinets, if cabinet ends or sides extend below the cabinet bottoms, the portion below the cabinet bottom is considered an exposed interior surface and shall be the same color and pattern as the exposed surface.
    b. Exposed ends shall be of integral construction or secondarily applied.
    c. When viewed from the side, exposed ends shall conceal all other structural cabinet components, except toe kicks.
    d. Horizontal components (excluding countertops) shall not extend beyond the exposed end.
    e. Secondarily applied exposed ends shall be mechanically fastened to the cabinet body.
9. Backs: Cabinet backs are required.
    a. At multiple-panel backs, visible joints shall be inconspicuous at exposed or semi-exposed interiors where panels intersect.
10. Sliding Doors: Laminated Glass.
    a. Sliding doors more than 1.5 times as tall as they are wide shall be mounted with an overhead metal track and roller hanger to prevent tipping and binding.
    b. Frameless glass sliding doors require formed or extruded tracks.
    c. Thickness of frameless glass sliding doors shall be a minimum of 6.4 mm (0.250 inches) laminated glass.
    d. Stops shall be synthetic or solid stock of compatible species to adjacent surfaces and compatible color to exposed interior surfaces.
    e. Stops shall be continuous, removable, and on the interior only.
    f. Silicone or glazing putty used as a stop is not permitted.
    g. Exposed rabbet shall be painted or stained compatible to the exposed interior surface.
    h. Glass doors shall have exposed edges flat polished.
11. Shelves: Laminated Glass.
    a. Thickness: 12mm (1/2 inch) for spans over 36 inches.
12. Standards and Brackets: Heavy-duty wall-mounted adjustable shelving.
    a. Metal shelf standards shall extend vertically to within 152.4 mm (6 inches) of the interior top and bottom of the cabinet space.
    b. Double slot design with 1-1/4 inch vertical slot adjustability.
    c. Basis of Design: Knape & Vogt - 82/182 Series.
13. Glass Door Hardware:
    a. Double roller track system, with upper channel and lower track. Designed for use with 1/4" laminated glass. Recommended overlap of glass panels 1-1/2 inch.
        1) Bottom track with built-in smooth operating nylon rollers.
        2) Basis of Design: CRL Double Roller Track System.
    b. Sliding glass door plunger lock, installed directly onto glass with plunger resting against edge of back sliding door. 1-1/4 inch hole drilled in the front sliding door to accept lock.
        1) Basis of Design: CRL Sliding Glass Door Plunger Lock.
    c. Slip-On handles for frameless glass sliding door, secured with silicone no glass fabrication is required.
        1) Basis of Design: CRL Slip-On Handle for Frameless Sliding Door.

14. Laminated Glass Lid with Aluminum Chanel Frame: Lift with Hinges and Gas Strut Support.
    a. 1/4" laminated glass lid with approximately 3.25 lbs per square foot. Total lid area of 43.08 square feet.
        1) Estimated lid weight: 180 lbs.
15. Structural Frame: Aluminum frame for laminated glass case top.
    a. Reinforce bracket junctions by using internal steel reinforcement plates inside the aluminum profile at the strut mounting brackets. Secure them via through-bolts to sandwich the aluminum wall cleanly.
16. Hinged lid along the long side, allowing shorter dimension to swing upwards.
    a. Heavy-duty stainless steel continuous piano hinge running full length.
17. Strut Calculations:
    a. Lid Width: 66 inches.
    b. Center of Gravity: 33 inches from hinge.
    c. Standard Strut Attachment Point: Approximately 16.5 inches from the hinge along the side frames (25 percent of lid width).
    d. Force Requirements: 360 lbs of total upward force at the mounting point.
    e. Recommendation: Two gas struts rated at 215 lbs of force each.
18. Mounting: Secure lower strut bracket to the fixed display base away from the hinge line, and upper strut bracket away from hinge line, fixed directly into the aluminum channel frame.

2.04 LUMBER MATERIALS

A. Wood fabricated from old growth timber is not permitted.

B. Softwood Lumber: NIST PS 20; Graded in accordance with AWI/AWMAC Architectural Woodwork Quality Standards Illustrated, Grade II/Custom; average moisture content of 5-10 percent; species as follows:
    1. Concealed Framing and Blocking: Species - fabricator's choice.

2.05 PANEL CORE MATERIALS

A. Particleboard (PTB): Typical applications, unless listed below; comply with ANSI A208.1.
    1. Grade:
        a. Meeting M-2 minimum requirements.
    2. Density Average: 45-50 lbs. per cubic foot.
    3. Panel Thickness: Varies, see fabrication.

B. Moisture Resistnat Particleboard: Interior applications where exposure to high humidity or intermittent contact with water (i.e. sink cabinets and countertops with sinks). Comply with ANSI A208.1.
    1. Grade:
        a. Meeting M-2 minimum requirements.
    2. Density Average: 45-50 lbs. per cubic foot.
    3. Panel Thickness: Varies, see fabrication.

C. Medium Density Fiberboard (MDF): Composite panel composed of cellusoic fibers, additives, and bonding system; cured under heat and pressure; comply with ANSI A208.2.
    1. Grade: 115.
    2. Panel Thickness: 3/4 inch.
    3. Moisture Resistance: MR10.

2.06 CONCEALED LAMINATE PANELS

A. Thermally Fused Laminate (TFL): Melamine-resin-saturated decorative papers; for fusion to composite wood substrates under heat and pressure. Material on interior semi-exposed casework components, unless noted otherwise.
    1. Test in accordance with NEMA LD 3 Section 3.
    2. Panel Core Substrate: Particleboard.
    3. No raw core material allowed, even if hidden from view.
    4. Color: White.

B. Cabinet Liner (CLS): Material on concealed side of door and drawer panels, 0.024 inch nominal thickness.
   1. Test in accordance with NEMA LD 3 Section 3.
   2. Panel Core Substrate: Particleboard.
   3. No raw core material allowed, even if hidden from view.
   4. Color: White.

C. High-Pressure Laminate Backer (HPL-B): Material on concealed side of horizontal surfaces, 0.048 inch nominal thickness.
   1. Test in accordance with NEMA LD 3 Section 3.
   2. Panel Core Substrate: Particleboard.
   3. No raw core material allowed, even if hidden from view.
   4. Color: White.

2.07 LAMINATE MATERIALS

A. Manufacturers:
   1. Arborite: www.arborite.com/#sle.
   2. Formica Corporation: www.formica.com/#sle.
   3. Panolam Industries International, Inc: www.panolam.com/#sle.
   4. Wilsonart LLC: www.wilsonart.com/#sle.
   5. Substitutions: See Section 01 6000 - Product Requirements.

B. High-Pressure Decorative Laminate (PLAM): NEMA LD 3, types as recommended for specific applications.

C. Provide specific types as indicated.
   1. Manufacturers: As indicated on Drawings.
   2. Product: As indicated on Drawings.
   3. Style: As indicated on Drawings.
   4. Color: As indicated on Drawings.
   5. Horizontal Surfaces (HGS): 0.048 inch nominal thickness.
   6. Vertical Surfaces (VGS): 0.028 inch nominal thickness.
      a. Material on exposed casework components, door and drawer fronts, exposed cabinet end panels.

2.08 CABINET AND DRAWER HARDWARE

A. Hinges, Self-Closing, Integrated Damper Hinges:
   1. Description: Self-closing hinges with integrated damper mechanisms.
   2. Comply with BHMA A156.9, .
   3. Features: Provide soft-closing integrated damper hinges.
   4. Opening Range: 120 degrees of opening.
      a. 90 degrees of opening at all cabinets installed adjacent to a wall.
   5. Material and Finish: Steel with nickel-plated finish.
   6. Cabinet door swing restrictor must be incorporated into the hinge mechanism.
      a. No additional component, such as chins or external limiters, may be attached to the door.
      b. Swing restrictor must provide a smooth, controlled motion to prevent door over-extension.
   7. Products:
      a. Blum, Inc: www.blum.com/#sle.
      b. Hardware Resources: www.hardwareresources.com.
      c. Substitutions: See Section 01 6000 - Product Requirements.

B. Cabinet Door Pulls:
   1. Description: Back-mounted pulls.
   2. Design: U-shape wire pulls.
   3. Center-to-Center Mounting Dimension: as indicated in Finish Schedule.
   4. Material and Finish: as indicated in Finish Schedule.

5. Products:
    a. **BASIS OF DESIGN:** Holdahl Company - Studio 917; model as indicated on Finish Schedule.
    b. Substitutions: See Section 01 6000 - Product Requirements.

C. Adjustable Shelf Support Systems, Standards and Shelf Rests:
1. Description: Slotted vertical standards with shelf rests for supporting shelves; standards mounted in evenly spaced, cleanly bored holes.
2. Load Capacity: Comply with with specified structural performance duty level.
3. Material and Finish: polished chrome or satin chrome.
4. Products:
    a. Richelieu Metal Shelf Pin (Basis of Design); www.richelieu.com/us/en.
    b. Substitutions: See Section 01 6000 - Product Requirements.

D. Display Case Shelf Supports:
1. Description: Slotted vertical standards with shelf rests with rubber cushion for supporting glass shelves; standards mounted in evenly spaced, cleanly bored holes.
2. Material and Finish: Zinc plated.
3. Product: CRL zinc plated 3/4" shelf support with rubber cushion for CRL zinc surface mounted standard.

E. Drawer Slides:
1. Description: Hardware units that suspend drawers and provide controlled drawer sliding.
2. Comply with specified performance requirements.
3. Comply with BHMA A156.9, Heavy Duty Grade 1HD-100.
4. Features: Self-closing.
5. Mounting: Side-mounted.
6. Travel: Full extension with overtravel.
7. Stops: Integral type.
8. Products:
    a. Accuride International, Inc: www.accuride.com/#sle.
    b. Knape & Vogt Manufacturing Company: www.knapeandvogt.com/#sle.
    c. Substitutions: See Section 01 6000 - Product Requirements.

F. Door/Drawer Bumpers: Bumpers must be made of high-quality, durable material (e.g., silicone, rubber, or thermoplastic elastomer) to provide long-lasting performance and prevent wear.
1. Bumpers must feature strong adhesive backing or integrated mounting to prevent movement or detachment over time.

2.09 CASEWORK ACCESSORY COMPONENTS

A. Edgebanding: PVC, flat, smooth finish; width to match component thickness.
1. Color: As indicated on drawings.
2. Thickness: as indicated above.
3. Products:
    a. Rehau; www.rehau.com
    b. Charter Industries; www.charterindustries.com
    c. Doelken; www.na.doelken.com
    d. Formica; www.formica.com
    e. Wilsonart; www.wilsonart.com
    f. Substitutions: See Section 01 6000 - Product Requirements.

B. Glass and Glazing Applications:
1. Glass Shelves: Clear, tempered, safety glass.
    a. ASTM C1048, Kind FT fully tempered; Condition A uncoated; Quality Q3.
    b. Thickness: 1/4 inch nominal, minimum.
2. Display Case Front: Laminated safety glass.
    a. Description: Two lites of flat glass of equal thickness bonded with one interlayer.

b. ASTM C1036, Type I transparent flat; Class I clear.
c. ANSI Z97.1, Type II; with interlayer complying with ASTM C1172 - Class A.
d. Interlayer: Polyvinyl butyral (PVB): 0.030 inch, minimum.
e. Glass Ply Thickness: 1/4 inch nominal, minimum, each ply.

2.10 ACCESSORIES

A. Fasteners: Size and type to suit application.

B. Concealed Joint Fasteners: Threaded steel.

C. Bolts, Nuts, Washers, Lags, Pins, and Screws: Of size and type to suit application; chrome-plated finish in concealed locations and stainless steel finish in exposed locations.

D. Adhesives: Type recommended by fabricator to suit application.

E. Wall Cleats: French cleats for stud wall partitions, with lower cleat fastened to wall and upper cleat fastened to millwork.

2.11 FABRICATION

A. Shop-fabricate casework to dimensions, profiles, and details indicated on drawings.

B. Fabricate to maximum extents plausible, including doors, drawers, and hardware; fabricate units in sizes transportable through building openings.

C. When necessary to cut and fit on site, provide materials with sufficient allowance for cutting.

D. Wood Casework with Laminate Cladding: Apply laminates in full uninterrupted sheets consistent with manufactured sizes. Fit corners and joints hairline.

E. Provide cutouts for plumbing fixtures, inserts, appliances, outlet boxes, and fixtures and fittings. Verify locations of cutouts from on-site dimensions. Fully finish exposed cut edges.

F. Edgebanding: Apply where specified; do not use more than one piece for any single length.

G. Hardware: Install hardware in accordance with hardware manufacturer's written instructions; use fasteners supplied by hardware manufacturer.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify casework and materials required for installation have been delivered, handled and stored as specified.

B. Verify wood blocking that provides casework backing is installed as indicated on drawings.

C. Verify location and sizes of rough-in plumbing and rough-in electrical associated with work of this section.

D. Verify casework and materials required for installation have been delivered, handled, ans stored in accordance with AWI 200 and requirements specified in Part 1 - Delivery, Storage and Handling.

E. Verify field conditions comply with AWI 200 and requirements specified in Part 1 - Field Conditions.

3.02 PREPARATION

A. Acclimate casework to the environment in which it will be installed for a minimum of 72 hours prior to installation. Comply with AWI 200.

3.03 INSTALLATION

A. Install work in accordance with ANSI/AWI 0620 requirements for grade indicated.

B. Install work of this section rigid, plumb, and level and in accordance with fabricator's documented instructions; secure casework as indicated on drawings.

C. Base and Wall Cabinet Anchorage Support Construction:
1. See Section 09 2216 for non-load-bearing steel stud framing providing backing for casework.

D. Install cabinet hardware in accordance with hardware manufacturer's documented instructions using hardware manufacturer's furnished fasteners.

E. Install scribe fillers to close gaps between casework and adjacent walls.

F. Install hardware in accordance with hardware manufacturer's written instructions using fasteners furnished by hardware manufacturer.

G. See Section 08 8000 for site-glazing of glass applications installed in casework components.

3.04 TOLERANCES

A. Comply with specified performance requirements for tolerances.

3.05 INSTALLATION ITEMS BY TRADE CONTRACTOR

A. Install plumbing and electrical service to and within equipment.

B. Set plumbing fixtures and accessory fixtures, and make final connections of such.

C. Complete wiring and connection to electrical boxes, receptacles, switches, lights, and flush plates. Work shall be in accordance with local codes, whether or not specifically called for in the contract documents.

3.06 ADJUSTING

A. Test installed work for rigidity and ability to support loads.

B. Adjust moving or operating parts to function smoothly and correctly.

C. Adjust hardware for smooth operation in accordance with hardware manufacturer's documented instructions.

D. Repair damaged and defective cabinets, where possible, to eliminate functional and visual defects. Where not possible to repair, replace architectural cabinets in their entirety. Adjust joinery for uniform appearance.

E. Lubricate and adjust hardware.

3.07 CLEANING

A. See Section 01 7000 - Execution and Closeout Requirements for additional requirements.

B. Clean exposed surfaces of casework, shelving, and hardware.

C. Clean all materials provided under this section and all adjacent materials, which may have become soiled from this work.

1. High Pressure Laminates (HPL): refer to NEMA publication Ld3-2005 Annex B Care and Cleaning of Laminates.

D. Wipe out millwork interiors and empty drawers of dirt and debris. Remove pencil marks and other blemishes from millwork surfaces.

E. Remove foreign matter that could affect operation or appearance of hardware.

F. Make final adjustments to drawers and doors. Doors shall swing freely. All doors shall be aligned both vertically and horizontally. Drawers shall open and close smoothly, without binding or excessive slide and play.

3.08 PROTECTION OF FINISHED WORK

A. Do not permit finished casework to be exposed to continued construction activity.

B. Cover with protective cover, taped to casework.

C. Remove temporary protective cover at date of Substantial Completion.

END OF SECTION

SECTION 06 8316
FIBERGLASS REINFORCED PANELING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Fiberglass reinforced plastic panels (FRP-1, FRP-2).

B. Trim.

1.02 RELATED REQUIREMENTS

A. Section 10 2600 - Wall and Door Protection: Decorative wall protection components.

1.03 REFERENCE STANDARDS

A. ASTM D3273 - Standard Test Method for Resistance to Growth of Mold on the Surface of Interior Coatings in an Environmental Chamber.

B. ASTM D5319 - Standard Specification for Glass-Fiber Reinforced Polyester Wall and Ceiling Panels.

C. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials.

D. FDA Food Code - Chapter 6 - Physical Facilities.

E. ISO 846 - Plastics - Evaluation of the Action of Microorganisms.

F. ISO 2812-1 - Paints and Varnishes -- Determination of Resistance to Liquids -- Part 1: Immersion in Liquids Other than Water.

1.04 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide data on specified products, describing physical and performance characteristics; including sizes, patterns and colors available; and installation instructions.

C. Samples: Submit two samples 6 by 6 inch in size illustrating material and surface design of panels.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Store panels flat, indoors, on a clean, dry surface. Remove packaging and allow panels to acclimate to room temperature for 48 hours prior to installation.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Fiberglass Reinforced Plastic Panels:
   1. Crane Composites, Inc: www.cranecomposites.com.
   2. **BASIS OF DESIGN:** Marlite: www.marlite.com.
      a. FRP-1: Standard FRP
      b. FRP-2: Symmetrix.
   3. Nudo: www.nudo.com.
   4. Panolam Industries International, Inc: www.panolam.com/#sle.
   5. Substitutions: See Section 01 6000 - Product Requirements.

2.02 PANEL SYSTEMS

A. Wall Panels (FRP-1):
   1. Panel Size: 4 by 8 feet.
   2. Panel Thickness: 0.09 inch.
   3. Surface Design: As indicated on Finish Schedule
   4. Color: As indicated on Finish Schedule.
   5. Attachment Method: Adhesive only, with trim and sealant in joints.

B. Wall Panels (FRP-2):
   1. Panel Size:4 by 8 feet.
   2. Panel Thickness: 3/32 inch.

3. Surface Design: Skinny Vertical
4. Color: As indicated on Finish Schedule.
5. Attachment Method: Adhesive, with sealant at joints and trim at exposed edges.

2.03 MATERIALS

A. Panels: Fiberglass reinforced plastic, complying with ASTM D5319.
1. Surface Burning Characteristics: Maximum flame spread index of 25 and smoke developed index of 450; when system tested in accordance with ASTM E84.
2. Mold Resistance: Score of 10, when tested in accordance with ASTM D3273.
3. Surface Characteristics and Cleanability: Provide products that are smooth, durable, and easily cleanable, in compliance with FDA Food Code, Chapter 6 - Physical Facilities.
4. Chemical Cleanability: Excellent chemical resistance to common cleaners and detergents when tested in accordance with ISO 2812-1.
5. Biological Resistance: Rating of 0, when tested in accordance with ISO 846.

B. Perimeter Trim: Vinyl; color coordinating with panel.

C. Adhesive: Low-VOC type recommended by panel manufacturer.

D. Sealant:
1. Typical: Silicone; color matching panel.
2. Locations where FRP-2 meets tile: Silicone; color match caulk.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify existing conditions and substrate flatness before starting work.

B. Verify that substrate conditions are ready to receive the work of this section.

3.02 INSTALLATION - WALLS

A. Install panels in accordance with manufacturer's instructions.

B. Cut and drill panels with carbide tipped saw blades, drill bits, or snips.

C. Apply adhesive to the back side of the panel using trowel as recommended by adhesive manufacturer.

D. Apply panels to wall with seams plumb and pattern aligned with adjoining panels.

E. Install panels with manufacturer's recommended gap for panel field and corner joints.

F. Place trim on panel before fastening edges, as required.

G. Fill channels in trim with sealant before attaching to panel.

H. Install trim with adhesive and screws or nails, as required.

I. Seal gaps at floor, ceiling, and between panels with sealant to prevent moisture intrusion.

J. Remove excess sealant after paneling is installed and prior to curing.

END OF SECTION

SECTION 07 0553
FIRE AND SMOKE ASSEMBLY IDENTIFICATION

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Identification markings for fire and smoke rated partitions, and fire rated walls.

1.02 RELATED REQUIREMENTS

A. Section 09 9123 - Interior Painting: Paint finish.

1.03 REFERENCE STANDARDS

A. ICC (IBC) - International Building Code.

1.04 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Product Data: Manufacturer's printed product literature for each type of marking, indicating font, foreground and background colors, wording, and overall dimensions.

C. Schedule: Completely define scope of proposed marking, and indicate location of affected walls and partitions, and number of markings.

D. Samples: Submit two samples of each type of marking proposed for use, of size similar to that required for project, illustrating font, wording, and method of application.

1.05 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years of documented experience.

1.06 FIELD CONDITIONS

A. Do not install adhered markings when ambient temperature is lower than recommended by label or sign manufacturer.

B. Do not install painted markings when ambient temperature is lower than recommended by coating manufacturer.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Partition Identification Labels:
   1. Fire Wall Signs, Inc: www.firewallsigns.com/#sle.
   2. Safety Supply Warehouse, Inc: www.safetysupplywarehouse.com/#sle.
   3. Substitutions: See Section 01 6000 - Product Requirements.

2.02 FIRE AND SMOKE ASSEMBLY IDENTIFICATION

A. Regulatory Requirements: Comply with "Marking and Identification" requirements of "Fire-Resistance Ratings and Fire Tests" chapter of ICC (IBC).
   1. Lettering shall not be less than 3 inches in height with a minimum of 3/8 inch stroke.
   2. Letter color must contrast with color of substrate.

B. Adhered Fire and Smoke Assembly Identification Signs: Printed vinyl sign with factory applied adhesive backing.

C. Applied Fire and Smoke Assembly Identification: Identification markings applied to partition with paint and a code compliant stencil. See Section 09 9123 for products.

D. Languages: Provide sign markings in English.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that substrate surfaces are ready to receive work.

3.02 PREPARATION

A. See Section 09 9123 for substrate preparation for painted markings.

3.03 INSTALLATION

A. Locate markings as required by ICC (IBC).
   1. Permanently and effectively mark all fire walls, fire barriers, fire partitions, and smoke barriers in accessible concealed spaces.
   2. Locate markings within 15 feet of wall or partition end, and no farther apart than 30 feet horizontally.

B. Install adhered markings in accordance with manufacturer's instructions.

C. Install applied markings in accordance with Section 09 9123.

D. Install neatly, with horizontal edges level.

E. Protect from damage until Date of Substantial Completion; repair or replace damaged markings.

END OF SECTION

SECTION 07 1400
FLUID-APPLIED WATERPROOFING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Water-based asphalt emulsion waterproofing.

B. Accessories, including:
   1. Drainage Mat.
   2. Protection Board, where no insulation or drainage panel is present.

1.02 RELATED REQUIREMENTS

A. Section 03 3000 - Cast-in-Place Concrete: Concrete substrate.

B. Section 07 2100 - Thermal Insulation: Insulation used for protective cover.

C. Section 07 2700 - Air Barriers: coordination of above-grade air/water barriers for compatibility.

D. Section 07 6200 - Sheet Metal Flashing and Trim: Metal counterflashings.

1.03 REFERENCE STANDARDS

A. ASTM D412 - Standard Test Methods for Vulcanized Rubber and Thermoplastic Elastomers--Tension.

B. ASTM D4541 - Standard Test Method for Pull-Off Strength of Coatings Using Portable Adhesion Testers.

C. ASTM E96/E96M - Standard Test Methods for Gravimetric Determination of Water Vapor Transmission Rate of Materials.

D. NRCA (WM) - The NRCA Waterproofing Manual.

1.04 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements for submittal procedures.

B. Product Data: Provide data for membrane, surface conditioner, flexible flashings, joint cover sheet, and joint and crack sealants.

C. Shop Drawings: Indicate special joint or termination conditions and conditions of interface with other materials.

D. Warranty Documentation:
   1. Submit manufacturer warranty and ensure that forms have been completed in Owner's name and registered with manufacturer.
   2. Submit installer's documentation that installation complies with warranty conditions for the field-applied waterproofing.

1.05 QUALITY ASSURANCE

A. Perform Work in accordance with NRCA Roofing and Waterproofing Manual for fluid-applied waterproofing system.

B. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section, with not less than three years documented experience.

C. Installer Qualifications: Company specializing in performing work of the type specified and with at least three years of documented experience and approved by manufacturer.

D. Division 03: Coordinate waterstops used in cast-in-place concrete with waterproofing manufacturer’s requirements.

1.06 FIELD CONDITIONS

A. Maintain ambient temperatures above 40 degrees F for 24 hours before and during application and until cured.

B. Do not apply waterproofing to a damp or wet substrate. Do not apply waterproofing in snow, rain, fog, or mist.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials to site in manufacturer's original, unopened packaging, with labels clearly identifying product name and manufacturer.

B. Store products in manufacturer's unopened packaging until ready for installation.

C. Protect materials during handling to prevent damage.

1.08 WARRANTY

A. See Section 01 7800 - Closeout Submittals for additional warranty requirements.

B. Provide ten year manufacturer warranty for waterproofing failing to resist penetration of water, except where such failures are the result of structural failures of building. Hairline cracking of concrete due to temperature change or shrinkage is not considered a structural failure.

PART 2 PRODUCTS

2.01 FLUID-APPLIED WATERPROOFING APPLICATIONS

A. Water-Based Asphalt Emulsion Waterproofing:
   1. Locations: Below-grade, vertical surface waterproofing.
   2. Cover with insulation.

2.02 FLUID-APPLIED WATERPROOFING MATERIALS

A. Water-Based Asphalt Emulsion Waterproofing:
   1. Cured Thickness: 60 mil, 0.060 inch, minimum.
   2. Suitable for installation over concrete substrates.
   3. Elongation: 800 percent, minimum, measured in accordance with ASTM D412.
   4. Water Vapor Permeability: 0.02 perm, maximum, measured in accordance with ASTM E96/E96M.
   5. Adhesion: 150 psi, minimum, measured in accordance with ASTM D4541.
   6. Products:
      a. Carlisle Coatings & Waterproofing, Inc; Barriseal-R: www.carlisleccw.com/#sle.
      b. Tremco Commercial Sealants & Waterproofing; TREMproof 260: www.tremcosealants.com/#sle.
      c. W. R. Meadows, Inc; MEL-ROL LM: www.wrmeadows.com/#sle.
      d. Substitutions: See Section 01 6000 - Product Requirements.

B. Flexible Flashings: Type recommended by membrane manufacturer.

2.03 ACCESSORIES

A. Surface Conditioner: Primer type, compatible with membrane compound; as recommended by membrane manufacturer.

B. Sealant for Joints and Cracks in Substrate: Type compatible with waterproofing material and as recommended by waterproofing manufacturer.

C. Cant Strips: Premolded composition material.

D. Counterflashings: Stainless steel as specified in Section 07 6200.

E. Thinner and Cleaner: As recommended by adhesive manufacturer, compatible with sheet membrane.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify existing conditions before starting work.

B. Verify substrate surfaces are free of frozen matter, dampness, loose particles, cracks, pits, projections, penetrations, or foreign matter detrimental to adhesion or application of waterproofing system.

C. Verify that substrate surfaces are smooth, free of honeycomb or pitting, and not detrimental to full contact bond of waterproofing materials.

D. Verify that items penetrating surfaces to receive waterproofing are securely installed.

E. Acceptance of Surfaces and Conditions: Examine substrate surfaces to receive products and systems and associated Work for compliance with requirements and other conditions affecting performance. Proceed only when unsatisfactory conditions have been corrected in a manner complying with Contract Documents. Starting Work within a particular area will be construed as acceptance of surface conditions.

3.02 PREPARATION

A. General: Comply with manufacturer's instructions, recommendations, and specifications for cleaning and surface preparation. Surfaces shall have no defects, contaminants, or errors which would result in poor or potentially defective installation or would cause latent defects in Work. Provide smooth and clean substrates, free of dust, dirt, and moisture according to manufacturer's written instructions.

B. Protect adjacent surfaces from damage not designated to receive waterproofing.

C. Clean and prepare surfaces to receive waterproofing in accordance with manufacturer's instructions; vacuum substrate clean.

D. Do not apply waterproofing to surfaces unacceptable to waterproofing manufacturer.

E. Fill non-moving joints and cracks with a filler compatible with waterproofing materials.

F. Seal moving cracks with sealant and non-rigid filler, using procedures recommended by sealant and waterproofing manufacturers.

G. Prepare building expansion joints at locations as indicated on drawings.

H. Install cant strips at inside corners.

3.03 INSTALLATION, GENERAL

A. Install waterproofing to specified minimum thickness in accordance with manufacturers instructions and NRCA (WM) applicable requirements.

B. General: Install waterproofing system to prevent passage if liquid water under hydrostatic pressure.

3.04 VERTICAL WATERPROOFING INSTALLATION

A. Apply primer or surface conditioner at a rate recommended by manufacturer, and protect conditioner from rain or frost until dry.

B. At all vertical joints and perimeter, apply joint cover sheets per manufacturers instructions.

C. At joints and cracks less than 1/2 inch in width including joints between horizontal and vertical surfaces, apply 12 inch wide strip of joint cover sheet.

D. At joints from 1/2 inch to 1 inch in width, loop joint cover sheet down into joint between 1-1/4 inch to 1-3/4 inch, and extend sheet at least 6 inches on either side of expansion joint.

E. Center joint cover sheet over joints, roll sheet into 1/8 inch thick coating of waterproofing material and apply second coat over sheet extending at least 6 inches beyond sheet edges.

F. Apply extra thickness (120 mils) of waterproofing material at corners, intersections, angles, hairline cracks, and around drains and penetrations.

G. Flexible Flashings: Seal items watertight that penetrate through waterproofing membrane with flexible flashings.

H. Extend waterproofing material and flexible flashing into drain clamp flange, apply adequate coating of liquid membrane to ensure clamp ring seal, and coordinate with drain installation requirements specified in Division 33 - Utilities.

I. Seal membrane and flashings to adjoining surfaces.
   1. Install termination bar along edges.
   2. Install counterflashing over exposed edges.

3.05 FIELD QUALITY CONTROL

A. See Section 01 4000 - Quality Requirements for additional requirements.

B. Owner will provide testing and inspection services.

3.06 PROTECTION

A. Do not permit traffic over unprotected or uncovered membrane.

END OF SECTION

SECTION 07 1613
CEMENTITIOUS WATERPROOFING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Cementitious waterproofing.

1.02 REFERENCE STANDARDS

A. ASTM C109/C109M - Standard Test Method for Compressive Strength of Hydraulic Cement Mortars (Using 50 mm [2 in.] Cube Specimens).

B. ASTM C666/C666M - Standard Test Method for Resistance of Concrete to Rapid Freezing and Thawing.

C. ASTM D412 - Standard Test Methods for Vulcanized Rubber and Thermoplastic Elastomers--Tension.

D. ASTM E96/E96M - Standard Test Methods for Gravimetric Determination of Water Vapor Transmission Rate of Materials.

E. COE CRD-C 48 - Handbook for Concrete and Cement Standard Test Method for Water Permeability of Concrete.

F. NRCA (WM) - The NRCA Waterproofing Manual.

1.03 SUBMITTALS

A. See Section 01 3000 - 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.
   4. Details of joints and intersections.

C. Test Reports: Where testing is explicitly called for, submit reports showing tests to pressure equal to or higher than that specified, with satisfactory lack of leakage.

D. Certification: Provide manufacturer's certification that waterproofing to be provided is suitable for the purpose specified and the locations where it is intended to be installed and that the requirements of Contract Documents do not preclude satisfactory installation and performance.

E. Manufacturer's qualification statement.

F. Maintenance Data: Instructions for care and repair of damaged coatings.

1.04 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section, with not less than three years of documented experience.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Deliver products to project site in manufacturer's original packaging, marked with manufacturer's product identification.

B. Store products in manufacturer's unopened packaging until ready for installation.

C. Keep stored products dry; store under cover and elevated above grade.

1.06 FIELD CONDITIONS

A. Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's absolute limits.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Polymer-Modified Cement Waterproofing:
   1. W. R. Meadows, Inc; CEM-KOTE FLEX ST: www.wrmeadows.com/#sle.

2. Substitutions: See Section 01 6000 - Product Requirements.

B. Crystalline Waterproofing:
1. Xypex Chemical Corporation; Xypex Concentrate: www.xypex.com/#sle.
2. Substitutions: See Section 01 6000 - Product Requirements.

2.02 MATERIALS

A. Polymer-Modified Cement Waterproofing: Slurry coating of Portland or hydraulic cement, aggregates, polymer admixtures, and water; no solvents; for application directly to cementitious substrate.
1. Explicitly recommended by manufacturer as waterproofing, not simply as dampproofing.
2. Approved by manufacturer for use below grade.
3. Requiring green concrete cure time of not more than 28 days.
4. Elongation at Failure: 20 percent, minimum, when tested in accordance with ASTM D412.
5. Water Vapor Transmission: Minimum permeance of finished coating of 1 perm, when tested in accordance with ASTM E96/E96M.
6. Freeze-Thaw Durability: No change when tested in accordance with ASTM C666/C666M for 300 cycles.
7. Compressive Strength: 5,000 psi, minimum, at 28 days, when tested in accordance with ASTM C109/C109M.
8. Finished Coating Thickness: As recommended by manufacturer for the specific application.

B. Crystalline Waterproofing: Portland cement, quartz or silica sand, and other active chemicals that when applied to surface of concrete forms insoluble crystals in capillary pores preventing passage of liquids, while having no adverse effect on normal properties of concrete.
1. Water Permeability of Applied Concrete: No measurable leakage or water flow at pressure ranging from 175 psi to 200 psi when tested in accordance with COE CRD-C 48, using at least 2-inch thick sample, and with applied surface preparation and installation in accordance with NRCA (WM).
2. Toxicity: Non-toxic.

C. Crack Repair Material, Joint Tape, and Reinforcing: Type and application as recommended by waterproofing manufacturer.

D. Plugging Compound: Ready-mixed cementitious compound meeting requirements and approved by waterproofing manufacturer, resistant to water but vapor permeable for horizontal, vertical, and overhead surfaces not exposed to vehicular traffic and compatible with substrate.

E. Patching Compound: Ready-mixed cementitious mortar approved by waterproofing manufacturer for patching or filling tie holes, reveals, honeycombs, or other damaged cementitious surfaces and compatible with substrate.

F. Water: Clean, clear, non-alkaline potable water, free of salts and other harmful elements.

PART 3 EXECUTION

3.01 EXAMINATION

A. Examine surfaces where waterproofing is to be applied for conditions detrimental to satisfactory performance.

B. Do not begin installation until substrates have been properly prepared.

C. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

3.02 PREPARATION

A. Remove defective concrete and rebuild to original profiles.

B. Plug active leaks according to waterproofing manufacturer's instructions.

C. Patch holes and non-moving cracks and joints.

D. Clean and prepare surfaces thoroughly prior to installation; schedule cleaning and preparation so that residue will not fall on newly coated, uncured surfaces.

E. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions. Use sandblasting, water blasting, or acid etching as recommended.

F. Application of waterproofing constitutes acceptance of substrates.

G. Protect other work from fallout, overspray, and spatter from waterproofing application; provide temporary enclosures and covers as necessary to do so.

3.03 INSTALLATION

A. Install waterproofing in accordance with manufacturer's instructions and recommendations unless more stringent requirements are indicated.

B. Perform installation only during ambient and substrate conditions recommended by manufacturer; provide temporary enclosures and/or temporary heating as necessary to do so.

C. Fill voids and holes prior to application of first coat.

D. Apply the number of coats and at the rates recommended by manufacturer for the specific application ; apply at least two coats unless one coat is specifically indicated.

E. At surfaces exposed to view, apply a uniformly textured finish without major variations in appearance.

F. Extend waterproofing to all surfaces in areas indicated to form continuous waterproofed surfaces.

G. Cure waterproofing by recommended methods for recommended period prior to making waterproofed area available for use or occupancy; protect from too rapid drying, severe weather exposure, and water accumulation.

1. Hot, Dry Weather: Use wet-cure methods regardless of manufacturer's instructions.
2. Do not use covers that could stain waterproofing surfaces.
3. Do not use chemical curing agents unless explicitly approved by waterproofing manufacturer.
4. Do not expose waterproofing to sunlight for minimum of 72 hours after placement.

H. Do not backfill, fill water or liquid holding structures, or apply finish coatings until time period recommended by manufacturer has passed.

3.04 PROTECTION

A. Protect installed products until completion of project.

B. Touch-up, repair or replace damaged products before Substantial Completion.

END OF SECTION

SECTION 07 2100.01
THERMAL INSULATION-FOUNDATIONS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Board insulation at:
   1. Perimeter foundation wall.

1.02 RELATED REQUIREMENTS

A. Section 03 3000 - Cast-in-Place Concrete: Coordination of insulation installation.

1.03 REFERENCE STANDARDS

A. ASTM C578 - Standard Specification for Rigid, Cellular Polystyrene Thermal Insulation.

B. ASTM D2842 - Standard Test Method for Water Absorption of Rigid Cellular Plastics.

C. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials.

D. ASTM E283 - Standard Test Method for Determining the Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen.

E. ASTM E2178 - Standard Test Method for Determining Air Leakage Rate and Calculation of Air Permeance of Building Materials.

1.04 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements for submittal procedures.

B. Product Data: Provide data on product characteristics, performance criteria, and product limitations.

C. Shop Drawings: Submit drawings that indicate location of joint or termination detail conditions and conditions of interface with other materials.

1.05 FIELD CONDITIONS

A. Do not install insulation adhesives when temperature or weather conditions are detrimental to successful installation.

PART 2 PRODUCTS

2.01 APPLICATIONS

A. Insulation at Perimeter of Foundation: Extruded polystyrene (XPS) board.

2.02 FOAM BOARD INSULATION MATERIALS

A. Extruded Polystyrene (XPS) Board Insulation: Comply with ASTM C578 with either natural skin or cut cell surfaces.
   1. Type and Compressive Resistance: Type IV, 25 psi (173 kPa), minimum.
   2. Flame Spread Index (FSI): Class A - 0 to 25, when tested in accordance with ASTM E84.
   3. Smoke Developed Index (SDI): 450 or less, when tested in accordance with ASTM E84.
   4. Type and Thermal Resistance, R-value: Type IV, 5.0 (0.88), minimum, per 1 inch thickness at 75 degrees F mean temperature.
   5. Board Edges: Square.
   6. Type and Water Absorption: Type IV, 0.3 percent by volume, maximum, by total immersion.
   7. Products:
      a. DuPont de Nemours, Inc; Styrofoam Brand Square Edge: building.dupont.com/#sle.
      b. Kingspan Insulation LLC; GreenGuard GG25-LG XPS Insulation Board: www.kingspan.com/#sle.
      c. Owens Corning Corporation; FOAMULAR 250 XPS: www.owenscorning.com/en-us/#sle.
      d. Substitutions: See Section 01 6000 - Product Requirements.

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.

C. Verify substrate materials are compatible with insulation and adhesives.

3.02 BOARD INSTALLATION AT FOUNDATION PERIMETER

A. Apply adhesive to back of boards:
   1. Three continuous beads per board length.

B. Install boards horizontally on foundation perimeter.
   1. Place boards to maximize adhesive contact.
   2. Install in running bond pattern.
   3. Butt edges and ends tightly to adjacent boards and to protrusions.

C. Cut and fit insulation tightly to protrusions or interruptions to the insulation plane.

3.03 PROTECTION

A. Do not permit installed insulation to be damaged prior to its concealment.

END OF SECTION

SECTION 07 2100.02
THERMAL INSULATION

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Board insulation at :
   1. Perimeter foundation wall.
   2. Exterior wall behind finish.

B. Batt insulation in exterior wall construction.

1.02 RELATED REQUIREMENTS

A. Section 03 3000 - Cast-in-Place Concrete: Coordination of insulation installation.

B. Section 07 2119 - Foamed-In-Place Insulation.

C. Section 09 2116 - Gypsum Board Assemblies: Acoustic insulation inside walls and partitions.

1.03 REFERENCE STANDARDS

A. ASTM C578 - Standard Specification for Rigid, Cellular Polystyrene Thermal Insulation.

B. ASTM C665 - Standard Specification for Mineral-Fiber Blanket Thermal Insulation for Light Frame Construction and Manufactured Housing.

C. ASTM D2842 - Standard Test Method for Water Absorption of Rigid Cellular Plastics.

D. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials.

E. ASTM E283 - Standard Test Method for Determining the Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen.

F. ASTM E2178 - Standard Test Method for Determining Air Leakage Rate and Calculation of Air Permeance of Building Materials.

1.04 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements for submittal procedures.

B. Product Data: Provide data on product characteristics, performance criteria, and product limitations.

C. Shop Drawings: Submit drawings that indicate location of joint or termination detail conditions and conditions of interface with other materials.

1.05 FIELD CONDITIONS

A. Do not install insulation adhesives when temperature or weather conditions are detrimental to successful installation.

PART 2 PRODUCTS

2.01 APPLICATIONS

A. Insulation at Perimeter of Foundation: Extruded polystyrene (XPS) board.

B. Insulation Over Metal Stud Framed Walls, Continuous: Extruded polystyrene (XPS) board.

C. Insulation in Metal Framed Walls: Batt insulation with separate vapor retarder.

2.02 FOAM BOARD INSULATION MATERIALS

A. Extruded Polystyrene (XPS) Board Insulation: Comply with ASTM C578 with either natural skin or cut cell surfaces.
   1. Type and Compressive Resistance: Type IV, 25 psi (173 kPa), minimum.
   2. Flame Spread Index (FSI): Class A - 0 to 25, when tested in accordance with ASTM E84.
   3. Smoke Developed Index (SDI): 450 or less, when tested in accordance with ASTM E84.
   4. Type and Thermal Resistance, R-value: Type IV, 5.0 (0.88), minimum, per 1 inch thickness at 75 degrees F mean temperature.
   5. Board Edges: Square.

6. Type and Water Absorption: Type IV, 0.3 percent by volume, maximum, by total immersion.
7. Products:
   a. DuPont de Nemours, Inc; Styrofoam Brand Square Edge: building.dupont.com/#sle.
   b. Kingspan Insulation LLC; GreenGuard GG25-LG XPS Insulation Board: www.kingspan.com/#sle.
   c. Owens Corning Corporation; FOAMULAR 250 XPS: www.owenscorning.com/en-us/#sle.
   d. Substitutions: See Section 01 6000 - Product Requirements.

2.03 BATT AND BLANKET INSULATION MATERIALS

A. Mineral Wool Blanket Thermal Insulation: Flexible or semi-rigid preformed insulation, complying with ASTM C665.
   1. Flame Spread Index: 25 or less, when tested in accordance with ASTM E84.
   2. Smoke Developed Index: 50 or less, when tested in accordance with ASTM E84.
   3. Thermal Resistance: R-value of 4.2 per inch minimum.
   4. Products:
      a. Johns Manville; MinWool Sound Attenuation Fire Batts: www.jm.com/#sle.
      b. ROCKWOOL; COMFORTBATT: www.rockwool.com/#sle.
      c. Thermafiber, Inc; SAFB FF: www.thermafiber.com/#sle.
      d. Substitutions: See Section 01 6000 - Product Requirements.

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.

C. Verify substrate materials are compatible with insulation and adhesives.

3.02 BOARD INSTALLATION AT FOUNDATION PERIMETER

A. Apply adhesive to back of boards:
   1. Three continuous beads per board length.

B. Install boards horizontally on foundation perimeter.
   1. Place boards to maximize adhesive contact.
   2. Install in running bond pattern.
   3. Butt edges and ends tightly to adjacent boards and to protrusions.

C. Cut and fit insulation tightly to protrusions or interruptions to the insulation plane.

3.03 BOARD INSTALLATION AT EXTERIOR WALLS

A. Apply adhesive to back of boards:
   1. Three continuous beads per board length.

B. Install boards horizontally on walls.
   1. Place boards to maximize adhesive contact.
   2. Install in running bond pattern.
   3. Butt edges and ends tightly to adjacent boards and protrusions.

C. Cut and fit insulation tightly to protrusions or interruptions to the insulation plane.

3.04 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. At metal framing, place vapor retarder on warm side of insulation; lap and seal sheet retarder joints over face of member

F. Tape seal tears or cuts in vapor retarder.

G. Extend vapor retarder tightly to full perimeter of adjacent window and door frames and other items interrupting the plane of the membrane; tape seal in place.

3.05 FOAMED-IN-PLACE INSULATION

A. Mask and protect adjacent surfaces from over spray or dusting.

B. Apply primer in accordnace with manufacturer's instructions.

C. Apply insulation in accordance with manufacturer's instructions.

D. Apply insulation by spray method, to a uniform monolithic density without voids.

E. Patch damaged areas.

F. Where applied to voids and gaps assure space for expansion to avoid pressure on adjacent materials that may bind operable parts.

G. Trim excess away for applied trim or remove as required for continuous sealant bead.

3.06 PROTECTION

A. Do not permit installed insulation to be damaged prior to its concealment.

END OF SECTION

SECTION 07 2119
FOAMED-IN-PLACE INSULATION

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Foamed-in-place insulation.
   1. In exterior wall crevices.
   2. At junctions of dissimilar wall and roof materials.

B. Protective intumescent coating.

1.02 REFERENCE STANDARDS

A. ASTM C518 - Standard Test Method for Steady-State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus.

B. ASTM D2842 - Standard Test Method for Water Absorption of Rigid Cellular Plastics.

C. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials.

D. ASTM E96/E96M - Standard Test Methods for Gravimetric Determination of Water Vapor Transmission Rate of Materials.

E. ASTM E2178 - Standard Test Method for Determining Air Leakage Rate and Calculation of Air Permeance of Building Materials.

F. FM 4880 - Examination Standard for Class 1 Fire Rating of Building Panels or Interior Finish Materials.

G. NFPA 275 - Standard Method of Fire Tests for the Evaluation of Thermal Barriers.

H. NFPA 286 - Standard Methods of Fire Tests for Evaluating Contribution of Wall and Ceiling Interior Finish to Room Fire Growth.

I. UL 1040 - Standard for Safety Fire Test of Insulated Wall Construction.

J. UL 1715 - Standard for Safety Fire Test of Interior Finish Material.

1.03 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements for submittal procedures.

B. Product Data: Provide product description, insulation properties, and preparation requirements.

1.04 QUALITY ASSURANCE

A. Applicator Qualifications: Company specializing in performing work of the type specified, and approved by manufacturer.

1.05 REGULATORY REQUIREMENTS

A. Conform to applicable code for flame and smoke limitations.

1.06 ENVIRONMENTAL CONDITIONS

A. Products containing urea-formaldehyde will not be permitted.

B. Chlorofluorocarbons (CFCs)/HCFCs: Products and equipment requiring or using CFCs or HCFCs during the manufacturing or installation process will not be permitted.

1.07 DELIVERY, STORAGE AND HANDLING

A. Observe all safety precautions and handling instructions.

B. Deliver materials to site in manufacturer's original, unopened containers and packaging, with labels clearly indicating manufacturer and material.

C. Store materials in a dry area protected from precipitation, freezing and overheating, at temperatures not lower than 60 deg. F or above 90 deg. F.

D. Protect materials during handling and application to prevent damage and contamination.

1.08 FIELD CONDITIONS

A. Do not apply foam when temperature is below that specified by the manufacturer for ambient air and substrate.

B. Do not apply foam when temperature is within 5 degrees F of dew point.

PART 2 PRODUCTS

2.01 MATERIALS

A. Foamed-In-Place Insulation: Medium-density, rigid or semi-rigid, closed cell polyurethane foam; foamed on-site, using blowing agent of water or non-ozone-depleting gas.
   1. Regulatory Requirements: Comply with applicable code for flame and smoke, concealment, and fire protection requirements.
      a. Fire Protection: Provide 15-minute thermal barrier of 1/2 inch gypsum board or equivalent material complying with NFPA 275 test method, or foamed-in-place insulation either exposed or with covering that complies with FM 4880, NFPA 286, UL 1040, or UL 1715.
   2. Thermal Resistance: R-value of 6.2, minimum, per 1-inch thickness at 75 degrees F mean temperature when tested in accordance with ASTM C518.
   3. Water Vapor Permeance: Vapor retarder; 1.0 perms, maximum, when tested at intended thickness in accordance with ASTM E96/E96M, desiccant method.
   4. Water Absorption: Less than 2 percent by volume, maximum, when tested in accordance with ASTM D2842.
   5. Bacterial or Fungal Growth: No growth; no material deterioration.
   6. Air Permeance: 0.04 cfm per square foot, maximum, when tested at intended thickness in accordance with ASTM E2178 at 1.57 psf.
   7. Closed Cell Content: At least 85 percent.
   8. Surface Burning Characteristics: Flame spread/smoke developed index of 25/450, maximum, when tested in accordance with ASTM E84.
   9. Products:
      a. BASF Corporation: www.spf.basf.com/#sle.
      b. Henry Company: www.henry.com/#sle.
      c. Johns Manville: www.jm.com/#sle.
      d. Substitutions: See Section 01 6000 - Product Requirements.

2.02 ACCESSORIES

A. Primer: As required by insulation manufacturer.

B. Protective Coating: Intumescent coating of type recommended by insulation manufacturer and as required to comply with applicable codes.
   1. Coating Type: Single component, water-based.
   2. Protected Insulation Type: Spray polyurethane foam (SPF).
   3. Application: Apply using brush, roller, or airless sprayer.
   4. Surface Burning Characteristics: Flame spread/smoke developed index of 25/450, maximum, when tested in accordance with ASTM E84.
   5. Color: As indicated on drawings.
   6. Products:
      a. International Fireproof Technology Inc; DC315 Intumescent Coating: www.painttoprotect.com/#sle.
      b. International Coatings Group; FBL-100 Fire Barrier Latex: www.internationalcoatingsgroup.com/#sle.
      c. No-Burn, Inc; Plus ThB Intumescent Coating: www.noburn.com/#sle.
      d. Substitutions: See Section 01 6000 - Product Requirements.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify work within construction spaces or crevices is complete before insulation application.

B. Verify that surfaces are clean, dry, and free of matter that may inhibit insulation adhesion.

C. Verify that other work on and within spaces to be insulated is complete prior to application.

D. Notify Architect of conditions that would adversely affect the application.

E. Beginning of installation means applicator accepts existing conditions.

3.02 PREPARATION

A. Mask and protect adjacent surfaces from over spray or dusting.

B. Prepare all substrates scheduled or intended to receive material in accordance with manufacturer's written instructions.
   1. Prepare all surfaces to receive spray foam application.
   2. Properly seal all areas that require sealant to insure a proper air seal when complete.
   3. Properly mask all windows, doors and areas to be protected from overspray.
   4. Protect floors and drywall areas from overspray.

C. Remove foreign materials, dirt, grease, oil, paint, laitance, efflorescence, and other substances that will affect application.

D. Application of materials by spray foam contractor shall constitute acceptance of job-site conditions and substrates and therefore negate future claims of insulation failures due to those conditions or substrates.

E. Apply primer in accordance with manufacturer's instructions.

3.03 APPLICATION

A. Apply insulation in accordance with manufacturer's instructions.

B. Apply insulation by spray method, to a uniform monolithic density without voids.

C. Patch damaged areas.

D. Where applied to voids and gaps assure space for expansion to avoid pressure on adjacent materials that may bind operable parts.

E. Trim excess away for applied trim or remove as required for continuous sealant bead.

3.04 FIELD QUALITY CONTROL

A. See Section 01 4000 - Quality Requirements for additional requirements.

B. Inspection will include verification of insulation thickness and density.

3.05 PROTECTION

A. Do not permit subsequent construction work to disturb applied insulation.

B. Exposed foam must be covered with wall board as soon as possible. Insulation shall be separated from the interior of the building by 1/2" gypsum board or equivalent approved 15 minute thermal barrier.

END OF SECTION

SECTION 07 2600
VAPOR RETARDERS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Vapor retarders.

1.02 RELATED REQUIREMENTS

A. Section 07 2700 - Air Barriers.

1.03 DEFINITIONS

A. Vapor Retarder: Airtight barrier made of material that is relatively water vapor impermeable, to degree specified, with seams and joints sealed to adjacent surfaces.

B. Vapor Retarder Class: A measure of a material or assembly's ability to limit the amount of moisture that passes through that material or assembly. Vapor retarder class is defined using Procedure A, Desiccant Method at 73 degrees F and 50 percent Relative Humidity (RH), in accordance with ASTM E96/E96M and ICC (IBC)-2018, as follows:
   1. Class I: 0.1 perm or less.
   2. Class II: Greater than 0.1 perm to 1.0 perm.
   3. Class III: Greater than 1.0 perm to 10 perms.

1.04 REFERENCE STANDARDS

A. ASTM D4397 - Standard Specification for Polyethylene Sheeting for Construction, Industrial, and Agricultural Applications.

B. ASTM E96/E96M - Standard Test Methods for Gravimetric Determination of Water Vapor Transmission Rate of Materials.

C. ICC (IBC)-2018 - International Building Code.

1.05 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements for submittal procedures.

B. Product Data: Provide data on material characteristics, performance criteria, and limitations.

C. Shop Drawings: Provide drawings of special joint conditions.

D. Manufacturer's Installation Instructions: Indicate preparation, installation methods, and storage and handling criteria.

1.06 QUALITY ASSURANCE

A. Installer Qualifications: Company specializing in performing the work of this section and approved by manufacturer.

1.07 FIELD CONDITIONS

A. Maintain temperature and humidity recommended by materials manufacturers before, during, and after installation.

PART 2 PRODUCTS

2.01 VAPOR RETARDERS

A. Vapor Retarder Sheet: Polyethylene sheeting complying with ASTM D4397, clear colored.
   1. Thickness: 10 mil, 0.010 inch, nominal.
   2. Water Vapor Permeance: 0.1 perm, maximum, when tested in accordance with ASTM E96/E96M.
   3. Seam and Perimeter Tape: Polyethylene self-adhering type, mesh reinforced, 2 inches wide; compatible with sheet material.

2.02 ACCESSORIES

A. Sealants, Tapes, and Accessories for Sealing Vapor Retarder and Adjacent Substrates: As indicated, complying with vapor retarder manufacturer's installation instructions.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that surfaces and conditions comply with requirements of this section.

3.02 PREPARATION

A. Remove projections, protruding fasteners, and loose or foreign matter that might interfere with proper installation.

B. Clean and prime substrate surfaces to receive sealants and adhered products in accordance with manufacturer's installation instructions.

3.03 INSTALLATION

A. Install materials in accordance with manufacturer's installation instructions.

B. Vapor Retarders: Install continuous airtight barrier over surfaces indicated, with sealed seams and sealed joints to adjacent surfaces.

C. Apply sealants and adhesives within recommended temperature range in accordance with manufacturer's installation instructions.

D. Mechanically Fastened Sheets - Vapor Retarder On Interior:
   1. When insulation is installed within assembly, install vapor retarder over insulation.
   2. Anchor to metal framing using seam tape, adhering at least one-half of tape width to metal substrate.
   3. Seal seams, laps, perimeter edges, penetrations, tears, and cuts with self-adhesive tape, providing an airtight seal.
   4. Locate laps at framing members; at laps fasten one sheet to framing member then tape overlapping sheet to first sheet in shingle fashion to shed water.
   5. Seal entire perimeter to structure, window and door frames, and other penetrations.
   6. Where conduits, pipes, wires, ducts, outlet boxes, and other items are installed within insulation cavity, pass vapor retarder sheet behind these items and over insulation to maintain airtight seal.

E. Openings and Penetrations in Vapor Retarders:
   1. At interior face of openings, seal gaps between window/door frame and rough framing using appropriate joint sealant over backer rod.
   2. Service and Other Penetrations: Form flashing around penetrating items and seal to surface of vapor retarder.

3.04 FIELD QUALITY CONTROL

A. Take digital photographs of each portion of installation prior to covering up vapor retarders.

3.05 PROTECTION

A. If additional openings need to be made in vapor retarders, install in accordance with this section.

END OF SECTION

SECTION 07 2700
AIR BARRIERS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Air barriers.

1.02 RELATED REQUIREMENTS

A. Section 07 6200 - Sheet Metal Flashing and Trim: Metal flashings installed in conjunction with air barriers.

B. Section 07 9200 - Joint Sealants: Sealant Materials.

1.03 DEFINITIONS

A. Air Barrier: Airtight barrier made of material that is virtually air impermeable but water vapor permeable, both to amount as specified, with sealed seams and sealed joints to adjacent surfaces.

1.04 REFERENCE STANDARDS

A. ASTM E96/E96M - Standard Test Methods for Gravimetric Determination of Water Vapor Transmission Rate of Materials.

B. ASTM E2178 - Standard Test Method for Determining Air Leakage Rate and Calculation of Air Permeance of Building Materials.

C. ICC-ES AC148 - Acceptance Criteria for Flexible Flashing Materials.

1.05 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements for submittal procedures.

B. Product Data: Provide data on material characteristics, performance criteria, and limitations.

C. Shop Drawings: Provide drawings of special joint conditions.

D. Manufacturer's Installation Instructions: Indicate preparation, installation methods, and storage and handling criteria.

1.06 QUALITY ASSURANCE

A. Manufacturer Qualification: Use evaluated materials from a single manufacturer regularly engaged in air barrier material manufacture, and use secondary materials approved in writing by primary material manufacturer.

B. Preinstallation Meeting: Conduct a preinstallation meeting one week prior to the start of the work of this section; require attendance by all affected installers.

C. Manufacturer Inspection: Provide a field visit by manufacturer's representative after installation and before work is covered up.

1.07 FIELD CONDITIONS

A. Maintain temperature and humidity recommended by materials manufacturers before, during, and after installation.

PART 2 PRODUCTS

2.01 AIR BARRIER MATERIALS (AIR IMPERMEABLE AND WATER VAPOR IMPERMEABLE)

A. Air and Vapor Barrier, Fluid-Applied:
   1. Air Permeance: 0.004 cfm/sq ft, maximum, when tested in accordance with ASTM E2178.
   2. Water Vapor Permeance: 1 perm, maximum, when tested in accordance with ASTM E96/E96M using Procedure A - Desiccant Method, at 73.4 degrees F.

2.02 ACCESSORIES

A. Sealants, Tapes, and Accessories for Sealing Air Barrier and Adjacent Substrates: As indicated or in compliance with air barrier manufacturer's installation instructions.

B. Sealant for Cracks and Joints In Substrates: Resilient elastomeric joint sealant compatible with substrate and air barrier materials.
   1. Application: Apply at 30 to 40 mil, 0.030 to 0.040 inch, nominal thickness.

C. Primer: Water-based silicone adhesion promoter.

D. Flexible Flashing: Self-adhering or mechanically-attached flashing used for wall penetrations in accordance with ICC-ES AC148 requirements.

E. Preformed Transition Membrane: Semirigid silicone or polyester composition, tapered edges, tear resistant.

F. Thinners and Cleaners: As recommended by material manufacturer.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that surfaces and conditions are ready for work of this section.

B. Where existing conditions are responsibility of another installer, notify Architect of unsatisfactory conditions.

C. Do not proceed with this work until unsatisfactory conditions have been corrected.

D. Existing air barrier type is unknown, verify compatibility when uncovered.

3.02 PREPARATION

A. Remove projections, protruding fasteners, and loose or foreign matter that might interfere with proper installation.

B. Clean and prime substrate surfaces to receive adhesives and sealants in accordance with manufacturer's installation instructions.

3.03 INSTALLATION

A. Install materials in accordance with manufacturer's installation instructions.

B. Air Barriers: Install continuous airtight barrier over surfaces indicated, with sealed seams and with sealed joints to adjacent surfaces.

C. Apply sealants and adhesives within recommended temperature range in accordance with manufacturer's installation instructions.

3.04 FIELD QUALITY CONTROL

A. See Section 01 4000 - Quality Requirements for additional requirements

B. Owner will provide testing services, and Contractor to provide temporary construction and materials for testing.

C. Do not cover installed air barriers until required inspections have been completed.

D. Take digital photographs of each portion of installation prior to covering up air barriers.

3.05 PROTECTION

A. Do not leave materials exposed to weather longer than recommended by manufacturer.

END OF SECTION

SECTION 07 4113
METAL ROOF PANELS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Insulated metal roof panel system of preformed steel panels.

B. Accessories.

1.02 RELATED REQUIREMENTS

A. Section 06 1000 - Rough Carpentry: Roof sheathing.

B. Section 07 2100 - Thermal Insulation: Rigid roof insulation.

C. Section 07 4213.19 - Insulated Metal Wall Panels.

D. Section 07 6200 - Sheet Metal Flashing and Trim.

E. Section 07 9200 - Joint Sealants: Sealing joints between metal roof panel system and adjacent construction.

F. Section 13 3419 - Metal Building Systems

1.03 REFERENCE STANDARDS

A. AAMA 2605 - Voluntary Specification, Performance Requirements and Test Procedures for Superior Performing Organic Coatings on Aluminum Extrusions and Panels (with Coil Coating Appendix).

B. ASTM A792/A792M - Standard Specification for Steel Sheet, 55% Aluminum-Zinc Alloy-Coated by the Hot-Dip Process.

C. ASTM C518 - Standard Test Method for Steady-State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus.

D. ASTM D6226 - Standard Test Method for Open Cell Content of Rigid Cellular Plastics.

E. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials.

F. ASTM E1592 - Standard Test Method for Structural Performance of Sheet Metal Roof and Siding Systems by Uniform Static Air Pressure Difference.

G. ASTM E1646 - Standard Test Method for Water Penetration of Exterior Metal Roof Panel Systems by Uniform Static Air Pressure Difference.

H. ASTM E1680 - Standard Test Method for Rate of Air Leakage through Exterior Metal Roof Panel Systems.

I. FM 4880 - Examination Standard for Class 1 Fire Rating of Building Panels or Interior Finish Materials.

J. UL 580 - Standard for Tests for Uplift Resistance of Roof Assemblies.

1.04 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements for submittal procedures.

B. Product Data: Manufacturer's data sheets on each product to be used, including:
   1. Storage and handling requirements and recommendations.
   2. Installation methods.
   3. Specimen warranty.

C. Shop Drawings: Include layouts of roof panels, details of edge and penetration conditions, spacing and type of connections, flashings, underlayments, and special conditions.
   1. Show work to be field-fabricated or field-assembled.

D. Verification Samples: For each roofing system specified, submit samples of minimum size 12 inches square, representing actual roofing metal, thickness, profile, color, and texture.
   1. Include typical panel joint in sample.
   2. Include typical fastening detail.

E. Test Reports: Indicate compliance of metal roofing system to specified requirements.

F. Warranty: Submit specified manufacturer's warranty and ensure that forms have been completed in Owner's name and are registered with manufacturer.

1.05 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section and with at least three years of documented experience.

B. Installer Qualifications: Company specializing in performing work of the type specified and with at least three years of documented experience and approved by manufacturer.

1.06 DELIVERY, STORAGE, AND HANDLING

A. See Section 01 7419 - Construction Waste Management and Disposal for packaging waste requirements.

B. Provide strippable plastic protection on prefinished roofing panels for removal after installation.

C. Store roofing panels on project site as recommended by manufacturer to minimize damage to panels prior to installation.

1.07 WARRANTY

A. See Section 01 7800 - Closeout Submittals for additional warranty requirements.

B. Finish Warranty: Provide 20-year manufacturer warranty against excessive degradation of exterior finish. Include provision for replacement of units with excessive fading, chalking, or flaking. Complete forms in Owner's name and register with warrantor.

C. Special Warranty: Provide 5-year warranty for weathertightness of roofing system, including agreement to repair or replace metal roof panels that fail to keep out water commencing on the Date of Substantial Completion. Complete forms in Owner's name and register with warrantor.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Structural Metal Roof Insulated Panel Manufacturers:
   1. **BASIS OF DESIGN:** Kingspan Insulated Panels; KingSeam Insulated Roof Panel: www.kingspan.com/#sle.
   2. Substitutions: See Section 01 6000 - Product Requirements.

2.02 PERFORMANCE REQUIREMENTS

A. Metal Roof Panels: Provide complete roofing assemblies, including roof panels, clips, fasteners, connectors, and miscellaneous accessories, tested for compliance with the following minimum standards:
   1. Structural Design Criteria: Provide panel assemblies designed to safely support design loads at support spacing indicated, with deflection not to exceed L/180 of span length(L) when tested in accordance with ASTM E1592.
      a. Dead Loads: Weight of roofing system.
      b. Live Loads: As indicated on drawings.
   2. Overall: Complete weathertight system tested and approved in accordance with ASTM E1592.
   3. Wind Uplift: Class 90 wind uplift resistance of UL 580.
   4. Air Infiltration: Maximum 0.01 cfm/sq ft at air pressure differential of 12 lbf/sq ft, when tested according to ASTM E1680.
   5. Water Penetration: No water penetration when tested in accordance with procedures and recommended test pressures of ASTM E1646.
   6. Thermal Movement: Design system to accommodate without deformation anticipated thermal movement over ambient temperature range of 100 degrees F.
   7. Thermal Resistance: Provide throughout system, R-value of 7.1 per inch, minimum, when tested in accordance with ASTM C518 at 75 degrees F mean temperature.
   8. Fire Resistance: Class 1 fire rated, without height limitation, when tested in accordance with FM 4880.
   9. Surface Burning Characteristics: Flame spread/Smoke developed index of 25/450, maximum, when tested in accordance with ASTM E84.

2.03 STRUCTURAL METAL ROOF PANELS

A. General: Provide complete engineered system complying with specified requirements and capable of remaining weathertight while withstanding anticipated movement of substrate and thermally induced movement of roofing system.

B. Structural Insulated Metal Panels: Factory-formed panels with factory-applied finish.
   1. Type: Double-skin, factory assembled with foamed-in-place polyurethane insulation.
      a. Thickness: 6 inches, nominal.
   2. Exterior Face of Panels:
      a. Aluminum-zinc alloy-coated SS (structural steel) sheet complying with ASTM A792/A792M; minimum AZ50 coating.
      b. Steel Thickness: Minimum 22 gauge, 0.03 inch.
      c. Profile: Shallow "mesa" rib.
      d. Texture: Smooth (non-embossed) OR Non-directional stucco embossed.
      e. Color: Kingspan light french gray.
      f. SRI: Minimum of 71.
   3. Interior Face of Panels:
      a. Aluminum-zinc alloy-coated SS (structural steel) sheet complying with ASTM A792/A792M; minimum AZ50 coating.
      b. Steel Thickness: Minimum 22 gauge, 0.03 inch.
      c. Profile: Shallow "lightly planked mesa ribs on 2.22" centers.
      d. Texture: Smooth (non-embossed).
      e. Color: Standard white unless otherwise indicated on drawings.
   4. Profile: Standing seam, with minimum 2-inch seam height; concealed fastener system for integral standing seam-shaped lap seam. Fasteners and attachment clip completely concealed within the side joint.
   5. Texture: Smooth.
   6. Panel Width: 40 inches.
   7. Panel Length: As indicated in drawings.
   8. Insulating Core: Minimum 91 percent closed cell structure (per ASTM D6226) urethane modified isocyanurate core with the following minimum physcial properties:
      a. Density Nominal: 2.0-2.5 pcf per ASTM C1622
      b. Shear Strength: 14 psi per ASTM C273
      c. Tensile Adhesion: 8.25 psi per ASTM C1623
      d. Compressive Strength: 14 psi per ASTM D1621
      e. Dimensional Stability: 14 day aged (ASTM D 2126) -20 degree F < 1% chg, dry heat 158 degree F < 1.5% chg, Humid Heat 158 degree F < 4.5% chg
      f. Surface burning characteristics when tested in accordance with ASTM E84:
      g. Flame Spread: less than 25
      h. Smoke Developed: less than 450

2.04 ATTACHMENT SYSTEM

A. Concealed System: Provide manufacturer's standard stainless steel or nylon-coated aluminum concealed anchor clips designed for specific roofing system and engineered to meet performance requirements, including anticipated thermal movement.

2.05 FABRICATION

A. Panels: Provide factory fabricated panels with applied finish and accessory items, using manufacturer's standard processes as required to achieve specified appearance and performance requirements.

B. Joints: Provide captive gaskets, sealants, or separator strips at panel joints to ensure weathertight seals, eliminate metal-to-metal contact, and minimize noise from panel movements.

2.06 FINISHES

A. Fluoropolymer Coil Coating System: Polyvinylidene fluoride (PVDF) multi-coat superior performing organic coatings system complying with AAMA 2605, including at least 70 percent PVDF resin, and at least 80 percent of coil coated metal surfaces having minimum total dry film thickness (DFT) of 0.9 mil, 0.0009 inch; color and gloss: as scheduled.

2.07 ACCESSORIES

A. Miscellaneous Sheet Metal Items: Provide flashings, trim, closure strips, and similar sheet metal items of the same material, thickness, and finish as used for the roofing panels. Items completely concealed after installation may optionally be made of stainless steel.

B. Sealants:
   1. Exposed Sealant: Elastomeric; silicone, polyurethane, or silyl-terminated polyether/polyurethane.
   2. Concealed Sealant: Non-curing butyl sealant or tape sealant.
   3. Seam Sealant: Factory-applied, non-skinning, non-drying type.

C. Fasteners:
   1. Self drilling fasteners shall be corrosion resistant plated steel, designed to resist maximum negative pull-off loads and hold the face sheet mechanically to the structural support.
   2. Panel attachment clip shall be one piece and fully concealed within the panel sidejoint. Top clip shall be a minimum 20 gauge stainless steel with an integral thermal break.

PART 3 EXECUTION

3.01 EXAMINATION

A. Do not begin installation of preformed metal roof panels until substrates have been properly prepared.

B. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

3.02 PREPARATION

A. Coordinate roofing work with provisions for roof drainage, flashing, trim, penetrations, and other adjoining work.

B. Remove protective film from surface of roof panels immediately prior to installation; strip film carefully to avoid damage to prefinished surfaces.

C. Separate dissimilar metals by applying a bituminous coating, self-adhering rubberized asphalt sheet, or other permanent method approved by metal roof panel manufacturer.

D. Protect surrounding areas and adjacent surfaces from damage during execution of this work.

E. At locations where metal will be in contact with wood or other absorbent material subject to wetting, seal joints with sealing compound and apply one coat of heavy-bodied bituminous paint.

3.03 INSTALLATION

A. Overall: Install roofing system in accordance with approved shop drawings and metal roof panel manufacturer's instructions and recommendations, as applicable to specific project conditions; securely anchor components of roofing system in place allowing for thermal and structural movement.
   1. Install roofing system with concealed clips and fasteners, except as otherwise recommended by manufacturer for specific circumstances.
   2. Minimize field cutting of panels. Where field cutting is required, use methods that will not distort panel profiles. Use of torches for field cutting is prohibited.

B. Accessories: Install necessary components that are required for complete roofing assembly, including flashings, trim, closure strips, and ridge closures.

C. Roof Panels: Install metal roof panels in accordance with manufacturer's installation instructions, minimizing transverse joints except at junction with penetrations.
   1. Form weathertight standing seams incorporating concealed clips.
   2. Install sealant or sealant tape at end laps and side joints as recommended by metal roof panel manufacturer.

3.04 CLEANING

A. See Section 01 7000 - Execution and Closeout Requirements for additional requirements.

B. Clean exposed sheet metal work at completion of installation. Remove grease and oil films, excess joint sealer, handling marks, and debris from installation, leaving the work clean and unmarked, free from dents, creases, waves, scratch marks, or other damage to the finish.

3.05 PROTECTION

A. Do not permit storage of materials or roof traffic on installed roof panels. Provide temporary walkways or planks as necessary to avoid damage to completed work. Protect roofing until completion of project.

B. Touch-up, repair, or replace damaged roof panels or accessories before Date of Substantial Completion.

END OF SECTION

SECTION 07 4213
METAL WALL PANELS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Manufactured metal panels for interior walls (LP-#), with accessory components.

1.02 RELATED REQUIREMENTS

A. Section 07 6200 - Sheet Metal Flashing and Trim: Head, cap, stepped and base flashings; miscellaneous metal trim.

B. Section 07 9200 - Joint Sealants: Sealing joints between metal wall panel system and adjacent construction.

1.03 REFERENCE STANDARDS

A. ASTM A480/A480M - Standard Specification for General Requirements for Flat-Rolled Stainless and Heat-Resisting Steel Plate, Sheet, and Strip.

B. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.

C. ASTM A792/A792M - Standard Specification for Steel Sheet, 55% Aluminum-Zinc Alloy-Coated by the Hot-Dip Process.

D. ASTM B209/B209M - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate.

E. ASTM B221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes.

F. ASTM B221M - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes (Metric).

1.04 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements for submittal procedures.

B. Product Data - Wall System: Manufacturer's data sheets on each product to be used, including:
   1. Physical characteristics of components shown on shop drawings.

C. Shop Drawings: Indicate dimensions, layout, joints, construction details, and methods of anchorage.

D. Samples: Submit one samples of wall panel of each type and color, 12 inch by 12 inch in size illustrating finish color, sheen, and texture.

1.05 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum five years of documented experience.

B. Installer Qualifications: Company specializing in installing products of the type specified in this section and approved by manufacture

1.06 DELIVERY, STORAGE, AND HANDLING

A. Protect panels from accelerated weathering by removing or venting sheet plastic shipping wrap.

B. Store prefinished material off the ground and protected from weather; prevent twisting, bending, or abrasion; provide ventilation; slope metal sheets to ensure proper drainage.

C. Prevent contact with materials that may cause discoloration or staining of products.

1.07 WARRANTY

A. See Section 01 7800 - Closeout Submittals for additional warranty requirements.

B. Correct defective work within manufacturer's standard 35 year warranty period after Date of Substantial Completion for degradation of panel finish, including color fading.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Provide Basis of Design manufacturer listed below, or a standard or custom product from one of the other listed manufacturers with equivalent performance, material properties, features, general configuration, appearance, and warranty:

B. Metal Wall Panels - Exposed Fasteners:
1. ATAS International, Inc: www.atas.com/#sle.
2. Berridge Manufacturing Company: www.berridge.com/#sle.
3. Fabral: www.fabral.com/#sle.
4. **BASIS OF DESIGN (LP-3):** MAC Architectural Metals, a Cornerstone Building Brands Company; Harrywood Plus: www.macmetalarchitectural.com/#sle.
5. Firestone: Omega VR Classic: www.firestonebpco.com
6. McElroy Metal: www.mcelroymetal.com/#sle.
7. Morin Corporation: www.morincorp.com/#sle.
8. **BASIS OF DESIGN (LP-1, LP-2):** Petersen Aluminum Corporation; R-36 Panel: www.pac-clad.com/#sle.
9. **BASIS OF DESIGN (LP-4):** Petersen Aluminum Corporation; 1/2 inch Corrugated Panel: www.pac-clad.com/#sle.
10. Substitutions: See Section 01 6000 - Product Requirements.

2.02 METAL WALL PANEL SYSTEM

A. Wall Panel System: Factory fabricated prefinished metal panel system, site assembled.
1. Provide interior liner panels.
2. Design and size components to support assembly dead loads, and to withstand live loads caused by positive and negative wind pressure acting normal to plane of wall.
3. Maximum Allowable Deflection of Panel: L/ 120 for length(L) of span.
4. Movement: Accommodate movement within system without damage to components or deterioration of seals, movement between system and perimeter components when subject to seasonal temperature cycling; dynamic loading and release of loads; and deflection of structural support framing.
5. Drainage: Provide positive drainage to exterior for moisture entering or condensation occurring within panel system.
6. Fabrication: Formed true to shape, accurate in size, square, and free from distortion or defects; pieces of longest practical lengths.
7. Corners: Factory-fabricated in one continuous piece.

B. Interior Liner Panels (LP-1, LP-2):
1. Profile: As indicated on drawings.
2. Side Seams: Interlocking, unsealed.
3. Material: Precoated steel sheet, 24 gauge minimum thickness.
4. Panel Width: 36 inch.
5. Color: As indicated on drawings.

C. Interior Liner Panels (LP-3):
1. Installation: Horizontal; style as indicated.
2. Seams: with interconnecting side joints, sealed with continuous bead of sealant.
3. Material: Precoated steel sheet, 24 gauge minimum thickness.
4. Panel Width: 6 inches nominal.
5. Panel depth: 0.375 inches
6. Color: As indicated on drawings.

D. Interior Liner Panels (LP-4):
1. Side Seams: Interlocking, unsealed.
2. Material: Precoated steel sheet, 24 gauge minimum thickness.
3. Panel Width: 44-1/2 inch.

4. Color: As indicated on drawings.

E. Internal and External Corners: Same material, thickness, and finish as exterior sheets; profile to suit system; shop cut and factory mitered to required angles.

F. Trim, Closure Pieces, Caps, and Flashings: Same material, thickness and finish as exterior sheets; brake formed to required profiles.

2.03 MATERIALS

A. Recycled Content: provide metal materials with a minimum recycled content of 25 percent.

B. Precoated Steel Sheet: Aluminum-zinc alloy-coated steel sheet, ASTM A792/A792M, Commercial Steel (CS)) or Forming Steel (FS), with AZ50/AZM150 coating; continuous-coil-coated on exposed surfaces with specified finish coating and on panel back with specified panel back coating.

C. Metal Framing Members: Include z-girts, z-clips, base and sill angles and channels, hat-shaped and rigid channels, and furring channels required for complete installation.
1. Provide material strength, dimensions, configuration as required to meet applied loads and in compliance with applicable building code.
2. Sheet Steel Components: ASTM A653/A653M galvanized to G90/Z275 or zinc-iron alloy-coated to A60/ZF180; or ASTM A792/A792M aluminum-zinc coated to AZ60/AZM180.
3. Stainless Steel Sheet Components: ASTM A480/A480M.
4. Aluminum Components: ASTM B209/B209M; or ASTM B221 (ASTM B221M).

2.04 FINISHES

A. Finish shall be Kynar 500 or Hylar 5000 Fluorocarbon coating with a top side film thickness of 0.70 to 0.90 mil over a 0.25 to 0.3 mil prime coat to provide a total dry film thickness of 0.95 to 1.25 mil, to meet AAMA 621. Bottom side shall be coated with a primer with a dry film thickness of 0.25 mil. Finish shall conform to all tests for adhesions, flexibility and longevity as specified by Kynar 500 or Hylar 5000 finish supplier.

2.05 ACCESSORIES

A. General: Provide complete metal wall panel assembly incorporating trim, copings, fasciae, parapet caps, soffits, sills, inside and outside corners, and miscellaneous flashings. Fabricate accessories in accordance with SMACNA Manual. Provide manufacturer's factory-formed clips, shims, flashings, gaskets, lap strips, closure strips, and caps for a complete installation.

B. Sealants: Specified in Section 07 9200. Manufacturer's standard type suitable for use with installation of system; non-staining; color as selected.
1. Exposed Sealant: Elastomeric; silicone, polyurethane, or silyl-terminated polyether/polyurethane.
2. Concealed Sealant: Non-curing butyl sealant or tape sealant.
3. Seam Sealant: Factory-applied, non-skinning, non-drying type.

C. Fasteners: Self-tapping 300 series stainless steel screws, No. 14 minimum, hex-head, and other acceptable fasteners recommended by panel manufacturer. Exposed fasteners same finish as panel system.

D. Field Touch-up Paint: As recommended by panel manufacturer.

E. Bituminous Paint: Asphalt base.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that support framing members are ready to receive panels.

B. Confirm that wall substrate is within tolerances acceptable to metal wall panel system manufacturer. Maximum substrate and framing deviations from flat plane acceptable:
1. 1/4-inch in 20 feet vertically or horizontally.
2. 1/2-inch across building elevation.
3. 1/8-inch in 5 feet.

C. Openings: Verify that openings and penetrations match layout on shop drawings.

3.02 INSTALLATION

A. Overall: Install system in accordance with approved shop drawings and panel manufacturer's instructions and recommendations, as applicable to specific project conditions. Anchor all components of wall system securely in place while allowing for thermal and structural movement.
   1. Install system with concealed clips and fasteners, except as otherwise recommended by manufacturer for specific circumstances.
   2. Minimize field cutting of panels. Where field cutting is absolutely required, use methods that will not distort panel profiles. Use of torches for field cutting is absolutely prohibited.

B. Install panels on walls in accordance with manufacturer's instructions.

C. Protect surfaces in contact with dissimilar metals with bituminous paint. Allow to dry prior to installation.

D. Fasten panels to structural supports; aligned, level, and plumb.

E. Locate joints over supports.

F. Lap panel ends 2 inches, minimum.

G. Provide expansion joints where indicated.

H. Use concealed fasteners unless otherwise indicated by Architect.

I. Seal and place gaskets to prevent weather penetration. Maintain neat appearance.
   1. Provide weatherproof escutcheons for pipe and conduit penetrating exterior walls.

3.03 TOLERANCES

A. Offset From True Alignment Between Adjacent Members Abutting or In Line: 1/16 inch, maximum.

B. Variation from Plane or Location As Indicated on Drawings: 1/4 inch, maximum.

3.04 CLEANING

A. Remove site cuttings from finish surfaces.

B. Remove protective material from wall panel surfaces.

C. Clean and wash prefinished surfaces with mild soap and water; rinse with clean water.

3.05 PROTECTION

A. Do not permit storage of materials or roof traffic on installed roof panels. Provide temporary walkways or planks as necessary to avoid damage to completed work. Protect roofing until completion of project.

B. Touch-up, repair, or replace damaged roof panels or accessories before Date of Substantial Completion.

END OF SECTION

SECTION 07 4213.19
INSULATED METAL WALL PANELS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Factory-assembled metal panel system for walls (MP-#), with trim, related flashings and accessory components.

1.02 RELATED REQUIREMENTS

A. Section 05 4000 - Cold-Formed Metal Framing: Stud wall framing system.

B. Section 07 4113 - Metal Roof Panels.

C. Section 07 9200 - Joint Sealants: Sealing between metal wall panel system and adjacent construction.

D. Section 13 3419 - Metal Building Systems

1.03 REFERENCE STANDARDS

A. AAMA 609 & 610 - Cleaning and Maintenance Guide for Architecturally Finished Aluminum.

B. ASTM A792/A792M - Standard Specification for Steel Sheet, 55% Aluminum-Zinc Alloy-Coated by the Hot-Dip Process.

C. ASTM D1621 - Standard Test Method for Compressive Properties of Rigid Cellular Plastics.

D. ASTM D1622 - Standard Test Method for Apparent Density of Rigid Cellular Plastics.

E. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials.

F. ASTM E330/E330M - Standard Test Method for Structural Performance of Exterior Windows, Doors, Skylights and Curtain Walls by Uniform Static Air Pressure Difference.

G. FM 4880 - Examination Standard for Class 1 Fire Rating of Building Panels or Interior Finish Materials.

1.04 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements for submittal procedures.

B. Product Data: Provide manufacturer documentation on tested structural, thermal, and fire resistance capabilities of assembled panel.

C. Shop Drawings: Indicate dimensions, panel profile and layout, spans, joints, construction details, methods of anchorage, and method and sequence of installation.

D. Samples: Submit two samples of panel, 12 by 12 inch in size illustrating finish color, sheen, and texture.

E. Design and Performance Data: Indicate panel profile and dimensions and structural properties.

F. Manufacturer's qualification statement.

1.05 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this Section with minimum three years documented experience.

B. Installer Qualifications: Company specializing in performing work of this Section approved by manufacturer.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Protect panels from accelerated weathering by removing or venting sheet plastic shipping wrap.

B. Store pre-finished material off ground with weather protection to prevent twisting, bending, or abrasion, and to provide ventilation. Slope metal sheets to ensure drainage.

C. Prevent contact with materials that could cause discoloration or staining.

1.07 FIELD CONDITIONS

A. Do not install panels when air temperature or relative humidity are outside manufacturer's limits.

1.08 WARRANTY

A. See Section 01 7800 - Closeout Submittals for additional warranty requirements.

B. Finish Warranty: Provide 20-year manufacturer warranty against excessive degradation of exterior finish. Include provision for replacement of units with excessive fading, chalking, or flaking. Complete forms in Owner's name and register with warrantor.

C. Thermal Warranty: Provide 30-year warranty in which manufacturer agrees to repair or replace panels that exhibit greater than 10% reduction from published material R-value at time of manufacture as measured in accordance with ASTM C518 within specified warranty period.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Insulated Metal Panels:
1. **BASIS OF DESIGN:** Kingspan Insulated Panels: www.kingspan.com/#sle.
   a. MP-1, MP-3: QuadCore B Vale.
   b. MP-2, MP-4, MP-5: QuadCore KS Series; KS Mini Micro - Rib.
   c. MP-6: Quad Core Karrier Panel.
2. Substitutions: See Section 01 6000 - Product Requirements.

2.02 PERFORMANCE / DESIGN CRITERIA

A. Metal Panel System: Factory-assembled metal panel system, with trim, related flashings and accessory components.
1. Provide positive drainage to exterior for moisture entering or condensation occurring within panel system.
2. Accommodate tolerances of building structural framing.

B. Performance Requirements:
1. Thermal Performance: Provide thermal resistance through entire system; R-value of 28, minimum.
2. Structural Performance: Design and size to withstand all dead loads and wind loads caused by positive and negative wind pressure acting normal to plane of panel.
   a. Verify structural performance in accordance with ASTM E330/E330M, using test pressure 1.5 times design wind pressure, with 10 seconds duration of maximum load.
   b. Design Wind Loads: as indicated in Structural Drawings.
3. Fire Resistance: Class 1 fire rated, without height limitation, when tested in accordance with FM 4880.
4. Surface Burning Characteristics: Flame spread/Smoke developed index of 25/90, maximum, when tested in accordance with ASTM E84.
5. Fatigue Test: There shall be no evidence of metal/insulation interface delamination when the panel is tested by simulated wind loads (positive and negative loads), when applied for two million alternate cycles of L/180 deflection.
6. Water Penetration: There shall be no uncontrolled water penetration through the panel joints at a pressure differential of 20 psf, when tested in accordance with ASTM E331.
7. Air Infiltration: Air infiltration through the panel shall not exceed 0.001 cfm/sf at 20 psf air pressure differential when tested in accordance with ASTM E283.
8. Movement: Accommodate the movement caused by the following without damage to system, components, or deterioration of seals:
   a. Normal movement between system components.
   b. Seasonal temperature cycling.
   c. Dynamic loading and release of loads.
   d. Deflection of structural support framing,

2.03 COMPONENTS

A. Wall Panels (MP-1, MP-3): Exterior and interior metal sheet skin, factory-assembled, with foamed-in-place insulation; exterior and interior sheet interlocking at edges, fitted with continuous gaskets.
1. Panel Width: 36 inch.

2. Profile: 5/8 inch deep ribbed Vale profile; horizontal panels.
3. Panel Thickness: 4 inch.
4. Panel Length: As indicated in drawings.
5. Panel Attachment: Fasteners and stainless steel attachment clip completely concealed withing the panel side joint.
6. Exterior Sheet: Pre-finished aluminum-zinc alloy-coated steel, 22 gauge, 0.0299 inch minimum base metal thickness .
7. Interior Sheet: Aluminum, pre-finished, 22 gauge, 0.0253 inch minimum thickness; shadowline.
8. Panel Edge Profile: Tongue and groove, for flush seam.
9. Exterior Finish: Polyvinylidene fluoride (PVDF) coating; .
   a. Color:
      1) MP-1: Grizzle Gray
      2) MP-3: Surrey Beige.
10. Interior Finish: Polyvinylidene fluoride (PVDF) coating; imperial white color.
11. Insulating Core: Precured, profiled, sanded flat, and fully inspected prior to lamination. Core material to be QuadCore-B or approved equal.
12. Structural Adhesive: Type II Class 2 Structural Urethane Adhesive, 100 percent solids and 100 percent solvent free, evaluated and listed for sandwich panel construction by ICC Evaluation Service or other recognized agency.

B. Wall Panels (MP-2, MP-4, MP-5): Exterior and interior metal sheet skin, factory-assembled, with foamed-in-place insulation; exterior and interior sheet interlocking at edges, fitted with continuous gaskets.
1. Panel Width: 30 inch.
2. Profile: Mini Micro Rib; horizontal (MP-2, MP-4) and vertical (MP-5) panels.
3. Panel Thickness: 4 inch.
4. Exterior Sheet: Pre-finished galvanized steel, 22 gauge, 0.0299 inch minimum base metal thickness; non embossed.
5. Interior Sheet: Aluminum, pre-finished, 22 gauge, 0.0253 inch minimum thickness; non-embossed.
6. Panel Edge Profile: Tongue and groove, for flush seam.
7. Fabricate panels in longest practicable lengths.
8. Exterior Finish: Polyvinylidene fluoride (PVDF) coating.
   a. Color:
      1) MP-2: Dove Gray.
      2) MP-4: Light Stone.
      3) MP-5: Wood Veneer finish similar match to Reynobond - French Walnut.
9. Interior Finish: Polyvinylidene fluoride (PVDF) coating; imperial white color.

C. Interior Wall Panels (MP-6): Exterior and interior metal sheet skin, factory-assembled, with foamed in place insulation; exterior and interior sheet interlocking at edges, fitted with continuous gaskets.
1. Panel Width: 30 inch.
2. Profile: shadowline or flat; horizontal panels.
3. Panel Thickness: 4 inch.
4. Exterior Sheet: Pre-finished aluminum-zinc alloy-coated steel, 22 gauge, 0.0299 inch minimum base metal thickness; stucco embossed.
5. Interior Sheet: Aluminum, pre-finished, 22 gauge, 0.0299 inch minimum thickness; stucco embossed.
6. Panel Edge Profile: Tongue and groove, for flush seam.
7. Fabricate panels in longest practicable lengths.
8. Exterior Finish: Polyvinylidene fluoride (PVDF) coating; White.
9. Interior Finish: Polyvinylidene fluoride (PVDF) coating; White.

D. Trim, Closure Pieces, Expansion Joints, and Flashings: Same material, thickness and finish as exterior sheets; factory-fabricated to required profiles; fabricated in longest practicable lengths.
1. Thickness: 22 gauge, 0.0299 inch.

2. Exposed Fasteners: Not permitted.
3. Profiles: To suit system.
4. Color: to match panel finish.
   a. Trim Color: Kingspan - Silversmith unless otherwise noted.

2.04 MATERIALS

A. Precoated Aluminum-Zinc Alloy-Coated Steel Sheet: ASTM A792/A792M, Commercial Steel (CS) or Forming Steel (FS), with AZ55/AZM165 coating; continuous coil coated with acrylic primer coat, polyvinylidene fluoride (PVDF) top coat, and polyester washcoat for panel back.

B. Foamed-in-Place Insulation: Polyisocyanurate type.
   1. Core is 95 percent closed cell when tested in accordance with ASTM D6226.
   2. Panel shall provide a nominal R-value of 7.2 hr x ft2 x degrees F/Btu per inch thickness when tested in accordance with ASTM C 518 at 75 degrees F mean temperature and 8.0 hr x ft2 degrees F/Btu per inch thickness when tested in accordance with ASTM C 518 at 35 degrees F mean temperature.
   3. Compressive Strength: 19 psi, in accordance with ASTM D1621 test method.
   4. Density: 2.2 to 2.8 lb/cu ft, in accordance with ASTM D1622 test method.

C. Gaskets: Manufacturer's standard type suitable for use with panel system, permanently resilient; ultraviolet and ozone resistant; color as selected by Architect.

D. Panel Sealants: Manufacturer's standard type suitable for use with installation of panel system; non-staining, skinning, non-shrinking, non-sagging, ultra-violet and ozone resistant; color as selected by Architect.

2.05 ACCESSORIES

A. Concealed Sealants: Non-curing butyl sealant or tape sealant.
   1. See Section 07 9200 - Joint Sealants for product requirements.

B. Exposed Sealants: Elastomeric; silicone, polyurethane, or silyl-terminated polyether/polyurethane.
   1. See Section 07 9200 - Joint Sealants for product requirements.
   2. Color: to match panel.

C. Fasteners: Manufacturer's standard type to suit application; stainless steel with soft neoprene washers; provide with fastener cap same color as exterior panel.

D. Field Touch-up Paint: As recommended by panel manufacturer.

E. Bituminous Paint: Asphalt base.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that structural framing is ready to receive panel system.

3.02 INSTALLATION

A. Install panel system on walls and soffits in accordance with manufacturer's instructions.

B. Protect panel surfaces in contact with cementitious materials with bituminous paint; allow paint to dry prior to installation.

C. Permanently fasten panel system to structural supports; aligned, level, and plumb, within specified tolerances.

D. Locate panel joints over supports.

E. Provide expansion joints where indicated.

F. Use concealed fasteners unless otherwise approved by Architect.

G. Seal and place gaskets to prevent weather penetration. Maintain neat appearance.

3.03 TOLERANCES

A. Maximum Offset From True Alignment Between Adjacent Members Butting or In Line: 1/16 inch.

B. Maximum Variation from Plane or Location Indicated on Drawings: 1/4 inch.

3.04 CLEANING

A. See Section 01 7000 - Execution and Closeout Requirements for additional requirements.

B. Remove site cuttings from finish surfaces.

C. Clean and wash prefinished surfaces with mild soap and water; rinse with clean water.

D. Upon completion of installation, thoroughly clean prefinished aluminum surfaces in accordance with AAMA 609 & 610.

3.05 PROTECTION

A. Protect installed products from damage until Date of Substantial Completion.

END OF SECTION

SECTION 07 5400
THERMOPLASTIC MEMBRANE ROOFING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Adhered system with thermoplastic roofing membrane.

B. Insulation, flat and tapered.

C. Cover boards.

D. Flashings.

1.02 REFERENCE STANDARDS

A. ASTM C1177/C1177M - Standard Specification for Glass Mat Gypsum Substrate for Use as Sheathing.

B. ASTM C1289 - Standard Specification for Faced Rigid Cellular Polyisocyanurate Thermal Insulation Board.

C. ASTM D412 - Standard Test Methods for Vulcanized Rubber and Thermoplastic Elastomers--Tension.

D. ASTM D6878/D6878M - Standard Specification for Thermoplastic Polyolefin-Based Sheet Roofing.

E. ASTM E154/E154M - Standard Test Methods for Water Vapor Retarders Used in Contact with Earth Under Concrete Slabs, on Walls, or as Ground Cover.

F. ASTM E1980 - Standard Practice for Calculating Solar Reflectance Index of Horizontal and Low-Sloped Opaque Surfaces.

G. NRCA (RM) - The NRCA Roofing Manual.

H. NRCA (WM) - The NRCA Waterproofing Manual.

1.03 ADMINISTRATIVE REQUIREMENTS

A. Preinstallation Meeting: Convene one week before starting work of this section.
   1. Review preparation and installation procedures and coordinating and scheduling required with related work.
   2. Meeting shall include, but not be limited to, the following subjects:
      a. Proper operation of induction welding tools and magnetic cooling clamps.
      b. Calibration of induction welding tools.
      c. Installation of roof insulation and membrane roofing.
      d. Insulation fastening patterns for desired FM wind uplift ratings in accordance with membrane roofing manufacturer’s instructions for roof field, perimeter, and corners.
      e. Testing of welds.
      f. Protection of installed membrane roofing.
      g. Coordination with other work.

1.04 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements for submittal procedures.

B. Product Data: Provide data indicating membrane materials, flashing materials, insulation, vapor retarder, surfacing, and fasteners.

C. Shop Drawings: Submit drawings that indicate joint or termination detail conditions, conditions of interface with other materials, and roof pad layout.

D. Manufacturer's qualification statement.

E. Installer's qualification statement.

F. Warranty Documentation:
   1. Submit manufacturer warranty and ensure that forms have been completed in Owner's name and registered with manufacturer.
   2. Submit installer's written verification that installation complies with warranty conditions for waterproof membrane.

1.05 QUALITY ASSURANCE

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

B. Installer Qualifications: Company specializing in performing work of this section with at least five years of documented experience and approved by manufacturer.

C. Provide adequate number of experienced workmen regularly engaged in this type of work who are skilled in the application techniques of the materials specified. Provide at least one thoroughly trained and an experienced superintendent on the job at all times roofing work is in progress.

D. Upon completion of the installation, the applicator shall arrange for an inspection to be made by a non-sales technical representative of the membrane manufacturer in order to determine whether or not corrective work will be required before the warranty will be issued. Notify the building owner seventy-two (72) hours prior to the manufacturer's final inspection.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials in manufacturer's original containers, dry and undamaged, with seals and labels intact, unless otherwise indicated.

B. Store materials in weather protected environment, clear of ground and moisture.

C. Ensure storage and staging of materials does not exceed static and dynamic load-bearing capacities of roof decking.

D. Protect foam insulation from direct exposure to sunlight.

1.07 FIELD CONDITIONS

A. Do not apply roofing membrane during unsuitable weather.

B. Do not apply roofing membrane when ambient temperature is below 40 degrees F or above 100 degrees F.

C. Do not apply roofing membrane to damp or frozen deck surface or when precipitation is expected or occurring.

D. Do not expose materials vulnerable to water or sun damage in quantities greater than can be weatherproofed the same day.

E. Schedule applications so that no partially completed sections of roof are left exposed at end of workday.

1.08 WARRANTY

A. See Section 01 7800 - Closeout Submittals for additional warranty requirements.

B. System Warranty: Provide manufacturer's system warranty agreeing to repair or replace roofing that leaks or is damaged due to wind or other natural causes.
   1. Warranty Term: 20 years.
   2. For repair and replacement include costs of both material and labor in warranty.
   3. Exceptions are not Permitted:
      a. Damage due to wind speed up to 72 mph.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Thermoplastic Polyolefin (TPO) Membrane Roofing Materials:
   1. Carlisle SynTec Systems: www.carlisle-syntec.com/#sle.
   2. Elevate: www.holcimelevate.com/#sle.
   3. GenFlex Roofing Systems, LLC: www.genflex.com/#sle.
   4. Mule-Hide Products Co, Inc: www.mulehide.com/#sle.
   5. Versico Roofing Systems: www.versico.com/#sle.
   6. Substitutions: See Section 01 6000 - Product Requirements.

B. Insulation: same manufacturer or approved by membrane manufacturer.
   1. Carlisle SynTec Systems; SecurShield Insulation: www.carlisle-syntec.com/#sle.

2. Elevate: www.holcimelevate.com.
3. Hunter Panels: www.hunterpanels.com/#sle.
4. Johns Manville: www.jm.com/#sle.
5. Owens Corning Corporation: www.owenscorning.com/en-us/#sle.
6. Versico Roofing Systems: www.versico.com/#sle.
7. Substitutions: See Section 01 6000 - Product Requirements.

2.02 ROOFING - UNBALLASTED APPLICATIONS

A. Thermoplastic Membrane Roofing: One ply membrane, fully adhered, over insulation.

B. Roofing Assembly Requirements:
1. Solar Reflectance Index (SRI): 78, minimum, calculated in accordance with ASTM E1980.
a. Field applied coating may not be used to achieve specified SRI.
2. Long-Term Thermal Resistance (LTTR): 5.7 per inch, minimum; provide insulation of thickness required.

C. Acceptable Insulation Types - Constant Thickness Application:
1. Minimum 2 layers of polyisocyanurate board, 3 inch layers 6 inches total.

D. Acceptable Insulation Types - Tapered Application:
1. Tapered polyisocyanurate board covered with uniform thickness polyisocyanurate board.
2. Provide preformed saddles, crickets, tapered edge strips, and other insulation shapes where indicated for sloping to drain. Fabricate to slopes indicated.

2.03 MEMBRANE ROOFING AND ASSOCIATED MATERIALS

A. Membrane Roofing Materials:
1. TPO: Thermoplastic polyolefin (TPO) complying with ASTM D6878/D6878M, sheet contains reinforcing fabrics or scrims.
a. Thickness: 60 mil, 0.060 inch, minimum.
2. Sheet Width:
a. Adhered Application: Limit width to 120 inches, maximum, when ambient temperatures are less than 40 degrees F for extended period of time during installation.
3. Color: Gray.

B. Seaming Materials: As recommended by membrane manufacturer.

C. Flexible Flashing Material: Same material as membrane.

2.04 COVER BOARDS

A. Cover Boards: Glass-mat faced gypsum panels complying with ASTM C1177/C1177M.
1. Thickness: 1/2 inch, fire-resistant.
2. Products:
a. Georgia-Pacific; DensDeck Prime with EONIC Technology: www.densdeck.com/#sle.
b. Gold Bond Building Products, LLC provided by National Gypsum Company; DEXcell Glass Mat Roof Board: www.goldbondbuilding.com/#sle.
c. Substitutions: See Section 01 6000 - Product Requirements.

2.05 INSULATION

A. Polyisocyanurate (ISO) Board Insulation: Rigid cellular foam, complying with ASTM C1289.
1. Classifications:
a. Type II: Faced with either cellulosic facers or glass fiber mat facers on both major surfaces of the core foam.
1) Class 1 - Faced with glass fiber reinforced cellulosic facers on both major surfaces of the core foam.
2) Compressive Strength: Classes 1-2-3, Grade 1, 16 psi (110 kPa), minimum.
3) Thermal Resistance, R-value: At 1-1/2 inches thick; Class 1, Grades 1-2-3, 8.4 (1.48), minimum, at 75 degrees F.
2. Board Size: 48 by 96 inches.

3. Tapered Board: Slope as indicated; minimum thickness 1/4 inch; fabricate of fewest layers possible.
4. Board Edges: Square.

2.06 ACCESSORIES

A. Stack Boots: Prefabricated flexible boot and collar for pipe stacks through membrane; same material as membrane.

B. Insulation Joint Tape: Glass fiber reinforced type as recommended by insulation manufacturer, compatible with roofing materials; 6 inches wide; self adhering.

C. Membrane Adhesive: As recommended by membrane manufacturer.

D. Surface Conditioner for Adhesives: Compatible with membrane and adhesives.

E. Thinners and Cleaners: As recommended by adhesive manufacturer, compatible with membrane.

F. Insulation Adhesive: As recommended by insulation manufacturer.

G. Sealants: As recommended by membrane manufacturer.

H. Miscellaneous Accessories: Provide pourable sealers, preformed cone and vent sheet flashings, preformed inside and outside corner sheet flashings, T-joint covers, termination reglets, cover strips, slip sheet, and other accessories, as required for a complete installation.

I. Walkway Pads: Suitable for maintenance traffic, contrasting color or otherwise visually distinctive from roof membrane.
1. Composition: Roofing membrane manufacturer's standard.
2. Size: Manufacturer's standard size.
3. Surface Color: As selected by Architect from manufacturer's standard.
4. Surface Texture: Non-slip.

PART 3 EXECUTION

3.01 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements and other conditions affecting performance of roofing system:
1. Verify that surfaces and site conditions are ready to receive work.
2. Verify deck is supported and secure.
3. Verify deck is clean and smooth, flat, free of depressions, waves, or projections, properly sloped and suitable for installation of roof system.

B. Verify deck surfaces are dry and free of snow or ice.
1. Verify that roof openings, curbs, and penetrations through roof are solidly set, and cant strips, nailing strips, and reglets are in place.

3.02 INSTALLATION, GENERAL

A. Perform work in accordance with manufacturer's instructions, NRCA (RM), and NRCA (WM) applicable requirements.

B. Do not apply roofing membrane during cold or wet weather conditions.

C. Do not apply roofing membrane when ambient temperature is outside the temperature range recommended by manufacturer.

D. Do not apply roofing membrane to damp or frozen deck surface or when precipitation is expected or occurring.

E. Do not expose materials vulnerable to water or sun damage in quantities greater than can be weatherproofed the same day.

3.03 INSTALLATION - INSULATION, UNDER MEMBRANE

A. Ensure vapor retarder is clean and dry, continuous, and ready for application of insulation.

B. Attachment of Insulation: Embed insulation in adhesive in full contact, in accordance with roofing and insulation manufacturers' instructions.

C. Cover Boards: Mechanically fasten cover boards in accordance with roofing manufacturer's instructions.

D. Lay subsequent layers of insulation with joints staggered minimum 6 inches from joints of preceding layer.

E. Place tapered insulation to the required slope pattern in accordance with manufacturer's instructions.

F. Lay boards with edges in moderate contact without forcing. Cut insulation to fit neatly to perimeter blocking and around penetrations through roof.

G. Tape joints of insulation in accordance with roofing and insulation manufacturers' instructions.

H. Do not install more insulation than can be covered with membrane in same day.

3.04 INSTALLATION - MEMBRANE

A. Roll out membrane, free from wrinkles or tears. Place sheet into place without stretching.

B. Shingle joints on sloped substrate in direction of drainage.

C. Fully Adhered Application: Apply adhesive to substrate at rate of manufacturer's recommended gallons per square foot. Fully embed membrane in adhesive except in areas directly over or within 3 inches of expansion joints. Fully adhere one roll before proceeding to adjacent rolls.

D. Overlap edges and ends and seal seams by contact adhesive, minimum 3 inches. Seal permanently waterproof.

E. At intersections with vertical surfaces:
   1. Extend membrane over cant strips and up a minimum of 4 inches onto vertical surfaces.
   2. Fully adhere flexible flashing over membrane and up to nailing strip, reglet or termination bar as detailed.
   3. Secure flashing to nailing strips at 4 inches on center.

F. Around roof penetrations, seal flanges and flashings with flexible flashing.

G. Coordinate installation of roof drains and scuppers and related flashings.

3.05 INSTALLATION - WALKWAY PADS

A. Install walkway pads as indicated on the drawings.
   1. Install walkway products at roof ladders, at hatches and doors to roof, around mechanical equipment; below downspouts, and in locations indicated.
   2. Adhere walkway products to substrate with compatible adhesive according to roofing system manufacturer's written instructions.
   3. Space pad joints to permit drainage.

3.06 FIELD QUALITY CONTROL

A. See Section 01 4000 - Quality Requirements for additional requirements.

B. Owner will provide testing services, and Contractor to provide temporary construction and materials for testing in accordance with requirements.

C. Provide periodic on-site attendance of roofing and insulation manufacturer's representative during installation of this work.

3.07 CLEANING

A. See Section 01 7000 - Execution and Closeout Requirements for additional requirements.

B. Remove bituminous markings from finished surfaces.

C. In areas where finished surfaces are soiled by work of this section, consult manufacturer of surfaces for cleaning advice and comply with their documented instructions.

D. Repair or replace defaced or damaged finishes caused by work of this section.

3.08 PROTECTION

A. Protect installed roofing and flashings from construction operations.

B. Where traffic must continue over finished roof membrane, protect surfaces using durable materials.

END OF SECTION

SECTION 07 6200
SHEET METAL FLASHING AND TRIM

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Fabricated sheet metal items, including flashings, counterflashings, gutters, and downspouts.

B. Sealants for joints within sheet metal fabrications.

1.02 RELATED REQUIREMENTS

A. Section 06 1000 - Rough Carpentry: Wood nailers for sheet metal work.

B. Section 07 9200 - Joint Sealants: Sealing non-lap joints between sheet metal fabrications and adjacent construction.

1.03 REFERENCE STANDARDS

A. AAMA 2605 - Voluntary Specification, Performance Requirements and Test Procedures for Superior Performing Organic Coatings on Aluminum Extrusions and Panels (with Coil Coating Appendix).

B. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.

C. ASTM A666/A666M - Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar.

D. ASTM A755/A755M - Standard Specification for Steel Sheet, Metallic Coated by the Hot-Dip Process and Prepainted by the Coil-Coating Process for Exterior Exposed Building Products.

E. ASTM A792/A792M - Standard Specification for Steel Sheet, 55% Aluminum-Zinc Alloy-Coated by the Hot-Dip Process.

F. ASTM B209/B209M - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate.

G. ASTM C920 - Standard Specification for Elastomeric Joint Sealants.

H. ASTM D2244 - Standard Practice for Calculation of Color Tolerances and Color Differences from Instrumentally Measured Color Coordinates.

I. ASTM D226/D226M - Standard Specification for Asphalt-Saturated Organic Felt Used in Roofing and Waterproofing.

J. ASTM D4214 - Standard Test Methods for Evaluating the Degree of Chalking of Exterior Paint Films.

K. ASTM D523 - Standard Test Method for Specular Gloss.

L. SMACNA (ASMM) - Architectural Sheet Metal Manual.

1.04 SUBMITTALS

A. Shop Drawings: Indicate material profile, jointing pattern, jointing details, fastening methods, flashings, terminations, and installation details.

B. Samples: Submit two samples 3 by 4 inch in size illustrating metal finish color.

1.05 QUALITY ASSURANCE

A. Perform work in accordance with SMACNA (ASMM) requirements and standard details, except as otherwise indicated.

B. Fabricate and install roof edge profiles to comply with ANSI/SPRI/FM 4435/ES-1 Wind Design Standard for Edge Systems Used with Low Slope Roofing Systems.

C. Fabricator and Installer Qualifications: Company specializing in sheet metal work with five years of documented experience.

D. 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. Temperature Change: 120 deg F, ambient; 180 deg F, material surfaces

1.06 DELIVERY, STORAGE, AND HANDLING

A. Stack material to prevent twisting, bending, and abrasion, and to provide ventilation. Slope metal sheets to ensure drainage.

B. Prevent contact with materials that could cause discoloration or staining.

1.07 WARRANTY

A. See Section 01 7800 - Closeout Submittals, for additional warranty requirements.

B. Finish Warranty: Provide manufacturer's written warranty stating that the finish will perform as follows for minimum of 20 years:
   1. Chalking: No more than that represented by a No. 8 rating based on ASTM D4214.
   2. Color Retention: No fading or color change in excess of 5 Hunter color difference units, calculated in accordance with ASTM D2244.
   3. Gloss Retention: Minimum of 30 percent gloss retention, when tested in accordance with ASTM D523.

PART 2 PRODUCTS

2.01 SHEET MATERIALS

A. Stainless Steel: ASTM A666/A666M, Type 304 alloy, soft temper, 28 gauge, 0.0156 inch thick; smooth No. 4 - Brushed finish.

2.02 PREFINISHED ALUMINUM SHEETS

A. Description: Factory-applied topcoat systems applied to aluminum flat sheet substrates prior to fabrication by coil coating; topcoat systems consist of primers and organic topcoats on exposed side and backing coats on unexposed side.

B. Aluminum Sheet Substrates: ASTM B209/B209M, alloy and temper as recommended by manufacturer for application.

C. Superior Performance Organic Coating System: Comply with AAMA 2605 for aluminum preparation, pretreatment, primer and finish coat system; provide thermally cured 70-percent PVDF fluoropolymer systems; tested for weathering for 10 years with 5 delta units color change maximum.

2.03 PREPAINTED, METALLIC-COATED STEEL SHEETS

A. Description: Factory-applied coatings applied to metallic-coated steel sheet substrates prior to fabrication by coil coating; topcoat systems consist of primers and organic topcoats on exposed, top side of sheet; washcoats on bottom, unexposed sheet side.

B. Comply with ASTM A755/A755M.

C. Metallic-Coated Steel Sheet Substrates:
   1. Aluminum-Zinc-Alloy-Coated Steel Sheets: Commercial steel sheets, alloy-coated by hot-dip process; comply with ASTM A792/A792M; coating designation AZ50.

D. Substrate Preparation for Prefinishing: Clean and prepare substrate surfaces in accordance with coating manufacturer's recommendations for substrate type and application.

E. Washcoats or Backercoats: Provide washcoats or backercoats in accordance with organic coating manufacturer's recommendations.

F. Primer Coats: Provide basecoat primers in accordance with coating manufacturer's recommendations for substrate type, topcoat, and application.

G. Superior Performance Organic Coating System: Provide thermally cured 70-percent PVDF or FEVE fluoropolymer systems in accordance with AAMA 2605, tested for weathering for 10 years with 5 delta units maximum of color change.

2.04 FABRICATION

A. Form sections true to shape, accurate in size, square, and free from distortion or defects.
   1. Provide custom profiles where indicated.

B. Form pieces in longest possible lengths.

C. Hem exposed edges on underside 1/2 inch; miter and seam corners.

D. Form material with batten seams, except where otherwise indicated; at moving joints, use sealed lapped, bayonet-type or interlocking hooked seams.

E. Fabricate corners from one piece with minimum 18-inch long legs; seam for rigidity, seal with sealant.

F. Fabricate vertical faces with bottom edge formed outward 1/4 inch and hemmed to form drip.

G. Fabricate roof edge copings and flashings to comply with ANSI/SPRI/FM 4435/ES-1 Wind Design Standard for Edge Systems Used with Low Slope Roofing Systems.

2.05 GUTTERS AND DOWNSPOUTS

A. Gutters: SMACNA (ASMM) Rectangular profile, 6 x 6 inches, unless otherwise indicated.

B. Downspouts: Rectangular profile, 4 x 4 inches, unless otherwise indicated.

C. Accessories: Profiled to suit gutters and downspouts.
1. Anchorage Devices: In accordance with SMACNA (ASMM) requirements.
2. Gutter Supports: Brackets.
3. Downspout Supports: Brackets.

D. Splash Pads: Precast concrete type, of size and profiles indicated; minimum 3,000 psi at 28 days, with minimum 5 percent air entrainment.

E. Downspout Boots: Steel.

F. Downspout Extenders: Same material and finish as downspouts.

G. Seal metal joints.

2.06 ACCESSORIES

A. General: Provide materials and types of fasteners, solder, welding rods, protective coatings, separators, sealants, and other miscellaneous items as required for complete sheet metal flashing and trim installation.

B. Fasteners: Wood screws, annular threaded nails, self-tapping screws, self-locking rivets and bolt, and other suitable fasteners designed to withstand design loads.
1. Exposed Fasteners: Heads matching color of sheet metal by means of plastic caps or factory-applied coating.
2. Fasteners for Flashing and Trim: Blind fasteners or self-drilling screws, gasketed with hex washer heads.
3. Blind Fasteners: High-strength aluminum or stainless-steel rivets.
4. Use fasteners of sizes that will penetrate substrate not les than 1-1/4 inches for nails and not less than 3/4 inch for wood screws. Use stainless steel fasteners.
5. Neoprene washers

C. Underlayment: ASTM D226/D226M, organic roofing felt, Type II, No. 30.

D. Primer Type: Zinc chromate.

E. Protective Backing Paint: Zinc molybdate alkyd, 15 mils DFT minimum.

F. Concealed Sealants: Non-curing butyl sealant.

G. Exposed Sealants: ASTM C920; elastomeric sealant, with minimum movement capability as recommended by manufacturer for substrates to be sealed; color to match adjacent material.

H. Reglets: Surface mounted type, galvanized steel.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify roof openings, curbs, pipes, sleeves, ducts, and vents through roof are solidly set, reglets in place, and nailing strips located.

B. Verify roofing termination and base flashings are in place, sealed, and secure.

3.02 PREPARATION

A. Install starter and edge strips, and cleats before starting installation.

B. Install surface mounted reglets true to lines and levels, and seal top of reglets with sealant.

C. Back paint concealed metal surfaces with protective backing paint to a minimum dry film thickness of 15 mil, 0.015 inch.

3.03 INSTALLATION

A. Insert flashings into reglets to form tight fit; secure in place with plastic wedges; seal flashings into reglets with sealant.

B. Secure flashings in place using concealed fasteners, and use exposed fasteners only where permitted.

C. 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.

D. Apply plastic cement compound between metal flashings and felt flashings.

E. Fit flashings tight in place; make corners square, surfaces true and straight in planes, and lines accurate to profiles.

F. Seal metal joints watertight.

3.04 SCHEDULE

A. Gutters and Downspouts: prefinished galvanized steel.

B. Coping, Cap, Parapet, Sill and Ledge Flashings: prefinished aluminum.

C. Flashings and Counterflashings at aluminum-framed openings: prefinished aluminum.

D. Counterflashings at Roofing Terminations (over roofing base flashings): prefinished galvanized steel.

E. Counterflashings at Curb-Mounted Roof Items: pre-finished galvanized steel.

F. Roofing Penetration Flashings, for Pipes, Structural Steel, and Equipment Supports: Stainless Steel: 0.0187 inch thick.

G. Roof-Drain Flashing: Stainless Steel: 0.0156 inch, unless heavier gauge is required for roofing warranty.

END OF SECTION

SECTION 07 7200
ROOF ACCESSORIES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Roof hatches.

1.02 RELATED REQUIREMENTS

A. Section 07 5300 - Elastomeric Membrane Roofing: coordination.

1.03 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements for submittal procedures.

B. Product Data: Manufacturer's data sheets on each product to be used.
   1. Preparation instructions and recommendations.
   2. Storage and handling requirements and recommendations.
   3. Installation methods.
   4. Maintenance requirements.

C. Shop Drawings: Submit detailed layout developed for this project and provide dimensioned location and number for each type of roof accessory.

D. Warranty Documentation:
   1. Submit manufacturer warranty.
   2. Ensure that forms have been completed in Owner's name and registered with manufacturer.
   3. Submit documentation that roof accessories are acceptable to roofing manufacturer, and do not limit the roofing warranty.

1.04 DELIVERY, STORAGE, AND HANDLING

A. Store products in manufacturer's unopened packaging until ready for installation.

B. Store products under cover and elevated above grade.

1.05 WARRANTY

A. See Section 01 7800 - Closeout Submittals for additional warranty requirements.

B. Manufacturer Warranty: Provide 5-year manufacturer warranty for defects in material and workmanship, and rust or other degradation of the metal itself. Complete forms in Owner's name and register with manufacturer.

PART 2 PRODUCTS

2.01 ROOF HATCHES

A. Roof Hatch Manufacturers:
   1. Acudor Products Inc; Galvanized Steel Roof Hatch: www.acudor.com/#sle.
   2. Babcock-Davis; Personnel: www.babcockdavis.com/#sle.
   3. **BASIS OF DESIGN:** Bilco Company; NB50TB: www.bilco.com/#sle.
   4. Milcor, Inc: www.milcorinc.com.
   5. Nystrom, Inc: www.nystrom.com/#sle.
   6. Substitutions: See Section 01 6000 - Product Requirements.

B. Roof Hatches : Factory-assembled aluminum frame and cover, complete with operating and release hardware.
   1. Style: Provide flat metal covers unless otherwise indicated.
   2. Mounting: Provide frames and curbs suitable for mounting conditions as indicated on drawings.
   3. Thermally Broken Hatches: Added insulation to frame and cover; available in each manufacturer's standard.
   4. For Ships Ladder Access: Single leaf; 30 by 54 inches minimum.

C. Frames and Curbs: One-piece curb and frame with integral cap flashing to receive roof flashings; extended bottom flange to suit mounting.

1. Material: Mill finished aluminum, 11 gauge, 0.0907 inch thick.
2. Insulation: Manufacturer's standard; 3 inch rigid polyisocyanurate, located on outside face of curb.
3. Curb Height: 12 inches from finished surface of roof, minimum.

D. Metal Covers: Flush, insulated, hollow metal construction.
1. Capable of supporting 40 psf live load.
2. Material: Mill finished aluminum; outer cover 11 gauge, 0.0907 inch thick, liner 0.04 inch thick.
3. Insulation: Manufacturer's standard 3 inch rigid polyisocyanurate.
4. Gasket: Heavy, extruded EPDM, continuous around cover perimeter.

E. Hardware: Steel, zinc coated and chromate sealed, unless otherwise indicated or required by manufacturer.
1. Lifting Mechanisms: Compression or torsion spring operator with shock absorbers that automatically opens upon release of latch; capable of lifting covers despite 10 psf load.
2. Hinges: Heavy duty pintle type.
3. Hold open arm with vinyl-coated handle for manual release.
4. Latch: Upon closing, engage latch automatically and reset manual release.
5. Manual Release: Pull handle on interior.
6. Locking: Padlock hasp on interior.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that substrate is sound, dry, smooth, clean, sloped for drainage, and securely anchored.

B. Do not begin installation until substrates have been properly prepared.

C. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

3.02 PREPARATION

A. Clean surfaces thoroughly prior to installation.

B. Prepare surfaces using methods recommended by manufacturer for achieving acceptable results for applicable substrate under project conditions.

3.03 INSTALLATION

A. Install in accordance with manufacturer's instructions, in manner that maintains roofing system weather-tight integrity.

B. Install roof accessories level, plumb, true to line and elevation, and without warping, jogs in alignment, excessive oil canning, buckling, or tool marks.

C. Anchor roof accessories securely in place so they are capable of resisting indicated loads.

D. Use fasteners, separators, sealants, and other miscellaneous items as required to complete installation of roof accessories and fit them to substrates.

E. Install roof accessories to resist exposure to weather without failing, rattling, leaking, or loosening of fasteners and seals.

F. Seal joints with elastomeric sealant as required by roof accessory manufacturer.

3.04 CLEANING

A. See Section 01 7000 - Execution and Closeout Requirements for additional requirements.

B. Clean installed work to like-new condition.

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 07 8400
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.

C. Work to install Firestopping provided in 07 8400 shall be performed by a single contractor specializing in such work. General contractor shall coordinate work with various trades.

1.02 RELATED REQUIREMENTS

A. Section 01 7000 - Execution and Closeout Requirements: Cutting and patching.

B. Section 07 9200 - Joint Sealants.

C. Section 09 2116 - Gypsum Board Assemblies: Gypsum wallboard fireproofing.

1.03 REFERENCE STANDARDS

A. ASTM E119 - Standard Test Methods for Fire Tests of Building Construction and Materials.

B. ASTM E814 - Standard Test Method for Fire Tests of Penetration Firestop Systems.
   1. ASTM E1966 - Standard Test Method for Fire-Resistive Joint Systems.

C. 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.

D. ASTM G21 - Standard Practice for Determining Resistance of Synthetic Polymeric Materials to Fungi.

E. ITS (DIR) - Directory of Listed Products.

F. FM 4991 - Approval Standard of Firestop Contractors.

G. FM (AG) - FM Approval Guide.

H. UL 2079 - Standard for Tests for Fire Resistance of Building Joint Systems.

I. UL (FRD) - Fire Resistance Directory.

1.04 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements for submittal procedures.

B. Schedule of Firestopping: List each type of penetration, fire rating of the penetrated assembly, and firestopping test or design number.

C. Product Data: Provide data on product characteristics, performance ratings, and limitations.
   1. VOC Data: provide printed statement of VOC content of non-preformed sealants

D. Installer's qualification statement.

1.05 QUALITY ASSURANCE

A. Fire Testing: Provide firestopping assemblies of designs that provide the scheduled fire ratings when tested in accordance with methods indicated, ASTM E119, and ASTM E814.
   1. Listing in UL (FRD), FM (AG), or ITS (DIR) will be considered as constituting an acceptable test report.
   2. Submission of actual test reports is required for assemblies for which none of the above substantiation exists.

B. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum five years documented experience.

C. Installer Qualifications: Company specializing in performing the work of this section and:
   1. Trained by manufacturer.
   2. Approved by Factory Mutual Research Corporation under FM 4991, or meeting any two of the following requirements:

3. With minimum 3 years experience installing work of this type.
4. Work to install Firestopping provided in 07 84 00 shall be performed by a single contractor specializing in such work. General contractor shall coordinate work with various trades.

1.06 MOCK-UPS

A. Install one firestopping assembly representative of each fire rating design required on project.
   1. Where one design may be used for different penetrating items or in different wall constructions, install one assembly for each different combination.

B. Obtain approval of authorities having jurisdiction (AHJ) before proceeding.

C. If accepted, mock-up will represent minimum standard for this work.

D. If accepted, mock-up may remain as part of this work. Remove and replace mock-ups not accepted.

1.07 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.

1.08 WARRANTY

A. See Section 01 7800 - Closeout Submittals, for additional warranty requirements.

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. GCP Applied Technologies: www.gcpat.com
   4. Hilti, Inc: www.us.hilti.com/#sle.
   5. Nelson FireStop Products: www.nelsonfirestop.com/#sle.
   6. Rectorseal; www.rectorseal.com
   7. Specified Technologies Inc: www.stifirestop.com/#sle.
   8. Tremco Commercial Sealants & Waterproofing: www.tremcosealants.com/#sle.
   9. Substitutions: See Section 01 6000 - Product Requirements.

2.02 MATERIALS

A. Firestopping Materials: Any materials meeting requirements.

B. Mold and Mildew Resistance: Provide firestopping materials with mold and mildew resistance rating of zero(0) in accordance with ASTM G21.

C. Primers, Sleeves, Forms, Insulation, Packing, Stuffing, and Accessories: Provide type of materials as required for tested firestopping assembly.

D. Fire Ratings: Refer to drawings for required systems and ratings.

2.03 FIRESTOPPING, GENERAL

A. Fire Ratings: Use any system listed by UL or tested in accordance with ASTM E 814 that has F Rating equal to fire rating of penetrated assembly and T Rating of 1 and that meets all other specified requirements.

B. Compatibility: Provide through-penetration firestop systems that are compatible with one another; with the substrates forming openings; and with the items, if any, penetrating through-penetration firestop systems, under conditions of service and application, as demonstrated by through-penetration firestop system manufacturer based on testing and field experience.

C. Accessories: Provide components for each through-penetration firestop system that are needed to install fill materials and to comply with Part 1 “Performance Requirements” Article. Use only components specified by through-penetration firestop system manufacturer and approved by qualified testing and inspecting agency for firestop systems indicated.

2.04 MATERIALS

A. Cast-in-Place Firestop Devices: Factory-assembled devices for use in cast-in-place concrete floors and consisting of an outer metallic sleeve lined with an intumescent strip, a radial extended flange attached to one end of the sleeve for fastening to concrete formwork, and a neoprene gasket.

B. Latex Sealants: Single-component latex formulations that after cure do not re-emulsify during exposure to moisture.

C. Firestop Devices: Factory-assembled collars formed from galvanized steel and lined with intumescent material sized to fit specified diameter of penetrant.

D. Firestop Devices - Wrap Type: Mechanical device with incombustible filler and sheet stainless steel jacket, intended to be installed after penetrating item has been installed; conforming to the following:
   1. Durability and Longevity: Permanent; suitable for pedestrian traffic.
   2. Manufacturers:
      a. A/D Fire Protection Systems Inc: www.adfire.com.
      b. 3M Fire Protection Products: www.3m.com/firestop.
      c. Hilti, Inc: www.us.hilti.com.
      d. Specified Technologies, Inc: www.stifirestop.com.
      e. Substitutions: See Section 01 60 00 - Product Requirements.

E. Fire Dam Spray Material: Mineral wool backing with sprayed intumescent coating. For top of wall to ceiling joints.
   1. Manufacturers:
      a. 3M Fire Protection Products; Product: "Firedam Spray": www.3m.com/firestop.
      b. Hilti, Inc: “CFS-SP WB”; www.us.hilti.com.
      c. Isolatek International; Product: "Cafco TPS Type CT": www.isolatek.com.
      d. Substitutions: See Section 01 60 00 - Product Requirements.

F. Intumescent Composite Sheets: Rigid panels consisting of aluminum-foil-faced elastomeric sheet bonded to galvanized steel sheet.

G. Intumescent Putties: Nonhardening dielectric, water-resistant putties containing no solvents, inorganic fibers, or silicone compounds.
   1. Potential Expansion: Minimum 1000 percent.
   2. Durability and Longevity: Permanent.
   3. Color: Black, dark gray, or red.
   4. Manufacturers:
      a. A/D Fire Protection Systems Inc: www.adfire.com.
      b. 3M Fire Protection Products; Product "3M Fire Barrier Moldable Putty Stix MP+" and "3M Fire Barrier Moldable Putty Pads MPP+": www.3m.com/firestop.
      c. Hilti, Inc; Product "CP 618 Firestop Putty Stick" and "CP 617 Firestop Putty Pads" : www.us.hilti.com.
      d. Specified Technologies, Inc; Product "Series SSP Putty and Putty Pads": www.stifirestop.com
      e. Substitutions: See Section 01 60 00 - Product Requirements.

H. Intumescent Wrap Strips: Single-component intumescent elastomeric sheets with aluminum foil on one side.

I. Mortars: Prepackaged dry mixes consisting of a blend of inorganic binders, hydraulic cement, fillers, and lightweight aggregate formulated for mixing with water at Project site to form a nonshrinking, homogeneous mortar.

J. Pillows/Bags: Reusable heat-expanding pillow/bags consisting of glass-fiber cloth cases filled with a combination of mineral-fiber, water-insoluble expansion agents, and fire-retardant additives.

K. Silicone Foams: Multicomponent, silicone-based liquid elastomers that, when mixed, expand and cure in place to produce a flexible, nonshrinking foam.

L. 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 other surfaces requiring a nonslumping, gunnable sealant, unless indicated firestop system limits use to nonsag grade for both opening conditions.
   2. Grade for Horizontal Surfaces: Pourable (self-leveling) formulation for openings in floors and other horizontal surfaces.
   3. Grade for Vertical Surfaces: Nonsag formulation for openings in vertical and other surfaces.
   4. Shrinkage: 25 percent.
   5. Durability and Longevity: Permanent.
   6. Color: Black, dark gray, or red.
   7. Manufacturers:
      a. A/D Fire Protection Systems Inc; Product "A/D FIREBARRIER Silicone": www.adfire.com.
      b. 3M Fire Protection Products; Product "3M Fire Barrier 2000+": www.3m.com/firestop.
      c. Hilti, Inc; Product "CP 601S Elastomeric Firestop Sealant": www.us.hilti.com.
      d. Specified Technologies, Inc: www.stifirestop.com
      e. Substitutions: See Section 01 60 00 - Product Requirements.

M. Fibered Compound Firestopping: Formulated compound mixed with incombustible non-asbestos fibers; conforming to the following:
   1. Durability and Longevity: Permanent.
   2. Color: Dark grey.
   3. Manufacturers:
      a. A/D Fire Protection Systems Inc: www.adfire.com.
      b. Hilti, Inc; Product : www.us.hilti.com.
      c. USG: www.usg.com.
      d. Substitutions: See Section 01 60 00 - Product Requirements.

N. Fiber Firestopping: Mineral fiber insulation used in conjunction with elastomeric surface sealer forming airtight bond to opening; conforming to the following:
   1. Durability and Longevity: Permanent.
   2. Manufacturers:
      a. A/D Fire Protection Systems Inc; Product "A/D FIREBARRIER Mineral Wool": www.adfire.com.
      b. Roxul: www.roxul.com.
      c. Thermafiber, Inc: www.thermafiber.com.
      d. Or approved equivalent.

O. Primers, Sleeves, Forms, Insulation, Packing, Stuffing and Accessories: Type required for tested assembly design.

2.05 FIRESTOPPING ASSEMBLY REQUIREMENTS

A. Head-of-Wall (HW) 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 wall assembly.
   1. Movement: Provide systems that have been tested to show movement capability as indicated.

B. Floor-to-Floor (FF), Floor-to-Wall (FW), Head-of-Wall (HW), and Wall-to-Wall (WW) 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.

1. Movement: Provide systems that have been tested to show movement capability as indicated.

C. 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.

2.06 MIXING

A. For those products requiring mixing before application, comply with through-penetration firestop system 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. Verify openings are ready to receive the work of this section.

B. Examine substrates and conditions, with Installer present, for compliance with requirements for opening configurations, penetrating items, substrates, and other conditions affecting performance of work.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

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 arrest liquid material 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. Fill voids and cavities formed by openings, forming materials, accessories and penetrating items to achieve required fire-resistance ratings.

C. For fill materials that will remain exposed after completing the Work, finish to produce smooth, uniform surfaces that are flush with adjoining finishes.

D. Do not cover installed firestopping until inspected by authorities having jurisdiction.

E. Repair or replace penetration firestopping and joints at locations where inspection results indicate firestopping or joints do not meet specified requirements.

F. Install labeling required by code.

1. Penetration Identification: Identify each penetration firestopping system with legible metal or plastic labels. Attach labels permanently to surfaces adjacent to and within 6 inches of penetration firestopping system edge so labels are visible to anyone seeking to remove penetrating items or firestopping systems. Use mechanical fasteners or self-adhering-type labels with adhesives capable of permanently bonding labels to surfaces on which labels are placed. Include the following information on labels:
   a. The words "Warning - Penetration Firestopping - Do Not Disturb. Notify Building Management of Any Damage."
   b. Contractor's name, address, and phone number.
   c. Designation of applicable testing and inspecting agency.
   d. Date of installation.
   e. Manufacturer's name.
   f. Installer's name.

3.04 CLEANING

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 system manufacturers and that do not damage materials in which openings occur.

B. Provide final protection and maintain conditions during and after installation that ensure that penetration firestopping systems are 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 material and install new materials to produce systems complying with specified requirements.

3.05 PROTECTION

A. Protect adjacent surfaces from damage by material installation.

END OF SECTION

SECTION 07 9200
JOINT SEALANTS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Nonsag gunnable joint sealants, including:

B. Self-leveling pourable joint sealants.

C. Joint backings and accessories.

1.02 RELATED REQUIREMENTS

A. Section 07 2700 - Air Barriers: Sealants required in conjunction with air barriers and vapor retarders.

B. Section 07 8400 - Firestopping: Firestopping sealants.

C. Section 08 7100 - Door Hardware: Setting exterior door thresholds in sealant.

D. Section 08 8000 - Glazing: Glazing sealants and accessories.

E. Section 09 2116 - Gypsum Board Assemblies: Sealing acoustical and sound-rated walls and ceilings.

F. Section 09 3000 - Tiling: Sealant between tile and plumbing fixtures and at junctions with other materials and changes in plane.

1.03 REFERENCE STANDARDS

A. ASTM C661 - Standard Test Method for Indentation Hardness of Elastomeric-Type Sealants by Means of a Durometer.

B. ASTM C834 - Standard Specification for Latex Sealants.

C. ASTM C919 - Standard Practice for Use of Sealants in Acoustical Applications.

D. ASTM C920 - Standard Specification for Elastomeric Joint Sealants.

E. ASTM C1193 - Standard Guide for Use of Joint Sealants.

F. ASTM C1248 - Standard Test Method for Staining of Porous Substrate by Joint Sealants.

G. ASTM C1311 - Standard Specification for Solvent Release Sealants.

H. ASTM C1330 - Standard Specification for Cylindrical Sealant Backing for Use with Cold Liquid-Applied Sealants.

I. ASTM C1521 - Standard Practice for Evaluating Adhesion of Installed Weatherproofing Sealant Joints.

J. ASTM D2240 - Standard Test Method for Rubber Property--Durometer Hardness.

K. SCAQMD 1168 - Adhesive and Sealant Applications.

1.04 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements for submittal procedures.

B. Product Data: Submit manufacturer's technical datasheets for each product to be used; include the following:
   1. Physical characteristics, including movement capability, VOC content, hardness, cure time, and color availability.
   2. List of backing materials approved for use with the specific product.
   3. Substrates that product is known to satisfactorily adhere to and with which it is compatible.
   4. Substrates the product should not be used on.
   5. Substrates for which use of primer is required.

C. Product Data for Accessory Products: Submit manufacturer's technical data sheet for each product to be used, including physical characteristics, installation instructions, and recommended tools.

D. Color Cards for Selection: Where sealant color is not specified, submit manufacturer's color cards showing standard colors available for selection.

E. Field Quality Control Plan: Submit at least two weeks prior to start of installation.

F. Field Quality Control Log: Submit filled-out log for each length or instance of sealant installed, within 10 days after completion of inspections/tests; include bagged test samples and photographic records, if any.

1.05 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum ten years documented experience.

B. Installer Qualifications: Company specializing in performing the work of this section and with at least three years of experience.

C. Testing Agency Qualifications: Independent firm specializing in performing testing and inspections of the type specified in this section.

D. Field Quality Control Plan:
1. Visual inspection of entire length of sealant joints.
2. Nondestructive field adhesion testing of sealant joints, except interior acrylic latex sealants.

E. Field Adhesion Test Procedures:
1. Allow sealants to fully cure as recommended by manufacturer before testing.
2. Have a copy of the test method document available during tests.
3. Record the type of failure that occurred, other information required by test method, and the information required on the Field Quality Control Log.
4. If any combination of sealant type and substrate does not show evidence of minimum adhesion or shows cohesion failure before minimum adhesion, report results to Architect.

F. Nondestructive Field Adhesion Test: Test for adhesion in accordance with ASTM C1521, using Nondestructive Spot Method.
1. Record results on Field Quality Control Log.
2. Repair failed portions of joints.

1.06 FIELD CONDITIONS

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

1.07 WARRANTY

A. See Section 01 7800 - Closeout Submittals, for additional warranty requirements.

B. Correct defective work within a five year period after Date of Substantial Completion.
1. For silicone sealants within 20 years.

C. Warranty: Include coverage for installed sealants and accessories that fail to achieve watertight seal , exhibit loss of adhesion or cohesion, or do not cure.

D. See Section 01 7800 - Closeout Submittals, for additional warranty requirements.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Nonsag Sealants:
1. Adhesives Technology Corporation: www.atcepoxy.com.
2. Bostik Inc: www.bostik-us.com.
3. Chem Link, Inc: www.chemlinkinc.com.
4. Dow: www.dow.com/#sle.
5. Franklin International, Inc: www.titebond.com.
6. Hilti, Inc: www.us.hilti.com/#sle.
7. Master Builders Solutions: www.master-builders-solutions.com/en-us/#sle.
8. Momentive Performance Materials, Inc (formerly GE Silicones): www.momentive.com/#sle.
9. Pecora Corporation: www.pecora.com/?sle.
10. The QUIKRETE Companies: www.quikrete.com.
11. Sherwin-Williams Company: www.sherwin-williams.com.

12. Sika Corporation: www.usa-sika.com.
13. Tremco Commercial Sealants & Waterproofing: www.tremcosealants.com/#sle.
14. W.R. Meadows, Inc: www.wrmeadows.com/sle.
15. Substitutions: See Section 01 6000 - Product Requirements.

B. Self-Leveling Sealants:
1. Adhesives Technology Corporation: www.atcepoxy.com.
2. Bostik Inc: www.bostik-us.com.
3. Dayton Superior Corporation: www.daytonsuperior.com.
4. Dow: www.dow.com/#sle.
5. Master Builders Solutions: www.master-builders-solutions.com/en-us/#sle.
6. Pecora Corporation: www.pecora.com/?sle.
7. The QUIKRETE Companies: www.quikrete.com.
8. Sherwin-Williams Company: www.sherwin-williams.com.
9. Sika Corporation: www.usa-sika.com.
10. Tremco Commercial Sealants & Waterproofing: www.tremcosealants.com/#sle.
11. W.R. Meadows, Inc: www.wrmeadows.com/sle.
12. Substitutions: See Section 01 6000 - Product Requirements.

2.02 JOINT SEALANTS - GENERAL

A. Sealants and Primers: Provide products having lower volatile organic compound (VOC) content than indicated in SCAQMD 1168.

2.03 NONSAG JOINT SEALANTS

A. Type - General Purpose Exterior Sealant -Non-Staining Silicone Sealant: ASTM C920, Grade NS, Uses M, G, O and A; not expected to withstand continuous water immersion or traffic.
1. Nonstaining to Porous Stone: Nonstaining to light-colored natural stone when tested in accordance with ASTM C1248.
2. Hardness Range: 15 to 35, Shore A, when tested in accordance with ASTM C661.
3. Color: To be selected by Architect from manufacturer's standard range.
4. Cure Type: Single-component, neutral moisture curing.
5. Products:
a. Dow; DOWSIL 790 Silicone Building Sealant: www.dow.com/#sle.
b. Pecora Corporation; Pecora 890 NST (Non-Staining Technology): www.pecora.com/#sle.
c. Pecora Corporation; Pecora 864 NST (Non-Staining Technology): www.pecora.com/#sle.
d. Sika Corporation; Sikasil WS-290: usa.sika.com/#sle.
e. Sika Corporation; Sikasil 728NS: www.usa.sika.com/#sle.
f. Tremco Commercial Sealants & Waterproofing; Spectrem 1: www.tremcosealants.com/#sle.
g. Tremco Commercial Sealants & Waterproofing; Spectrem 2: www.tremcosealants.com/#sle.
h. Tremco Commercial Sealants & Waterproofing; Spectrem 3: www.tremcosealants.com/#sle.
i. Tremco Commercial Sealants & Waterproofing; Tremsil 200: www.tremcosealants.com/#sle.
j. Tremco Commercial Sealants & Waterproofing; Tremsil 400: www.tremcosealants.com/#sle.
k. Substitutions: See Section 01 6000 - Product Requirements.
6. Applications:
a. Wall expansion and control joints.
b. Joints between door, window, and other frames and adjacent construction.
c. Joints between different exposed materials.
d. Openings below ledge angles in masonry.
e. Control, expansion, and soft joints in masonry.
f. Joints between concrete and other materials.

B. Type - Sanitary Sealant -Mildew-Resistant Silicone Sealant: ASTM C920, Grade NS, Uses M and A; single component, mildew resistant; not expected to withstand continuous water immersion or traffic.
1. Color: White.
2. Products:

a. Dow Corning Corporation; 786 Mildew Resistant.
b. GE Advanced Materials - Silicones; Sanitary SCS1700.
c. Pecora Corporation; Pecora 898 NST (Non-Staining Technology): www.pecora.com/#sle.
d. Sika Corporation; Sikasil GP: usa.sika.com/#sle.
e. Tremco Incorporated; Tremsil 200 Sanitary..
f. Substitutions: See Section 01 6000 - Product Requirements.

3. Applications:
a. Joints between plumbing fixtures and floor and wall surfaces.
b. Joints between kitchen and bath countertops and wall surfaces.

C. Type Wet Area Floor Sealant -Non-Sag "Traffic-Grade" Polyurethane Sealant: ASTM C920, Grade NS, Uses M and A; single or multi-component; explicitly approved by manufacturer for continuous water immersion and traffic without the necessity to recess sealant below traffic surface.
1. Movement Capability: Plus and minus 50 percent, minimum.
2. Hardness Range: 20 to 30, Shore A, when tested in accordance with ASTM C661.
3. Color: To be selected by Architect from manufacturer's standard range.
4. Applications:
a. Interior control and expansion joints in concrete floors considered wet areas.

D. Type - Acoustical Sealant -Acrylic-Urethane Sealant: Water-based; ASTM C920, Grade NS, Uses M and A; single component; paintable; not expected to withstand continuous water immersion or traffic.
1. Movement Capability: Plus and minus 12-1/2 percent, minimum.
2. Hardness Range: 15 to 40, Shore A, when tested in accordance with ASTM C661.
3. Color: White.
4. Products:
a. Acoustical Surfaces, Inc.; GREENchoice Acoustical Sound Sealant: www.acousticalsurfaces.com
b. Hilti, Inc.: CP 506 Smoke and Acoustical Sealant.
c. Owens Corning: QuietZone.
d. Pecora Corporation; AIS-919 Acoustical and Insulation Latex Sealant.
e. Substitutions: See Section 01 6000 - Product Requirements.
5. Applications:
a. In sound-rated wall assemblies, and where not indicated as fire-rated:
1) gaps between top stud runner and structure, between bottom stud track and floor, between gypsum wall board and floor, and between gypsum wall board and structure.
2) gaps at electrical outlets, wiring devices, piping, and other openings; between wall/ceiling and other construction; and other flanking sound paths.

E. Type - General Purpose Interior Sealant -Acrylic Emulsion Latex: Water-based; ASTM C834, single component, non-staining, non-bleeding, non-sagging; not intended for exterior use.
1. Color: To be selected by Architect from manufacturer's standard range.
2. Grade: ASTM C834; Grade - NF.
3. Products:
a. Pecora Corporation; AC-20 +Silicone: www.pecora.com/#sle.
b. Sherwin-Williams Company; White Lightning 3006 Siliconized Acrylic Latex Caulk: www.sherwin-williams.com/#sle.
c. Sherwin-Williams Company; 850A Acrylic Latex Caulk: www.sherwin-williams.com/#sle.
d. Sherwin-Williams Company; 950A Siliconized Acrylic Latex Caulk: www.sherwin-williams.com/#sle.
e. Tremco Commercial Sealants & Waterproofing; Tremflex 834: www.tremcosealants.com/#sle.
f. Substitutions: See Section 01 6000 - Product Requirements.
4. Applications:
a. Interior wall and ceiling control joints in non-wet areas.
b. Joints between door, window, and other frames and adjacent construction.

c. Other interior joints for which no other type of sealant is indicated.

F. Type - Moving Joint Sealant -Non-Curing Butyl Sealant: Solvent-based; ASTM C1311; single component, non-sag, non-skinning, non-hardening, non-bleeding; vapor-impermeable; intended for fully concealed applications.
1. Products:
a. Pecora Corporation; Pecora BA-98 Non-Skinning Butyl Sealant: www.pecora.com/#sle.
b. Substitutions: See Section 01 6000 - Product Requirements.
2. Applications:
a. Lap Joints in Sheet Metal Fabrications
b. Lap Joints between Manufactured Metal Panels

2.04 SELF-LEVELING JOINT SEALANTS

A. Type - Exterior Pavement Sealant -Self-Leveling Polyurethane Sealant: ASTM C920, Grade P, Uses M and A; single or multi-component; explicitly approved by manufacturer for traffic exposure; not expected to withstand continuous water immersion .
1. Movement Capability: Plus and minus 25 percent, minimum.
2. Hardness Range: 35 to 55, Shore A, when tested in accordance with ASTM C661.
3. Color: Gray.
4. Service Temperature Range: Minus 40 to 180 degrees F.
5. Products:
a. Pecora Corporation: www.pecora.com/#sle.
b. Sherwin-Williams Company; Stampede 1SL Polyurethane Sealant: www.sherwin-williams.com/#sle.
c. Sherwin-Williams Company; Stampede 2SL Polyurethane Sealant: www.sherwin-williams.com/#sle.
d. Sika Corporation; Sikaflex-1c SL: usa.sika.com/#sle.
e. Sika Corporation; Sikaflex-2c SL: usa.sika.com/#sle.
f. Substitutions: See Section 01 6000 - Product Requirements.
6. Applications:
a. Control and Expansion Joints in Concrete Paving

B. Type - Interior Slabs (unpolished) -Semi-Rigid Self-Leveling Epoxy Joint Filler: Epoxy or epoxy/polyurethane copolymer; intended for filling cracks and control joints not subject to significant movement; rigid enough to support concrete edges under traffic.
1. Composition: Multicomponent, 100 percent solids by weight.
2. Durometer Hardness: Minimum of 85 for Type A or 35 for Type D, after seven days when tested in accordance with ASTM D2240.
3. Color: To be selected by Architect from manufacturer's standard colors.
4. Joint Width, Minimum: 1/8 inch.
5. Joint Width, Maximum: 1/4 inch.
6. Joint Depth: Provide product suitable for joints from 1/8 inch to 2 inches in depth including space for backer rod.
7. Products:
a. Dayton Superior Corporation; SureFil J52 & Pro-Flex: www.daytonsuperior.com/#sle.
b. Euclid Chemical Company; EUCO 700: www.euclidchemical.com/#sle.
c. Metzger/McGuire; MM-80.
d. Nox-Crete Inc; DynaFlex 502: www.nox-crete.com
e. W.R. Meadows, Inc; Rezi-Weld Flex: www.wrmeadows.com
f. Substitutions: See Section 01 6000 - Product Requirements.

C. Type - Interior Slabs - polished -Semi-Rigid Self-Leveling Polyurea Joint Filler: Two-component, 100 percent solids; intended for filling cracks and control joints not subject to significant movement; rigid enough to support concrete edges under traffic.
1. Durometer Hardness, Type A: 86, minimum, after seven days when tested in accordance with ASTM D2240.

2. Color: To be selected by Architect from manufacturer's standard colors.
3. Products:
   a. **BASIS OF DESIGN:** Metzger/McGuire; Spal-Pro RS 88: www.metzgermcguire.com.
   b. Substitutions: See Section 01 6000 - Product Requirements.

2.05 ACCESSORIES

A. Sealant Backing Rod, Closed-Cell Type:
   1. Cylindrical flexible sealant backings complying with ASTM C1330 Type C.
   2. Size: 25 to 50 percent larger in diameter than joint width.

B. Sealant Backing Rod, Bi-Cellular Type:
   1. Cylindrical flexible sealant backings complying with ASTM C1330 Type B.
   2. Size: 25 to 50 percent larger in diameter than joint width.

C. Backing Tape: Self-adhesive polyethylene tape with surface that sealant will not adhere to and recommended by tape and sealant manufacturers for specific application.

D. Masking Tape: Self-adhesive, nonabsorbent, nonstaining, removable without adhesive residue, and compatible with surfaces adjacent to joints and sealants.

E. Joint Cleaner: Noncorrosive and nonstaining type, type recommended by sealant manufacturer; compatible with joint forming materials.

F. Primers: Type recommended by sealant manufacturer to suit application; nonstaining.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that substrates and joints are ready to receive work.

B. Verify that backing materials are compatible with sealants.

3.02 PREPARATION

A. Remove loose materials and foreign matter that could impair adhesion of sealant.

B. Clean joints, and prime as necessary, in accordance with manufacturer's instructions.

C. Perform preparation in accordance with manufacturer's instructions and ASTM C1193.

D. Mask elements and surfaces adjacent to joints from damage and disfigurement due to sealant work; be aware that sealant drips and smears may not be completely removable.

E. Concrete Floor Joints That Will Be Exposed in Completed Work: Test joint filler in an inconspicuous area to verify that it does not stain or discolor slab.

3.03 INSTALLATION

A. Install this work in accordance with sealant manufacturer's requirements for preparation of surfaces and material installation instructions.

B. Provide joint sealant installations complying with ASTM C1193.

C. Install acoustical sealant application work in accordance with ASTM C919.

D. Measure joint dimensions and size joint backers to achieve the following, unless otherwise indicated:
   1. Width/depth ratio of 2:1.
   2. Neck dimension no greater than 1/3 of the joint width.
   3. Surface bond area on each side not less than 75 percent of joint width.

E. Install bond breaker backing tape where backer rod cannot be used.

F. Install sealant free of air pockets, foreign embedded matter, ridges, and sags, and without getting sealant on adjacent surfaces.

G. Do not install sealant when ambient temperature is outside manufacturer's recommended temperature range, or will be outside that range during the entire curing period, unless manufacturer's approval is obtained and instructions are followed.

H. Do not seal the following types of joints.
   1. Intentional weepholes in masonry.
   2. Joints indicated to be treated with manufactured expansion joint cover or some other type of sealing device.
   3. Joints where sealant is specified to be provided by manufacturer of product to be sealed.
   4. Joints where installation of sealant is specified in another section.
   5. Joints between suspended panel ceilings/grid and walls.
   6. Through-penetrations in sound-rated assemblies that are also fire-rated assemblies.

I. Nonsag Sealants: Tool surface concave, unless otherwise indicated; remove masking tape immediately after tooling sealant surface.

J. Concrete Floor Joint Filler: After full cure, shave joint filler flush with top of concrete slab.

3.04 CLEANING

A. Clean adjacent soiled surfaces.

3.05 PROTECTION OF FINISHED WORK

A. Protect sealants until cured.

3.06 FIELD QUALITY CONTROL

A. See Section 01 4000 - Quality Requirements for additional requirements.

B. Perform field quality control inspection/testing as specified in PART 1 under QUALITY ASSURANCE article.

C. Non-Destructive Adhesion Testing: If there are any failures in first 100 linear feet, notify Architect immediately.

D. Remove and replace failed portions of sealants using same materials and procedures as indicated for original installation.

END OF SECTION

SECTION 07 9513
EXPANSION JOINT COVER ASSEMBLIES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Expansion joint cover assemblies for floor, wall, and ceiling surfaces (EJ-#).

1.02 RELATED REQUIREMENTS

A. Section 07 9200 - Joint Sealants: Sealing expansion and control joints using gunnable and pourable sealants.

B. Section 09 2116 - Gypsum Board Assemblies: Placement of expansion joint assemblies in gypsum board walls and ceilings.

1.03 REFERENCE STANDARDS

A. ASTM B221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes.

B. ASTM B221M - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes (Metric).

C. ASTM B308/B308M - Standard Specification for Aluminum-Alloy 6061-T6 Standard Structural Profiles.

1.04 ADMINISTRATIVE REQUIREMENTS

A. Installation Templates: For frames and anchors to be embedded in concrete or masonry, furnish templates to relevant installers; include installation instructions and tolerances.

B. Preinstallation Meeting: Convene one week before starting work of this section to verify project requirements, coordinate with installers of other work, verify condition and completeness of building substrate, and review manufacturer's installation instructions and warranty requirements.
   1. Attendance Required:
      a. System installer.
   2. b. Related sub-contractors.

C. Topics of Discussion:
   1. Scheduling.
   2. Personnel.
   3. Product transition areas
   4. Installation of adjacent materials and substrates.
   5. Quality Control procedures
   6. Protection procedures for this work and other construction.

1.05 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements for submittal procedures.

B. Product Data: Provide joint assembly profiles, profile dimensions, anchorage devices and available colors and finish.

C. Shop Drawings: Indicate joint and splice locations, miters, layout of the work, affected adjacent construction and anchorage locations.
   1. Include isometric diagram of joints, with indication of each type and transition by location.

D. Samples: Submit two samples 6 inch long, illustrating profile, dimension, color, and finish selected.

E. Manufacturer's Installation Instructions: Indicate rough-in sizes and required tolerances for item placement.

1.06 QUALITY ASSURANCE

A. Field Measurements: Verify actual dimensions by field measurement prior to starting fabrication; include recorded field measurements on shop drawings.
   1. Utilize factory-fabricated transition products to greatest extent available.

B. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section, with not less than five years of documented experience.

C. Installer Qualifications: Company specializing in performing work of the type specified and approved by manufacturer.

D. Source Limitations: Obtain all architectural joint systems through one source from a single manufacturer.

E. Loading Characteristics: Standard loading refers to covers that are capable of withstanding up to 500 lb. point loads. Heavy duty refers to covers that are capable of withstanding up to 2000 lb. point load.

F. Fire-Test-Response Characteristics: Where indicated, provide architectural joint system and fire-barrier assemblies identical to those of assemblies tested for fire resistance per UL 2079 and/or ASTM E 1966 by a testing and inspecting agency acceptable to authorities having jurisdiction. Fire rating not less than the rating of adjacent construction.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Examine delivered joint materials upon receipt to ensure that no damage has occurred during shipment.

B. Store components off-the-ground, covered with suitable weathertight and ventilated covering in manufacturer's unopened packaging until ready for installation.

C. Provide markings to identify components in coordination with shop drawings.

D. Exercise care in unloading, storing and installing panels to prevent bending, warping, twisting and surface damage.

E. Avoid contact of components with other materials that might cause staining, denting, or other surface damage.

1.08 COORDINATION

A. Coordinate installation of exterior wall joint systems with roof expansion assemblies to ensure that wall transitions are watertight.

1.09 FIELD CONDITIONS

A. Measure joint during adjacent material installation and size joint to allow for expansion and contraction of adjacent materials throughout the year.

B. Maintain environmental conditions, such as temperature, humidity, and ventilation during installation to be within limits as recommended by manufacturer for optimum results.

C. Do not install wall panel products under environmental conditions outside manufacturer's recommended limits.

1.10 WARRANTY

A. See Section 01 78 00 - Closeout Submittals, for additional warranty requirements.

B. Installation Warranty: Provide warranty by manufacturer and installer, agreeing to correct defects such as: attachment to adjacent materials; component joinery; and joint seals associated with the system, within a five year period after Date of Substantial Completion.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Expansion Joint Cover Assemblies:
   1. Balco, Inc: www.balcousa.com/#sle.
   2. Construction Specialties, Inc: www.c-sgroup.com/#sle.
   3. Sika Emseal: www.emseal.com/#sle.
   4. Inpro: www.inprocorp.com/#sle.
   5. MM Systems Corp: www.mmsystemscorp.com/#sle.
   6. Nystrom, Inc: www.nystrom.com/#sle.
   7. Substitutions: See Section 01 6000 - Product Requirements.

2.02 EXPANSION JOINT COVER ASSEMBLY APPLICATIONS

A. Acoustic Join Filler and Partition Closure (EJ-1):
   1. Joint width: as indicated on Drawings
   2. Finish:
      a. Foam seals with silicone face: Color as selected and approved from manufacturer's samples
   3. Product:
      a. **BASIS OF DESIGN**: Balco; BQSWA.
      b. Substitutions: See Section 01 6000 - Product Requirements.

B. Floor to Floor Expansion Joint Cover (EJ-2):
   1. Joint width: 4 inches.
   2. Movement per ASTM E1399:
      a. Expansion/contraction: ±50% to ±100%
      b. Lateral shear: ±50% to ±100%
   3. Load capacity: Pedestrian
   4. Fire rating per UL 2079/ASTM 1966: not less than the fire rating of the adjacent construction
   5. 45 Mil EPDM water barrier
   6. Finish:
      a. Mill finish aluminum extrusions, AA-M10, unless noted otherwise.
      b. All surfaces in contact with masonry or concrete shall be protected by a factory-applied coating
   7. Product:
      a. **BASIS OF DESIGN**: Balco; RPA.
      b. Substitutions: See Section 01 6000 - Product Requirements.

C. Floor to Wall Expansion Joint Cover (EJ-3):
   1. Joint Width: 4 inches.
   2. Movement per ASTM E1399:
      a. Expansion/contraction: ±50% to ±100%
      b. Lateral shear: ±50% to ±100%
   3. Fire rating per UL 2079/ASTM 1966: not less than the fire rating of the adjacent construction
   4. 45 Mil EPDM water barrier
   5. Finish:
      a. Mill finish aluminum extrusions, AA-M10, unless noted otherwise.
      b. All surfaces in contact with masonry or concrete shall be protected by a factory-applied coating
   6. Product:
      a. **BASIS OF DESIGN**: Balco; EXBL-2-4.
      b. Substitutions: See Section 01 6000 - Product Requirements.

D. Wall to Wall Expansion Joint Cover (EJ-4):
   1. Joint Width: As indicated in Drawings.
   2. Product:
      a. **BASIS OF DESIGN**: Sika; WFT.
      b. Substitutions: See Section 01 6000 - Product Requirements.

E. Corner Wall Expansion Joint Cover (EJ-5):
   1. Joint Width: As indicated in Drawings.
   2. Product:
      a. **BASIS OF DESIGN**: Sika; WFT-C.
      b. Substitutions: See Section 01 6000 - Product Requirements.

F. Ceiling Expansion joint Cover (EJ-6)
   1. Joint Width: As indicated in Drawings.
   2. Color: White
   3. Product:

a. **BASIS OF DESIGN**: Balco: ACVS-4
b. Substitutions: See Section 01 6000 - 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 on drawings.
   4. Lengths: Provide covers in full lengths required; avoid splicing wherever possible.
   5. Anchors, Fasteners, and Fittings: Provided by cover manufacturer.

B. Resilient Seal Type Covers: Having flat exposed surface without crevices that could collect dirt; designed to withstand expected movement without extrusion of seal from joint assembly; for floors, provide style that is flush with top of floor covering; for exterior joints, weathertight.

C. Sliding Cover Plate Type Covers: Provide plate with beveled edges and neat fit that does not collect dirt.

D. Covers in Gypsum Board Assemblies: Provide style with anchoring wings that can be completely covered by joint compound.

2.04 MATERIALS

A. Extruded Aluminum: ASTM B221 (ASTM B221M), 6063 alloy, T6 temper; or ASTM B308/B308M, 6061 alloy, T6 temper.

B. Resilient Seals:
   1. For Ceilings: Any resilient material, flush, pleated, or hollow gasket.

C. Anchors and Fasteners: As recommended by cover manufacturer.

D. Ferrous Metal Anchors: Galvanized where embedded in concrete or in contact with cementitious materials.

E. Threaded Fasteners: Stainless steel.

F. Backing Paint for Aluminum Components in Contact with Cementitious Materials: Asphaltic type.

G. Accessories: Manufacturer's standard anchors, clips, fasteners, set screws, spacers, and other accessories compatible with material in contact, as indicated or required for complete installation.

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 PREPARATION

A. Prepare substrates according to architectural joint system manufacturer's written instructions.

B. Coordinate and furnish anchorages, setting diagrams, and instructions for installing joint systems. Provide fasteners of metal, type, and size to suit type of construction indicated and to provide for secure attachment of joint systems.

3.03 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.

D. Metal Frames: Perform cutting, drilling and fitting required to install joint systems.

1. Install in true alignment and proper relationship to joints and adjoining finished surfaces measured from established lines and levels.
2. Adjust for differences between actual structural gap and nominal design gap due to ambient temperature at time of installation. Notify Architect where discrepancies occur that will affect proper joint installation and performance.
3. Cut and fit ends to accommodate thermal expansion and contraction of metal without buckling of frames.
4. Locate in continuous contact with adjacent surfaces.
5. All surfaces in contact with masonry or concrete shall be protected by a factory-applied coating.
6. Standard duty Systems: Shim to level where required. Support underside of frames
7. continuously to prevent vertical deflection when in service.
8. Locate anchors at interval recommended by manufacturer, but not less than 3 inches from each end and not more than 24 inches o.c.

E. Seals in Metal Frames: Install elastomeric seals and membranes in frames to comply with manufacturer's written instructions. Install with minimum number of end joints.
1. Provide in continuous lengths for straight sections.
2. Seal transitions according to manufacturer's written instructions. Vulcanize or heat-weld field-spliced joints as recommended by manufacturer.
3. Installation: Mechanically lock seals into frames or adhere to frames with adhesive or pressure-sensitive tape as recommended by manufacturer.

F. Compression Seals: Apply adhesive or lubricant adhesive as recommended by manufacturer before installing compression seals.

G. Terminate exposed ends of joint assemblies with field- or factory-fabricated termination devices.

H. Water Barrier: Provide water barrier at exterior joints and where called for on Drawings. Provide drainage fittings where indicated.

3.04 PROTECTION

A. Do not permit traffic over unprotected floor joint surfaces. Where necessary due to heavy construction traffic, remove and properly store cove plates or seals and install temporary protection over joints. Reinstall cover plates or seals prior to Substantial Completion of the Work.

B. Provide strippable coating to protect finish surface. Do not remove protective covering until finish work in adjacent areas is complete. When protective covering is removed, clean exposed metal surfaces to comply with manufacturer's written instructions.

END OF SECTION

SECTION 08 1113
HOLLOW METAL DOORS AND FRAMES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Non-fire-rated hollow metal doors and frames.

B. Fire-rated hollow metal doors and frames.

C. Thermally insulated hollow metal doors with thermally-broken hollow metal frames.

D. Hollow metal borrowed lites glazing frames.

E. Accessories, including glazing.

1.02 RELATED REQUIREMENTS

A. Section 08 7100 - Door Hardware.

B. Section 08 8000 - Glazing: Glass for doors and borrowed lites.

C. Section 09 9123 - Interior Painting: Field painting.

1.03 ABBREVIATIONS AND ACRONYMS

A. ANSI: American National Standards Institute.

B. SDI: Steel Door Institute.

C. UL: Underwriters Laboratories.

1.04 REFERENCE STANDARDS

A. ADA Standards - 2010 ADA Standards for Accessible Design.

B. ANSI/SDI A250.4 - Test Procedure and Acceptance Criteria for Physical Endurance for Steel Doors, Frames and Frame Anchors.

C. ANSI/SDI A250.6 - Recommended Practice for Hardware Reinforcing on Standard Steel Doors and Frames.

D. ANSI/SDI A250.8 - Specifications for Standard Steel Doors and Frames (SDI-100).

E. ANSI/SDI A250.10 - Test Procedure and Acceptance Criteria for Prime Painted Steel Surfaces for Steel Doors and Frames.

F. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.

G. ASTM A1008/A1008M - Standard Specification for Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, Required Hardness, Solution Hardened, and Bake Hardenable.

H. ASTM A1011/A1011M - Standard Specification for Steel, Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, and Ultra-High Strength.

I. ASTM C143/C143M - Standard Test Method for Slump of Hydraulic-Cement Concrete.

J. ASTM C476 - Standard Specification for Grout for Masonry.

K. BHMA A156.115 - Hardware Preparation in Steel Doors and Frames.

L. ICC A117.1 - Accessible and Usable Buildings and Facilities.

M. ITS (DIR) - Directory of Listed Products.

N. NAAMM HMMA 830 - Hardware Selection for Hollow Metal Doors and Frames.

O. NAAMM HMMA 831 - Hardware Locations for Hollow Metal Doors and Frames.

P. NAAMM HMMA 840 - Guide Specifications for Receipt, Storage and Installation of Hollow Metal Doors and Frames.

Q. NAAMM HMMA 861 - Guide Specifications for Commercial Hollow Metal Doors and Frames.

R. NFPA 80 - Standard for Fire Doors and Other Opening Protectives.

S. NFPA 105 - Standard for Smoke Door Assemblies and Other Opening Protectives.

T. NFPA 252 - Standard Methods of Fire Tests of Door Assemblies.

U. SDI 117 - Manufacturing Tolerances for Standard Steel Doors and Frames.

V. UL (DIR) - Online Certifications Directory.

W. UL 10C - Standard for Positive Pressure Fire Tests of Door Assemblies.

X. UL 1784 - Standard for Air Leakage Tests of Door Assemblies and Other Opening Protectives.

1.05 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements for submittal procedures.

B. Product Data: Materials and details of design and construction, hardware locations, reinforcement type and locations, anchorage and fastening methods, and finishes.

C. Shop Drawings: Details of each opening, showing elevations, glazing, frame profiles, and any indicated finish requirements.

1.06 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section, with not less than five years documented experience.

B. Installer Qualifications: Company specializing in performing work of the type specified and with at least three years of experience.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Comply with NAAMM HMMA 840 or ANSI/SDI A250.8 (SDI-100) in accordance with specified requirements.

B. Protect with resilient packaging; avoid humidity build-up under coverings; prevent corrosion and adverse effects on factory applied painted finish.

1.08 WARRANTY

A. See Section 01 7800 - Closeout Submittals, for additional warranty requirements.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Hollow Metal Doors and Frames:
   1. Ceco Door, Assa Abloy Group companies: www.assaabloydss.com.
   2. Curries, Assa Abloy Group companies: www.assaabloydss.com.
   3. Steelcraft, an Allegion brand: www.allegion.com/sle.
   4. Substitutions: See Section 01 6000 - Product Requirements.

B. Exterior (Thermally-Broken) Hollow Metal Doors and Frames:
   1. Ceco, an Assa Abloy Group company: www.assaabloydss.com.
   2. Curries, an Assa Abloy Group company: www.assaabloydss.com.
   3. Steelcraft, an Allegion brand: www.allegion.com
   4. Substitutions: See Section 01 60 00 - Product Requirements.

2.02 PERFORMANCE REQUIREMENTS

A. Requirements for Hollow Metal Doors and Frames:
   1. Steel Sheet: Comply with one or more of the following requirements; galvannealed steel complying with ASTM A653/A653M, cold-rolled steel complying with ASTM A1008/A1008M, or hot-rolled pickled and oiled (HRPO) steel complying with ASTM A1011/A1011M, commercial steel (CS) Type B, for each.
   2. Accessibility: Comply with ICC A117.1 and ADA Standards.
   3. Door Top Closures: Flush end closure channel, with top and door faces aligned.

4. Door Edge Profile: Beveled, both sides.
5. Rabbet: single, unless otherwise indicated.
6. Typical Door Face Sheets: Flush.
7. Glazed Lights: Non-removable stops on non-secure side; sizes and configurations as indicated on drawings. Style: Flush.
8. Hardware Preparations, Selections and Locations: Comply with NAAMM HMMA 830 and NAAMM HMMA 831 or BHMA A156.115 and ANSI/SDI A250.8 (SDI-100) in accordance with specified requirements.
    a. Steel Door Reinforcing:
        1) Minimum 10 gauge steel of equivalent thread depth for hinges.
        2) Minimum 12 gauge steel for lock front, closers, and overhead hold open/stop arms.
        3) Minimum 14 gauge steel for other hardware.
    b. Steel Frame Reinforcing:
        1) Minimum 7 gauge steel of equivalent thread depth for hinges.
        2) Minimum 12 gauge steel for closers and overhead hold open/stop arms.
        3) Minimum 14 gauge steel for strikes and other hardware.
9. Zinc Coating for Typical Interior and/or Exterior Locations: Provide metal components zinc-iron alloy-coated (galvannealed) by the hot-dip process in accordance with ASTM A653/A653M, with manufacturer's standard coating thickness, unless noted otherwise for specific hollow metal doors and frames.
    a. Based on SDI Standards: Provide at least A40/ZF120 (galvannealed) when necessary, coating not required for typical interior door applications, and at least A60/ZF180 (galvannealed) for exterior and corrosive locations.

B. Hollow Metal Panels: Same construction, performance, and finish as doors.

C. Combined Requirements: If a particular door and frame unit is indicated to comply with more than one type of requirement, comply with the specified requirements for each type; for instance, an exterior door that is also indicated as being sound-rated must comply with the requirements specified for exterior doors and for sound-rated doors; where two requirements conflict, comply with the most stringent.

2.03 HOLLOW METAL DOORS

A. Door Finish: Factory primed and field finished.

B. Exterior Doors: Thermally insulated.
1. Based on SDI Standards: ANSI/SDI A250.8 (SDI-100).
    a. Level 3 - Extra Heavy-duty.
    b. Physical Performance Level A, 1,000,000 cycles; in accordance with ANSI/SDI A250.4.
    c. Model 2 - Seamless.
    d. Door Face Metal Thickness: 14 gage, 0.067 inch, minimum.
    e. Zinc Coating: A60/ZF180 galvannealed coating; ASTM A653/A653M.
2. Core Material: Polyurethane, 1.8 lbs/cu ft minimum density.
3. Door Thermal Resistance: R-Value of 8.7, minimum, for installed thickness of polyurethane.
4. U value: 0.352, measured in accordance with ASTM C1363/ NFRC 102-2014
5. Air Infiltration: less than 0.1 cfm/sf measured in accordance with ASTM EE283/ NFRM 400-2014.
6. Must use with thermally broken frame and thermal saddle to achieve above values.
7. Door Thickness: 1-3/4 inches, nominal.
8. Weatherstripping: Refer to Section 08 7100.
9. All exterior doors will be prepared for EPT power transfer hinge to bring power from frame to the doors. See Section 08 7100.

C. Interior Doors, Non-Fire Rated:
1. Based on SDI Standards: ANSI/SDI A250.8 (SDI-100).
    a. Level 3 - Extra Heavy-duty.
    b. Physical Performance Level A, 1,000,000 cycles; in accordance with ANSI/SDI A250.4.
    c. Model 2 - Seamless.

d. Door Face Metal Thickness: 14 gauge, 0.067 inch, minimum at masonry conditions, 16 gauge, 0.053 inch, minimum at all other interior wall conditions.

2. Door Core Material: Vertical steel stiffeners, sound insulation core.
3. Door Thickness: 1-3/4 inches, nominal.

D. Interior Doors,Fire-Rated:

1. Based on SDI Standards: ANSI/SDI A250.8 (SDI-100).
   a. Level 4 - Maximum-duty.
   b. Physical Performance Level A, 1,000,000 cycles; in accordance with ANSI/SDI A250.4.
   c. Model 2 - Seamless.
   d. Door Face Metal Thickness: 14 gauge, 0.067 inch, minimum at masonry conditions, 16 gauge, 0.053 inch, minimum at all other interior wall conditions.
2. Fire Rating: As indicated on Door Schedule, tested in accordance with UL 10C and NFPA 252 ("positive pressure fire tests").
   a. Provide units listed and labeled by UL (DIR) or ITS (DIR).
   b. Attach fire rating label to each fire rated unit.
   c. Smoke and Draft Control Doors (Indicated with letter "S" on Drawings and/or Door Schedule): Self-closing or automatic closing doors in accordance with NFPA 80 and NFPA 105, with fire-resistance-rated wall construction rated the same or greater than the fire-rated doors, and the following;
      1) Maximum Air Leakage: 3.0 cfm/sq ft of door opening at 0.10 inch w.g. pressure, when tested in accordance with UL 1784 at both ambient and elevated temperatures.
      2) Gasketing: Provide gasketing or edge sealing as necessary to achieve leakage limit.
      3) Label: Include the "S" label on fire-rating label of door.
3. Core Material: Vertical steel stiffeners with fiberglass or mineral fiber batt infill, except where mineral fiberboard required for rating or temperature rise.
4. Door Thickness: 1-3/4 inches, nominal.

2.04 HOLLOW METAL FRAMES

A. General:

1. Comply with standards and/or custom guidelines as indicated for corresponding door in accordance with applicable door frame requirements.
2. Face Width: 2 inches, unless otherwise indicated.
3. Frame Depth: Coordinate to fit actual wall thicknesses, including masonry, plus 1/2-inch wrap each side. Refer to door schedule.
4. Frame Profile: Double rabbet, unless otherwise indicated.
5. Knock-down frames are prohibited.
6. Frame Reinforcements
   a. Spreader bars – 16 gauge channel, shall be removed prior to plumbing and securing frame in wall.
   b. Hinge reinforcements shall be 7 gauge required on top hinge.
   c. Surface mounted closers, overhead stops, holders reinforcement shall be 14 gauge steel plate welded.
   d. Reinforce for rim mounted strikes with 14 gauge steel sheet welded on inside of jamb.
   e. Drill and tap for surface mounted hardware at job site.
   f. Strikes for mortise locks and cylindrical locks shall be 4-7/8” and conform to ANSI A115.1 and A115.2.

B. Frame Finish: Factory primed and field finished.

C. Exterior Door Frames: Fully welded.

1. Galvanizing: Components hot-dipped zinc-iron alloy-coated (galvannealed) in accordance with ASTM A653/A653M, with A60/ZF180 coating.
2. Frame Metal Thickness: 14 gage, 0.067 inch, minimum.
3. Provide thermal anchors, and use with energy efficient door and thermal saddle
4. Weatherstripping: Separate, see Section 08 7100.

5. All exterior door frames will be prepared for conduit for powered door hardware. See Section 08 7100.

D. Interior Door Frames, Non-Fire Rated: Full profile/continuously welded type.
   1. Frame Metal Thickness: 16 gage, 0.053 inch, minimum.

E. Door Frames, Fire-Rated: Fully welded type.
   1. Fire Rating: Same as door, labeled.
   2. Frame Metal Thickness: 16 gage, 0.053 inch, minimum.

F. Borrowed Lites Glazing Frames: Construction and face dimensions to match door frames, and as indicated on drawings.

G. Transom Bars: Fixed, of profile same as jamb and head.

H. Provide mortar guard boxes for hardware cut-outs in frames to be installed in masonry or to be grouted.

I. Frames in Masonry Walls: Size to suit masonry coursing with head member 4 inches high to fill opening without cutting masonry units.

J. Frames Wider than 48 inches: Reinforce with steel channel fitted tightly into frame head, flush with top.

2.05 FINISHES

A. Primer: Rust-inhibiting, complying with ANSI/SDI A250.10, door manufacturer's standard.

B. Finish: See Door Schedule on Drawings.

2.06 ACCESSORIES

A. Glazing: As specified in Section 08 8000, factory installed.

B. Infill Panels: Insulated, steel sheet face and back, with solid face cores, with edges formed to fit glazing channel and sealed.
   1. Total Nominal Thickness: 1 inch.
   2. Core: Polyisocyanurate insulation core with R-value of 6.4.
   3. Finish(es): As selected by Architect from manufacturer's full range.
   4. Products:
      a. **BASIS OF DESIGN**: Mapes Industries; Mapes R: https://mapes.com/#sle.
      b. Nudo Products, Inc; Endurex 500: www.nudo.com/#sle.
      c. Substitutions: See Section 01 6000 - Product Requirements.

C. Removable Stops: Formed sheet steel, mitered corners; prepared for countersink style tamper proof screws.

D. Astragals for Double Doors: Specified in Section 08 7100.

E. Mechanical Fasteners for Concealed Metal-to-Metal Connections: Self-drilling, self-tapping, steel with electroplated zinc finish.

F. Grout for Frames: Mortar grout complying with ASTM C476 with maximum slump of 4 inches as measured in accordance with ASTM C143/C143M for hand troweling in place; plaster grout and thinner pumpable grout are prohibited.

G. Silencers: Resilient rubber, fitted into drilled hole; provide three on strike side of single door, three on center mullion of pairs, and two on head of pairs without center mullions.
   1. Coordinate with painter so that silencers are not painted.

H. Temporary Frame Spreaders: Provide for factory- or shop-assembled frames.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify existing conditions before starting work.

B. Verify that opening sizes and tolerances are acceptable.

C. Verify that finished walls are in plane to ensure proper door alignment.

3.02 INSTALLATION

A. Install doors and frames in accordance with manufacturer's instructions and related requirements of specified door and frame standards or custom guidelines indicated.

B. Install fire rated units in accordance with NFPA 80.

C. Coordinate frame anchor placement with wall construction.

D. Install batt insulation at frames in gypsum board walls with sound insulation.

E. Install spray foam insulation at frames at exterior walls.

F. Install door hardware as specified in Section 08 7100.

G. Comply with recommended practice for hardware placement of doors and frames in accordance with ANSI/SDI A250.6 or NAAMM HMMA 861.

H. Comply with glazing installation requirements of Section 08 8000.

I. Coordinate installation of electrical connections to electrical hardware items.

J. Touch up damaged factory finishes.

3.03 TOLERANCES

A. Clearances Between Door and Frame: Comply with related requirements of specified frame standards or custom guidelines indicated in accordance with SDI 117 or NAAMM HMMA 861.

B. Between Bottom of Door and Top of Threshold: Standard bottom clearance as required by manufacturer.

C. Maximum Diagonal Distortion: 1/16 inch measured with straight edge, corner to corner.

3.04 ADJUSTING

A. Adjust for smooth and balanced door movement.

3.05 SCHEDULE

A. Refer to Door and Frame Schedule on the drawings.

END OF SECTION

SECTION 08 3100
ACCESS DOORS AND PANELS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Wall- and ceiling-mounted access units.

1.02 RELATED REQUIREMENTS

A. Section 08 7100 - Door Hardware: Mortise cylinder and core hardware.

B. Section 09 2116 - Gypsum Board Assemblies: framing of rough opening, substrate.

C. Section 09 9123 - Interior Painting: Field paint finish.

D. Division 21 - Fire Suppression Requirements: Coordination of concealed work requiring access within wall and ceiling assemblies.

E. Division 22 - Plumbing Requirements: Coordination of concealed work requiring access within wall and ceiling assemblies.

F. Division 23 - HVAC Requirements: Coordination of concealed work requiring access within wall and ceiling assemblies.

G. Division 26 - Electrical Requirements: Coordination of concealed work requiring access within wall and ceiling assemblies.

H. Division 27 - Communications Requirements: Coordination of concealed work requiring access within wall and ceiling assemblies.

I. Division 28 - Electronic Safety and Security Requirements: Coordination of concealed work requiring access within wall and ceiling assemblies.

1.03 REFERENCE STANDARDS

A. ASTM A1008/A1008M - Standard Specification for Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, Required Hardness, Solution Hardened, and Bake Hardenable.

B. ASTM A1011/A1011M - Standard Specification for Steel, Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, and Ultra-High Strength.

1.04 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements for submittal procedures.

B. Product Data: Provide sizes, types, finishes, hardware, scheduled locations, and details of adjoining work.

C. Shop Drawings: Indicate exact position of each access door and/or panel unit.
   1. Ceiling Coordination Drawings for Access Doors at Ceilings: Furnish reflected ceiling plans, drawn to scale, on which ceiling-mounted items including access doors and frames, lighting fixtures, diffusers, grilles, speakers, sprinklers, and special trim are shown and coordinated with each other. Indicate method of attaching door frames to surrounding construction.

D. Schedule: List of wall or ceiling access doors required, per room, including types, locations, sizes, latching or locking provisions, and other data pertinent to installation.

E. Project Record Documents: Record actual locations of each access unit.

1.05 QUALITY ASSURANCE

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

1.06 COORDINATION

A. Verification: Determine specific locations and sizes for access doors needed to gain access to concealed equipment, and indicate on schedule specified in "Submittals" Article.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Metal Doors and Frames:
1. ACUDOR Products Inc: www.acudor.com/#sle.
2. Babcock-Davis: www.babcockdavis.com.
3. Cendrex, Inc: www.cendrex.com/#sle.
4. J. L. Industries, Inc: www.jlindustries.com.
5. Karp Associates, Inc: www.karpinc.com.
6. Larsen's Manufacturing Co.
7. Milcor, Inc.: www.milcorinc.com.
8. Nystrom, Inc: www.nystrom.com/sle.
9. Williams Brothers Corporation of America: www.wbdoors.com.
10. Substitutions: See Section 01 6000 - Product Requirements.

2.02 WALL & CEILING-MOUNTED UNITS

A. Wall and Ceiling Mounted Units: Factory fabricated door and frame, fully assembled units with corner joints welded, filled and ground flush; square and without rack or warp; coordinate requirements with type of installation assembly being used for each unit.
1. Material: Steel.
2. Style: as follows:
   a. Concrete or Masonry: Exposed frame with door surface flush with frame surface.
   b. Metal Stud and Gypsum Board: Use drywall bead type frame.
   c. Tiled Walls: Use drywall bead type frame with recessed door for infill with tile wall finish.
3. Door Style: Single thickness with rolled or turned in edges.
4. Frames: 16-gauge, 0.0598-inch minimum thickness.
5. Single Steel Sheet Door Panels: 16-gauge, 0,0625-inch minimum thickness.
6. Steel Finish: Primed.
7. Size: as required for access, 16 x 16 inches minimum typical.
8. Exposed flanges at tile and FRP locations.
9. Hardware:
   a. Hardware for Fire-Rated Units: As required for listing.
   b. Hinges for Non-Fire-Rated Units: Concealed, constant force closure spring type.175 degree with non-removable pin.
   c. Handle: No handle.
   d. Latch/Lock: Cylinder lock-operated cam latch, two keys for each unit.
      1) Mortise cylinder and core as specified in Section 08 7100.
      2) Screw driver slot for quarter turn cam latch acceptable for units located in maintenance/staff only areas.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that rough openings are correctly sized and located.

B. Begin installation only after substrates have been properly prepared, and if the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

C. Advise installers of other work about specific requirements relating to access door installation, including sizes of openings to receive access door and frame, as well as locations of supports, inserts, and anchoring devices.

3.02 PREPARATION

A. Clean surfaces thoroughly prior to proceeding with this work.

B. Prepare surfaces using methods recommended by manufacturer for applicable substrates in accordance with project conditions.

3.03 INSTALLATION

A. Install units in accordance with manufacturer's instructions.

B. Install frames plumb and level in openings, and secure units rigidly in place.

C. Install access doors in gypsum board walls before joints are taped and finished, or arrange for taping and mudding of access door flanges after installation.

D. Position units to provide convenient access to concealed equipment when necessary.

3.04 FIELD-APPLIED FINISHES

A. Painting of Interior Primed Steel and Mill Finish Aluminum Components: As specified in Section 09 9123.

3.05 ADJUSTING AND CLEANING

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 08 3313
COILING COUNTER DOORS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Non-fire-rated coiling counter doors and operating hardware.

B. Electric motor operation; wiring from electric circuit disconnect to operator to control station.

1.02 RELATED REQUIREMENTS

A. Section 06 1000 - Rough Carpentry: Rough openings.

B. Section 07 9200 - Joint Sealants: Sealing joints between frames and adjacent construction.

C. Section 26 0583 - Wiring Connections: Power to disconnect.

1.03 REFERENCE STANDARDS

A. ASTM B221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes.

B. ITS (DIR) - Directory of Listed Products.

C. NEMA MG 00001 - Motors and Generators.

D. UL (DIR) - Online Certifications Directory.

1.04 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements for submittal procedures.

B. Product Data: Submit manufacturer's standard literature showing materials and details of construction and finish.

C. Shop Drawings: Indicate rough and actual opening dimensions, anchorage methods, hardware locations, and installation details.

D. Samples: Two slats, 4 inches long, illustrating shape, color, and finish texture.

E. Operation and Maintenance Data: Indicate modes of operation, lubrication requirements and frequency, and periodic adjustments required.

F. Project Record Documents: Include as-built electrical diagrams for electrical operation and connection to fire alarm system.

1.05 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum ten years of documented experience.

B. Installer Qualifications: Company specializing in performing work of type specified and with at least three years documented experience and approved by manufacturer.

C. Products Requiring Electrical Connection: Listed and classified by ITS (DIR), UL (DIR), or testing firm acceptable to authorities having jurisdiction as suitable for the purpose specified in this section and indicated on the drawings.

1.06 WARRANTY

A. See Section 01 7800 - Closeout Submittals for additional warranty requirements.

B. Manufacturer Warranty: Provide 2-year manufacturer warranty for counterbalance shaft assembly. Complete forms in Owner's name and register with manufacturer.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Coiling Counter Doors:
   1. Cookson; www.cooksondoor.com or www.cornellcookson.com
   2. Cornell Iron Works; www.cornelliron.com or www.cornellcookson.com

3. Overhead Door Corporation: www.overheaddoor.com/#sle.
4. Substitutions: See Section 01 6000 - Product Requirements.

2.02 COILING COUNTER DOORS

A. Coiling Counter Metal Doors, Non-Fire-Rated: Aluminum slat curtain.
   1. Mounting: Interior face mounted.
   2. Nominal Slat Size: 1-1/2 inches wide.
   3. Slat Profile: Flat.
   4. Finish, Aluminum: Anodized.
   5. Color: As selected by Architect from manufacturer's standard range.
   6. Guides: Formed track; same material and finish unless otherwise indicated.
   7. Hood Enclosure: Manufacturer's standard; aluminum.
   8. Electric operation.

2.03 COMPONENTS

A. Metal Curtain Construction: Interlocking, single-thickness slats.
   1. Slat Ends: Alternate slats fitted with end locks to act as wearing surface in guides and to prevent lateral movement.
   2. Curtain Bottom: Fitted with angles to provide reinforcement and positive contact in closed position.
   3. Aluminum Slats: ASTM B221 (ASTM B221M), aluminum alloy Type 6063; minimum thickness 0.05 inch.

B. Guide Construction: Continuous, of profile to retain door in place, with mounting brackets of same metal.
   1. Aluminum Guides: Extruded aluminum channel, with wool pile runners along inside.

C. Hood Enclosure: None when installed above ceiling.

D. Lock Hardware:
   1. For motor operated units, additional lock or latching mechanisms are not required.

E. Roller Shaft Counterbalance: Steel pipe and torsion steel spring system, capable of producing torque sufficient to ensure smooth operation of curtain from any position and capable of holding position at mid-travel; with adjustable spring tension; requiring 25 lb nominal force to operate.

2.04 ELECTRIC OPERATION

A. Operator, Controls, Actuators, and Safeties: Listed and classified by ITS (DIR), UL (DIR), or testing agency acceptable to authorities having jurisdiction (AHJ) as suitable for purpose specified and indicated.
   1. Provide interlock switches on motor operated units.

B. Electric Operators:
   1. Mounting: Side mounted.
   2. Motor Enclosure: NEMA MG 00001.
   3. Motor Rating: As recommended by manufacturer; continuous duty.
   4. Motor Voltage: Manufacturer's standard.
   5. Opening Speed: 6 inches per second.
   6. Manual override in case of power failure.

C. Control Station: Standard three button (OPEN-STOP-CLOSE) constant pressure control for each electrical operator.
   1. Controls: 24 VAC circuit.
   2. Recessed.

D. Safety Edge: Located at bottom of curtain, full width, electro-mechanical sensitized type, wired to stop operator upon striking object, hollow neoprene covered.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that adjacent construction is suitable for door installation.

B. Verify that electrical services have been installed and are accessible.

C. Verify that door opening is plumb, header is level, and dimensions are correct.

D. Notify Architect of any unacceptable conditions or varying dimensions.

E. Commencement of installation indicates acceptance of substrate and door opening conditions.

3.02 INSTALLATION

A. Install units in accordance with manufacturer's instructions.

B. Use anchorage devices to securely fasten assembly to wall construction and building framing without distortion or stress.

C. Securely and rigidly brace components suspended from structure. Secure guides to structural members only.

D. Fit and align assembly including hardware; level and plumb, to provide smooth operation.

E. Coordinate installation of electrical service with Section 26 0583.

F. Complete wiring from disconnect to unit components.

3.03 TOLERANCES

A. Maintain dimensional tolerances and alignment with adjacent work.

B. Maximum Variation From Plumb: 1/16 inch.

C. Maximum Variation From Level: 1/16 inch.

D. Longitudinal or Diagonal Warp: Plus or minus 1/8 inch per 10 ft straight edge.

3.04 ADJUSTING

A. Adjust operating assemblies for smooth and noiseless operation.

3.05 CLEANING

A. Clean installed components.

B. Remove labels and visible markings.

END OF SECTION

SECTION 08 3613
SECTIONAL DOORS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Overhead sectional doors, electrically manually operated.
   1. Steel, for exterior use.
   2. Glazed Aluminum, for exterior use.

B. Operating hardware and supports.

C. Electrical controls.

1.02 RELATED REQUIREMENTS

A. Section 05 5000 - Metal Fabrications: Steel channel opening frame, brace framing for door tracks.

B. Section 06 1000 - Rough Carpentry: Rough wood blocking for door opening.

C. Section 07 9200 - Joint Sealants: Sealing joints between frames and adjacent construction.

D. Division 26: coordination of electrical conduit for electric operation.

E. Section 26 0583 - Wiring Connections.

F. Division 28: Security service connection to door controller.

1.03 PRICE AND PAYMENT PROCEDURES

A. Alternates:
   1. See Section 01 2300 - Alternates for product alternates affecting this section.
   2. This section includes base bid and alternate items.

1.04 REFERENCE STANDARDS

A. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.

B. ASTM B221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes.

C. ASTM B221M - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes (Metric).

D. ASTM E283/E283M - Standard Test Method for Determining Rate of Air Leakage Through Exterior Windows, Skylights, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen.

E. ASTM E330/E330M - Standard Test Method for Structural Performance of Exterior Windows, Doors, Skylights and Curtain Walls by Uniform Static Air Pressure Difference.

F. DASMA 102 - American National Standard Specifications for Sectional Doors.

G. ITS (DIR) - Directory of Listed Products.

H. NEMA ICS 2 - Industrial Control and Systems Controllers, Contactors and Overload Relays Rated 600 Volts.

I. NEMA MG 00001 - Motors and Generators.

J. NEMA EN 10250 - Enclosures for Electrical Equipment (1000 Volts Maximum).

K. NFPA 70 - National Electrical Code.

L. UL (DIR) - Online Certifications Directory.

M. UL 325 - Standard for Door, Drapery, Gate, Louver, and Window Operators and Systems.

1.05 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements for submittal procedures.

B. Shop Drawings: Indicate opening dimensions and required tolerances, connection details, anchorage spacing, hardware locations, and installation details.

C. Product Data: Show component construction, anchorage method, and hardware.

D. Samples: Submit two panel finish samples, 6 by 6 inch in size, illustrating color and finish.

E. Operation Data: Include normal operation, troubleshooting, and adjusting.

F. Maintenance Data: Include data for motor and transmission, shaft and gearing, lubrication frequency, spare part sources.

G. Warranty: Submit manufacturer warranty and ensure forms have been completed in Owner's name and registered with manufacturer.

1.06 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum five years of documented experience.

B. Installer Qualifications: Company approved by manufacturer.

C. Comply with applicable code for motor and motor control requirements.

D. Products Requiring Electrical Connection: Listed and classified by ITS (DIR), UL (DIR), or testing firm acceptable to authorities having jurisdiction, as suitable for purpose specified.

E. Single-Source Responsibility: Provide doors, tracks, motors, and accessories from one manufacturer for each type of door. Provide secondary components from source acceptable to manufacturer of primary components.

1.07 WARRANTY

A. See Section 01 7800 - Closeout Submittals for warranty requirements.

B. Extended Correction Period: Correct defective work within a 2-year period commencing on Date of Substantial Completion.

C. Warranty: Provide the following:
1. Ten year manufacturer warranty on the door sections against defects in material and workmanship, and deterioration due to rust-through.
2. Ten year manufacturer warranty on the door sections against delamination of the insulation from the steel skins.
3. One year manufacturer warranty on the window components against defects in material and workmanship.
4. One year manufacturer warranty on all hardware and spring components against defects in material and workmanship.
5. One year manufacturer warranty on high performance fluoropolymer coating.
6. Include coverage for electric motor and transmission.
7. Provide 25,000 cycle/ three year year manufacturer warranty for electric operating equipment.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Sectional Doors:
1. Amarr: www.amarr.com/commercial/#sle.
2. C.H.I. Overhead Doors: www.chiohd.com/sle.
3. Clopay Building Products: www.clopaydoor.com/sle.
4. Haas Door: www.haadoor.com
5. Overhead Doors; www.overheaddoor.com
   a. Aluminum: Overhead Doors: 521S
6. Raynor Garage Doors: www.raynor.com/#sle.
7. Wayne-Dalton, a Division of Overhead Door Corporation: www.wayne-dalton.com.
8. Substitutions: See Section 01 6000 - Product Requirements.

2.02 PERFORMANCE REQUIREMENTS

A. Performance: Withstand positive and negative wind loads equal to 1.5 times design wind loads specified by local code without damage or permanent set, when tested in accordance with ASTM E330/E330M, using 10 second duration of maximum load.

B. Air Leakage Rate: Less than 0.40 cfm/sq ft when tested in accordance with ASTM E283/E283M at test pressure difference of 1.57 psf.

C. Thermal Performance: R-Value of 27.2, minimum, in accordance with DASMA TDS-163.

2.03 STEEL DOORS

A. Steel Doors: Flush steel, insulated; vertical lift (high lift at Alternate 2) operating style with track and hardware; complying with DASMA 102, Commercial application.
   1. Door Panels: Steel construction; outer steel sheet of 27 gauge, 0.0164 inch minimum thickness, flush profile; inner steel sheet of 28 gauge, 0.015 inch minimum thickness, flat profile; core reinforcement sheet steel roll formed to channel shape, rabbeted weather joints at meeting rails; polyurethane insulation.
   2. Door Nominal Thickness: 3 inches thick.
   3. Exterior Finish:
      a. Factory finished with acrylic baked enamel; color as selected by Architect.
   4. Interior Finish:
      a. Factory finished with powder coated finish; color as selected from manufacturer's standard line.
   5. Operation: Electric.

2.04 COMPONENTS

A. Track: Galvanized steel angles, 0.094 inch minimum thickness; 3 inch size, continuous one piece per side; galvanized steel mounting brackets 1/4 inch thick.

B. Shaft: Solid spring shaft.

C. Mounting:
   1. Sections mounted in door opening using Lap Jamb Angle Mounting; section overlaps door jambs by 1 inch (25 mm) on each side of door opening.
   2. Floor-to-Shaft Angle-Mount consisting of continuous angle extending from the floor, past header, completely up to door shaft for use with steel, wood, or masonry jambs.
   3. Continuous angle size not less than 2-5/16 inches by 4 inches by 3/32 inch (59 by 102 by 2.5 mm) on 2-inch track and 3-1/2 inches by 5 inches by 1/8 inches (89 by 127by 3.2 mm) on 3-inch track.

D. Hinge and Roller Assemblies: Heavy duty hinges and adjustable roller holders of galvanized steel; floating hardened steel bearing rollers, located at top and bottom of each panel, each side.

E. Lift Mechanism: Torsion spring on cross head shaft, with braided stainless steel lifting cables.
   1. Minimum safety factor of 5.
   2. Spring Cycle Life: 25,000 cycles.
   3. For Emergency Manual Operation: Hoist Chain requiring maximum exertion of 25 lbs force to open.

F. Sill Weatherstripping: Resilient hollow vinyl strip, one piece; fitted to bottom of door panel in aluminum rail, full length contact.

G. Jamb Weatherstripping: Roll formed steel section full height of jamb, fitted with EPDM rubber seal weatherstripping, placed in moderate contact with door panels, replaceable.

H. Head Weatherstripping: EPDM rubber seal, one piece full length, replaceable.

I. Panel Joint Weatherstripping: Neoprene foam seal, one piece full length.

2.05 MATERIALS

A. Sheet Steel: Hot-dipped galvanized steel sheet, ASTM A653/A653M, with G60/Z180 coating, smooth surface.

B. Insulation: Foamed-in-place polyurethane, bonded to facing.
   1. Same thickness as core framing members.

2.06 ELECTRIC OPERATION

A. Operator, Controls, Actuators, and Safeties: Comply with UL 325; provide products listed by a testing agency acceptable to authorities having jurisdiction.
   1. Provide interlock switches on motor operated units.

B. Electric Operators:
   1. Mounting: Side mounted on cross head shaft.
   2. Motor Enclosure:
      a. Exterior Doors: NEMA MG 00001, Type 4; open drip proof.
   3. 3/4 hp; manually operable in case of power failure, transit speed of 12 inches per second.
   4. 120 volts, three phase, 60 Hz.
   5. Motor Controller: NEMA ICS 2, full voltage, reversing magnetic motor starter.
   6. Controller Enclosure: NEMA EN 10250, Type 1.
   7. Opening Speed: 12 inches per second.
   8. Brake: Adjustable friction clutch type, activated by motor controller.
   9. Manual override in case of power failure.
   10. See Section 26 0583 for electrical connections.

C. Wiring Terminations: Provide terminal lugs to match branch circuit conductor quantities, sizes, and materials indicated; enclose terminal lugs in terminal box sized to comply with NFPA 70.

D. Control Station: Provide standard three button (Open-Close-Stop) momentary-contact control device for each operator complying with UL 325.
   1. 24 volt circuit.
   2. Surface mounted, at location as directed by Owner.
   3. Entrapment Protection Devices: Provide sensing devices and safety mechanisms complying with UL 325.
      a. Primary Device: Provide electric sensing edge or wireless sensing as required with momentary-contact control device.
   4. Overhead door contrctor to provide and install control station and devices.

E. Control Wiring: Solid state circuitry with provisions for connection of safety edge to reverse, external radio control hook-up and maximum run timer. Provisions for timers to close, monitored reversing devices, mid stop and lock bar sensor capability. Control wiring to be provided and installed by the overhead door contractor.

F. Safety Edge: At bottom of door panel, full width; electro-mechanical sensitized type, wired to reverse door upon striking object; hollow neoprene covered to provide weatherstrip seal.

G. Provide interconnection to security system.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that wall openings are ready to receive work and opening dimensions and tolerances are within specified limits.

B. Verify that electric power is available and of the correct characteristics.

3.02 PREPARATION

A. Prepare opening to permit correct installation of door unit to perimeter air and vapor barrier seal.

3.03 INSTALLATION

A. Install door unit assembly in accordance with manufacturer's instructions.

B. Anchor assembly to wall construction and building framing without distortion or stress.

C. Securely brace door tracks suspended from structure. Secure tracks to structural members only.

D. Fit and align door assembly including hardware.

E. Coordinate installation of electrical service. Complete power and control wiring from disconnect to unit components.

F. Install perimeter trim and closures not provided with overhead door package.

3.04 TOLERANCES

A. Maximum Variation from Plumb: 1/16 inch.

B. Maximum Variation from Level: 1/16 inch.

C. Longitudinal or Diagonal Warp: Plus or minus 1/8 inch from 10 ft straight edge.

D. Maintain dimensional tolerances and alignment with adjacent work.

3.05 ADJUSTING

A. Adjust door assembly for smooth operation and full contact with weatherstripping.

B. Have manufacturer's field representative present to confirm proper operation and identify adjustments to door assembly for specified operation.

3.06 CLEANING

A. Clean doors and frames and glazing.

B. Remove temporary labels and visible markings.

3.07 PROTECTION

A. Protect installed products from damage until Date of Substantial Completion.

B. Do not permit construction traffic through overhead door openings after adjustment and cleaning.

END OF SECTION

SECTION 08 4313
ALUMINUM-FRAMED STOREFRONTS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Aluminum-framed storefront, with vision glass.

B. Aluminum swing doors within storefront, and frames.

C. Weatherstripping.

1.02 RELATED REQUIREMENTS

A. Section 07 9200 - Joint Sealants: Sealing joints between frames and adjacent construction.

B. Section 08 4413 - Glazed Aluminum Curtain Walls: exterior aluminum-framed openings and swing doors at exterior or vestibules.

C. Section 08 7100 - Door Hardware: Hardware items other than specified in this section.

D. Section 08 8000 - Glazing: Glass and glazing accessories.

1.03 REFERENCE STANDARDS

A. AAMA CW-10 - Care and Handling of Architectural Aluminum from Shop to Site.

B. AAMA 609 & 610 - Cleaning and Maintenance Guide for Architecturally Finished Aluminum.

C. AAMA 611 - Specification for Anodized Architectural Aluminum.

D. AAMA 1503 - Voluntary Test Method for Thermal Transmittance and Condensation Resistance of Windows, Doors and Glazed Wall Sections.

E. ASTM B209/B209M - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate.

F. ASTM B209 - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate.

G. ASTM B209M - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate (Metric).

H. ASTM B221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes.

I. ASTM B221M - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes (Metric).

J. ASTM E330/E330M - Standard Test Method for Structural Performance of Exterior Windows, Doors, Skylights and Curtain Walls by Uniform Static Air Pressure Difference.

K. ASTM E331 - Standard Test Method for Water Penetration of Exterior Windows, Skylights, Doors, and Curtain Walls by Uniform Static Air Pressure Difference.

1.04 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements for submittal procedures.

B. Product Data: Provide component dimensions, describe components within assembly, anchorage and fasteners, glass and infill, door hardware,.

C. Shop Drawings: Indicate system dimensions, framed opening requirements and tolerances, affected related work, expansion and contraction joint location and details, and field welding required.

D. Samples: Submit two samples 4 by 12 inches in size illustrating finished aluminum surface.

E. Hardware Schedule: Complete itemization of each item of hardware to be provided for each door, cross-referenced to door identification numbers in Contract Documents.

F. Warranty: Submit manufacturer warranty and ensure forms have been completed in Owner's name and registered with manufacturer.

1.05 QUALITY ASSURANCE

A. Manufacturer shall be the same as for Section 08 44 13 - Glazed Aluminum Curtain Walls.

B. Manufacturer Qualifications: Company specializing in performing work of type specified and with at least ten years of documented experience.

C. Installer Qualifications: Company approved by manufacturer.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Handle products of this section in accordance with AAMA CW-10.

B. Protect finished aluminum surfaces with wrapping. Do not use adhesive papers or sprayed coatings that bond to aluminum when exposed to sunlight or weather.

1.07 FIELD CONDITIONS

A. Do not install sealants when ambient temperature is less than 40 degrees F. Maintain this minimum temperature during and 48 hours after installation.

1.08 WARRANTY

A. See Section 01 7800 - Closeout Submittals for additional warranty requirements.

B. Correct defective Work within a five year period after Date of Substantial Completion.

C. Provide five year manufacturer warranty against failure of glass seal on insulating glass units, including interpane dusting or misting. Include provision for replacement of failed units.

D. Provide ten year manufacturer warranty against excessive degradation of exterior finish. Include provision for replacement of units with excessive fading, chalking, or flaking.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Aluminum-Framed Storefronts: Provide Basis of Design manufacturer listed, or a product from one of the other listed manufacturers that best meets the intent to match existing storefront:
   1. Kawneer North America: www.kawneer.com/#sle.
   2. Oldcastle BuildingEnvelope: www.oldcastlebe.com/#sle.
   3. Tubelite, Inc: www.tubeliteinc.com/#sle.
   4. Substitutions: See Section 01 6000 - Product Requirements.

2.02 ALUMINUM-FRAMED STOREFRONT

A. Exterior Aluminum-Framed Storefront: Factory fabricated, factory finished aluminum framing members with infill, and related flashings, anchorage and attachment devices.
   1. Fabrication Method: Shop/factory unitized system.
   2. Glazing Method: Either shop/factory or field glazed system.
   3. Glazing Rabbet for Interior Glazing: For 1 inch insulating glazing.
   4. Glazing Position: Centered (front to back).
   5. Vertical Mullion Dimensions: 2 inches wide by 4-1/2 or 6 inches deep - see storefront elevations.
   6. Finish: Class I natural anodized.
      a. Factory finish all surfaces that will be exposed in completed assemblies.
      b. Coat concealed metal surfaces that will be in contact with cementitious materials or dissimilar metals with bituminous paint.
   7. Fabrication: Joints and corners flush, hairline, and weatherproof, accurately fitted and secured; prepared to receive anchors and hardware; fasteners and attachments concealed from view; reinforced as required for imposed loads.
   8. Construction: Eliminate noises caused by wind and thermal movement, prevent vibration harmonics, and prevent "stack effect" in internal spaces.
   9. System Internal Drainage: Drain to the exterior by means of a weep drainage network any water entering joints, condensation occurring in glazing channel, and migrating moisture occurring within system.
   10. Expansion/Contraction: Provide for expansion and contraction within system components caused by cycling temperature range of 170 degrees F over a 12 hour period without causing detrimental effect to system components, anchorages, and other building elements.

11. Movement: Allow for movement between storefront and adjacent construction, without damage to components or deterioration of seals.
12. Perimeter Clearance: Minimize space between framing members and adjacent construction while allowing expected movement.
13. Air and Vapor Seal: Maintain continuous air barrier and vapor retarder throughout assembly, primarily in line with inside pane of glazing and heel bead of glazing compound.

B. Aluminum-Framed Swing Doors: Factory fabricated, factory finished aluminum framing members with infill, and related flashings, anchorage and attachment devices.
1. Unitized, shop assembly.
2. Glazing Rabbet: For 1 inch insulating glazing at exterior doors.
3. Glazing Rabbet: For 1/4 inch monolithic glazing at interior doors.
4. Finish: to match adjacent storefront.
a. Factory finish all surfaces that will be exposed in completed assemblies.
b. Touch-up surfaces cut during fabrication so that no natural aluminum is visible in completed assemblies, including joint edges.
5. Fabrication: Joints and corners flush, hairline, and weatherproof, accurately fitted and secured; prepared to receive anchors and hardware; fasteners and attachments concealed from view; reinforced as required for imposed loads.

C. Performance Requirements:
1. Wind Loads: Design and size components to withstand the specified load requirements without damage or permanent set, when tested in accordance with ASTM E330/E330M, using loads 1.5 times the design wind loads and 10 second duration of maximum load.
a. Design Wind Loads: Comply with requirements of structural notes/drawings.
b. Member Deflection: Limit member deflection to flexure limit of glass in any direction, with full recovery of glazing materials.
2. Water Penetration Resistance: No uncontrolled water on interior face, when tested in accordance with ASTM E331 at pressure differential of 10 psf.
3. Air Leakage: Maximum of 0.06 cu ft/min sq ft of wall area, when tested in accordance with ASTM E283 at 6.24 psf pressure differential across assembly.
4. Condensation Resistance Factor of Framing: 69, minimum, measured in accordance with AAMA 1503.

2.03 COMPONENTS

A. Aluminum Framing Members: Tubular aluminum sections, drainage holes and internal weep drainage system.
1. Framing members for interior applications need not be thermally broken.
2. Glazing Stops: Flush.

B. Glazing: See Section 08 8000.

C. Swing Doors: Glazed aluminum.
1. Provide thermally broken doors for exterior or semi-tempered locations
2. Thickness: 1-3/4 inches.
3. Stiles and Rails: wide style.
4. Bottom Rail: 10 inches wide.
5. Glazing Stops: Square.
6. Finish: to match adjacent storefront.
7. NFRC 100 System U Value at Exterior Doors: Shall not exceed 0.63 Btu/(hr sq ft deg F).

2.04 MATERIALS

A. Extruded Aluminum: ASTM B221 (ASTM B221M).

B. Sheet Aluminum: ASTM B209/B209M.

C. Fasteners: Stainless steel.

D. Glazing Gaskets: Type to suit application to achieve weather, moisture, and air infiltration requirements.

E. Glazing Accessories: See Section 08 8000.

2.05 FINISHES

A. Class I Natural Anodized Finish: AAMA 611 AA-M12C22A41 Clear anodic coating not less than 0.7 mils thick.

B. Touch-Up Materials: As recommended by coating manufacturer for field application.

2.06 HARDWARE

A. For each exterior or vestibule door, include weatherstripping.

B. Other Door Hardware: See Section 08 7100.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify dimensions, tolerances, and method of attachment with other work.

B. Verify that storefront wall openings and adjoining water-resistive and/or air barrier seal materials are ready to receive work of this section.

3.02 INSTALLATION

A. Install wall system in accordance with manufacturer's instructions.

B. Attach to structure to permit sufficient adjustment to accommodate construction tolerances and other irregularities.

C. Provide alignment attachments and shims to permanently fasten system to building structure.

D. Align assembly plumb and level, free of warp or twist. Maintain assembly dimensional tolerances, aligning with adjacent work.

E. Install sill flashings. Turn up ends and edges; seal to adjacent work to form water tight dam.

F. Install glass in accordance with Section 08 8000, using gasket glazing method.

G. Touch-up minor damage to factory applied finish; replace components that cannot be satisfactorily repaired.

3.03 TOLERANCES

A. Maximum Variation from Plumb: 0.06 inch per 3 feet non-cumulative or 0.06 inch per 10 feet, whichever is less.

B. Maximum Misalignment of Two Adjoining Members Abutting in Plane: 1/32 inch.

3.04 ADJUSTING

A. Adjust operating hardware for smooth operation.

3.05 CLEANING

A. Remove protective material from pre-finished aluminum surfaces.

B. Wash down surfaces with a solution of mild detergent in warm water, applied with soft, clean wiping cloths, and take care to remove dirt from corners and to wipe surfaces clean.

C. Upon completion of installation, thoroughly clean aluminum surfaces in accordance with AAMA 609 & 610.

3.06 PROTECTION

A. Protect installed products from damage until Date of Substantial Completion.

END OF SECTION

SECTION 08 5655
SECURITY WINDOW SCREENS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Security window screens.

1.02 REFERENCE STANDARDS

A. AAMA 2603 - Voluntary Specification, Performance Requirements and Test Procedures for Pigmented Organic Coatings on Aluminum Extrusions and Panels (with Coil Coating Appendix).

1.03 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements for submittal procedures.

B. Product Data: Manufacturer's published data showing materials, construction details, dimensions of components, and finishes.

C. Shop Drawings: Drawings prepared specifically for this project, showing plans, elevations, sections, details of construction, anchorage to other work, and hardware.

D. Samples: Samples of materials including: frame sections, infill sections, fasteners, and corner section.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Security Window Screens:
   1. **BASIS OF DESIGN:** Kane Innovations; SNR5-O.
   2. Substitutions: See Section 01 6000 - Product Requirements.

2.02 SECURITY WINDOW SCREENS

A. Main Frame
   1. The main frame rails shall be of not less than 16-gauge 1inch x 1 inch seamless welded galvanized steel tubing with high strength die cast metal corners which are pneumatically inserted into the frame ends with an interference fit.
   2. A removable face plate, extruded from 6063-T6 aluminum alloy, .062-inch thick .212 lbs./ft., shall be attached to the sides of the main frame using square drive Tek screws. The faceplate corner bead shall integrate with the sub-frame to conceal the hardware and fasteners.

B. Sub-frame
   1. The sub-frame shall be of channel design, extruded from 6063-T6-aluminum alloy. Weight shall be .515 lbs./ft. Wall thickness shall be .090 inch. The corners of the subframe shall be mitered, secured by an internal tension coupling assembly and shall be resistant to both torsion and flexural failure.
   2. The sub-frame shall have a continuous groove retaining a combination cushioning strip/insect shield. The depth of the subframe shall be no more than 1 3/4 inch.

C. Testing and Performance
   1. Certifications - Performance and testing must comply with impact test, sag test and forced entry resistance test of SMA 6001-02. Manufacturer must submit the AAMA Notice of Product Certification in compliance with CFR 200.935 as “Security Screen - Heavy”.

D. Infill
   1. Perforated Panel
      a. 12-gauge mill-galvannealed steel with 51% open area

E. Infill Attachment
   1. The perforated panel shall be attached to the mainframe with hex-head Tek Screws.
   2. Hex-head Tek screws shall penetrate the infill and main frame approximately 4 inch on center.

F. Emergency Egress Release

1. Each screen shall have two steel latches, which operate simultaneously from a emergency release. The emergency release mechanism shall be contained within the tubular mainframe. Each emergency release shall be outfitted with a secure spring-loaded activator to rotate the inhibitor, which allows the steel latches to open. When the emergency release is activated the steel latches are simultaneously released and the screen opens for instant egress. No plastic parts will be accepted.
2. Each screen shall have a tamper shield installed at the emergency release to protect the screen hardware from exterior tampering.

G. Optional lock: Exterior mounted, keyed cam lock

H. Hardware
1. Each screen shall be provided with two or more concealed 13-gauge, electroplated steel hinges with 1/4 inch diameter hardened, loose stainless steel pins and integral compression guards. 13-gauge stainless steel hinge available.
2. Each screen shall include adjustment screws (1/4-20 x ¾ Philips pan head thread cutting fastener) and .062-inch thick aluminum scribes. The 1-3/16 inch x 3/4 inch scribes shall be supplied at the head and jambs if required.
3. Each screen shall come fully assembled and tested from the factory.

2.03 FINISHES

A. Baked Enamel Finish: Cleaned and pretreated; two coat acrylic thermosetting finish, 1.5 to 2 mils thick, applied in accordance with paint manufacturer's recommendations; medium gloss.

B. Pigmented Organic Coatings: AAMA 2603; polyester or acrylic baked enamel finish.

C. Color: As selected by Architect from manufacturer's standard range.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that openings fit allowable tolerance, are plumb, level, provide a solid anchoring surface and comply with approved shop drawings.

3.02 INSTALLATION

A. Install in accordance with manufacturer's instructions and drawing details.

B. Plumb and align faces in a single plane and erect screens square and true, adequately anchored to structure.

C. After completion of installation, screens shall be adjusted, in working order and cleaned.

END OF SECTION

SECTION 08 7100

DOOR HARDWARE SCHEDULE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section references specification sections relating to commercial door hardware for the following:

1. Swinging doors.
2. Sliding Doors.
3. Other doors to the extent indicated.

B. Commercial door hardware includes, but is not necessarily limited to, the following:

1. Mechanical door hardware.
2. Electromechanical and access control door hardware.
3. Electromechanical and access control door hardware power supplies, back-ups and surge protection.
4. Automatic operators.
5. Cylinders specified for doors in other sections.

C. Related Sections:

1. Division 08 Section “Door Hardware”.
2. Division 08 Section “Automatic Door Operators”.
3. Division 28 Section “Integrated Access Control Hardware Devices”.

D. Codes and References: Comply with the version adopted by the Authority Having Jurisdiction.

1. ANSI A117.1 - Accessible and Usable Buildings and Facilities.
2. ICC/IBC - International Building Code.
3. NFPA 70 - National Electrical Code.
4. NFPA 80 - Fire Doors and Windows.
5. NFPA 101 - Life Safety Code.
6. NFPA 105 - Installation of Smoke Door Assemblies.
7. State Building Codes, Local Amendments.

E. Standards: Reference Related Sections for requirements regarding compliance with applicable industry standards.

1.3 SUBMITTALS

A. Product Data: Manufacturer's product data sheets including installation details, material descriptions, dimensions of individual components and profiles, operational descriptions and finishes.

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

1. Format: Comply with scheduling sequence and vertical format in DHI's "Sequence and Format for the Hardware Schedule."

2. Organization: Organize the Door Hardware Schedule into door hardware sets indicating complete designations of every item required for each door or opening. Organize door hardware sets in same order as in the Door Hardware Sets at the end of Part 3. Submittals that do not follow the same format and order as the Door Hardware Sets will be rejected and subject to resubmission.

3. Content: Include the following information:

   a. Type, style, function, size, label, hand, and finish of each door hardware item.
   b. Manufacturer of each item.
   c. Fastenings and other pertinent information.
   d. Location of door hardware set, cross-referenced to Drawings, both on floor plans and in door and frame schedule.
   e. Explanation of abbreviations, symbols, and codes contained in schedule.
   f. Mounting locations for door hardware.
   g. Door and frame sizes and materials.

4. Submittal Sequence: Submit the final Door Hardware Schedule at earliest possible date, particularly where approval of the Door Hardware Schedule must precede fabrication of other work that is critical in the Project construction schedule. Include Product Data, Samples, Shop Drawings of other work affected by door hardware, and other information essential to the coordinated review of the Door Hardware Schedule.

C. Keying Schedule: Prepared under the supervision of the Owner, separate schedule detailing final keying instructions for locksets and cylinders in writing. Include keying system explanation, door numbers, key set symbols, hardware set numbers and special instructions. Owner to approve submitted keying schedule prior to the ordering of permanent cylinders.

D. Product Test Reports: Indicating compliance with cycle testing requirements, based on evaluation of comprehensive tests performed by manufacturer and witnessed by a qualified independent testing agency.

E. Operating and Maintenance Manuals: Provide manufacturers operating and maintenance manuals for each item comprising the complete door hardware installation in quantity as required in Division 01, Closeout Submittals. The manual to include the name, address, and contact information of the manufacturers providing the hardware and their nearest service representatives.

The final copies delivered after completion of the installation test to include "as built" modifications made during installation, checkout, and acceptance.

F. Warranties and Maintenance: Special warranties and maintenance agreements specified in the Related Sections.

1.4 DELIVERY, STORAGE, AND HANDLING

A. Inventory door hardware on receipt and provide secure lock-up and shelving for door hardware delivered to Project site. Do not store electronic access control hardware, software or accessories at Project site without prior authorization.

B. Tag each item or package separately with identification related to the final Door Hardware Schedule, and include basic installation instructions with each item or package.

C. Deliver, as applicable, permanent keys, cylinders, cores, access control credentials, software and related accessories directly to Owner via registered mail or overnight package service. Instructions for delivery to the Owner shall be established at the "Keying Conference".

1.5 WARRANTY

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

1.6 MAINTENANCE SERVICE

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

PART 2 - PRODUCTS

2.1 SCHEDULED DOOR HARDWARE

A. Refer to “PART 3 – EXECUTION” for required specification sections.

PART 3 - EXECUTION

3.1 DOOR HARDWARE SETS

A. The door hardware sets represent the design intent and direction of the owner and architect. They are a guideline only and should not be considered a detailed hardware schedule. Discrepancies, conflicting hardware and missing items should be brought to the attention of the architect with corrections made prior to the bidding process. Omitted items not included in a hardware set should

be scheduled with the appropriate additional hardware required for proper application and functionality.

1. Quantities listed are for each pair of doors, or for each single door.

2. The supplier is responsible for handing and sizing all products.

3. Where multiple options for a piece of hardware are given in a single line item, the supplier shall provide the appropriate application for the opening.

4. At existing openings with new hardware the supplier shall field inspect existing conditions prior to the submittal stage to verify the specified hardware will work as required. Provide alternate solutions and proposals as needed.

B. Products listed in the hardware sets shall be supplied by and in accordance with the requirements described in the specification section as noted for each item.

1. Section 08 71 00 – Door Hardware.

C. Manufacturer's Abbreviations:

1. MK - McKinney
2. PE - Pemko
3. SU - Securitron
4. RO - Rockwood
5. RU - Corbin Russwin
6. MC - Medeco
7. NO - Norton Rixson
8. OT - Other
9. SA - SARGENT

Hardware Sets

Set: 1.0

Doors: 100V.2, 100V.3, 100V.4

2 Continuous Hinge (ALUM) PT	_FM_SLF-HD1 PT x Required Length		PE
2 Electric Power Transfer	EL-CEPT	630	SU
1 Mullion	CR90xKM series M57 x height req'd		RU
1 Rim Exit Device, Exit Only	ED5200 EO M92	630	RU
1 Rim Exit Device, Nightlatch	ED5200 K157ET M92 CT_SB	630	RU
1 Mullion Cylinder Kit	CRMCK1 CT_B	630	RU
2 SFIC	Match existing Keymark keyway	26	MC
2 Pull (offset)	RM201 Mtg-Type as req'd	US32D	RO
2 Surface Closer (PA, stop)	DC8210 A11	689	RU
1 Gasketing	Included by Aluminum door supplier		OT
1 Rain Guard	346_ x Width of Frame Head (Omit at Overhangs)		PE
1 Gasketing (Mullion)	5110_		PE
2 Sweep	315_N		PE
1 Threshold	252x3_FG		PE
2 Frame Harness	QC-C3000P		MK
2 Door Harness	QC-C**** x Required Length		MK
2 Position Switch	DPS-M/W_		SU
1 Power Supply (w/enclosure)	AQL_E_series		SU
1 Wiring Diagram	Elevation and Point to Point as Specified		OT

Notes: Coordinate hardware with Aluminum Door and Frame manufacturer. Provide special templates, brackets, spacers, drop plates and fasteners as required. Confirm hardware finish with architect prior to ordering.

Potential future card reader - MELR retrofit kit would be added where applicable.

1. Door position switch monitors open/closed status.
2. Motion sensor (REX) signals alarm system of an authorized exit without alarm condition.

Set: 2.0

Doors: 100.1, 100.2, 163

2 Continuous Hinge (ALUM) PT	_FM_SLF-HD1 PT x Required Length		PE
2 Electric Power Transfer	EL-CEPT	630	SU
1 Mullion	CR90xKM series M57 x height req'd		RU
1 Rim Exit Device, Exit Only	ED5200 EO M92 MELR	630	RU
1 Rim Exit Device	ED5200N-SN200 K157ET MELR CT_SB	630	RU
1 Mullion Cylinder Kit	CRMCK1 CT_B	630	RU
2 SFIC	Match existing Keymark keyway	26	MC
2 Pull (offset)	RM201 Mtg-Type as req'd	US32D	RO
2 Surface Closer (PA, stop)	DC8210 A11	689	RU
1 Gasketing	Included by Aluminum door supplier		OT
1 Rain Guard	346_ x Width of Frame Head (Omit at Overhangs)		PE
1 Gasketing (Mullion)	5110_		PE
2 Sweep	315_N		PE
1 Threshold	252x3_FG		PE
2 Frame Harness	QC-C3000P		MK
3 Door Harness	QC-C**** x Required Length		MK
1 ElectroLynx Adaptor	52-2946		SA
1 Position Switch	DPS-M/W_		SU
1 Power Supply (w/enclosure)	AQL_E_series		SU
1 Wiring Diagram	Elevation and Point to Point as Specified		OT

Notes: Coordinate hardware with Aluminum Door and Frame manufacturer. Provide special templates, brackets, spacers, drop plates and fasteners as required. Confirm hardware finish with architect prior to ordering.
Application:
-Card reader is integrated with lock and mounted on face of door.

Door normally closed and locked.
Entrance by presenting a valid card to card-reader.
Egress allowed at all times.
Loss of power maintains security from lock side, entrance by mechanical key only.
Door monitored for door ajar and forced open.
EL NOTES:
-exit device is furnished with door position switch (DPS) as a standard feature.
-internal switch within latching hardware allows an individual to freely leave without sending an alarm to the access control system.

Set: 3.0 - Not Used

Set: 4.0

Doors: 100V.1

1 Continuous Hinge (ALUM) PT	_FM_SLF-HD1 PT x Required Length		PE
1 Electric Power Transfer	EL-CEPT	630	SU
1 Rim Exit Device, Nightlatch	ED5200 K157ET M92 MELR CT_SB	630	RU
1 SFIC	Match existing Keymark keyway	26	MC
1 Pull (offset)	RM201 Mtg-Type as req'd	US32D	RO
1 Concealed Overhead Stop	1-x36	630	NO
1 Automatic Opener	6000 series - mounting as req'd	689	NO
1 Gasketing	Included by Aluminum door supplier		OT
1 Rain Guard	346_ x Width of Frame Head (Omit at Overhangs)		PE
1 Sweep	315_N		PE
1 Threshold	252x3_FG		PE
1 Card Reader	Provided By Security Contractor		OT
1 Frame Harness	QC-C3000P		MK
1 Door Harness	QC-C**** x Required Length		MK
1 Position Switch	DPS-M/W_		SU
2 Door Switch	505		NO
1 Power Supply (w/enclosure)	AQL_E_series		SU
1 Wiring Diagram	Elevation and Point to Point as Specified		OT

Notes: Coordinate hardware with Aluminum Door and Frame manufacturer. Provide special templates, brackets, spacers, drop plates and fasteners as required. Confirm hardware finish with architect prior to ordering.

Door normally closed and locked.
Entrance by valid card to card-reader.
Free egress at all times.
Valid card to card-reader allows locked side actuator switch to function for activating automatic operator for ingress.
Inside (egress side) actuator switch is always functional to activate automatic operator for accessibility needs.
Loss of power maintains security from locked side of opening, automatic door operator loses the electrically open operation, yet operator will function as a normal mechanical door closer - Entrance by mechanical key only. Door monitored for door ajar or forced open.

Set: 5.0 - Not Used

Set: 6.0

Doors: 101.3, 116.1

6 Hinge (Qty as Specified), Hvy Wt	T4A3386 (size per spec, NRP as applicable)	US32D	MK
2 Electric Power Transfer	EL-CEPT	630	SU
1 Mullion	CR90xKM series M57 x height req'd		RU
1 Rim Exit Device	ED5200N-SN200 N9605ET CT_SB	630	RU
1 Rim Exit Device, Dummy	ED5200 N950ET M92	630	RU
1 Mullion Cylinder Kit	CRMCK1 CT_B	630	RU
2 SFIC	Match existing Keymark keyway	26	MC
2 Surface Closer (PA, stop)	DC8210 A11	689	RU
2 Kick Plate	K1050 10" (high) CSK BEV	US32D	RO
1 Rain Guard	346_ x Width of Frame Head (Omit at Overhangs)		PE
1 Gasketing (Mullion)	5110_		PE
1 Gasketing	2891_PK (Head), 290_PK (Jamb x2)		PE
2 Sweep	315_N		PE
1 Threshold	252x3_FG		PE
2 Frame Harness	QC-C3000P		MK
2 Door Harness	QC-C**** x Required Length		MK
1 Position Switch	DPS-M/W_		SU
1 Power Supply (w/enclosure)	AQL_E_series		SU
1 Wiring Diagram	Elevation and Point to Point as Specified		OT

Notes:
Application:
-Card reader is integrated with lock and mounted on face of door.

Door normally closed and locked.
Entrance by presenting a valid card to card-reader.
Egress allowed at all times.
Loss of power maintains security from lock side, entrance by mechanical key only.
Door monitored for door ajar and forced open.
EL NOTES:
-exit device is furnished with door position switch (DPS) as a standard feature.
-internal switch within latching hardware allows an individual to freely leave without sending an alarm to the access control system.

Set: 7.0

Doors: 101.1. 147.1, 150.1, 150.5, 174.1

3 Hinge (Qty as Specified), Hvy Wt	T4A3386 (size per spec, NRP as applicable)	US32D	MK
1 Electric Power Transfer	EL-CEPT	630	SU
1 Rim Exit Device	ED5200N-SN200 N9605ET CT_SB	630	RU
1 SFIC	Match existing Keymark keyway	26	MC
1 Surface Closer (PA, stop)	DC8210 A11	689	RU
1 Kick Plate	K1050 10" (high) CSK BEV	US32D	RO
1 Rain Guard	346_ x Width of Frame Head (Omit at Overhangs)		PE
1 Gasketing	2891_PK (Head), 290_PK (Jamb x2)		PE
1 Sweep	315_N		PE
1 Threshold	252x3_FG		PE
1 Frame Harness	QC-C3000P		MK
1 Door Harness	QC-C**** x Required Length		MK
1 Position Switch	DPS-M/W_		SU
1 Power Supply (w/enclosure)	AQL_E_series		SU
1 Wiring Diagram	Elevation and Point to Point as Specified		OT

Notes: Door normally closed and locked.
Entrance by presenting a valid card to card-reader.
Egress allowed at all times.
Loss of power maintains security from lock side, entrance by mechanical key only.
Door monitored for door ajar and forced open.

Set: 7.1

Doors: 121.3, 121.5, 162.1

3 Hinge (Qty as Specified), Hvy Wt	T4A3386 (size per spec, NRP as applicable)	US32D	MK
1 Rim Exit Device, Exit Only	ED5200 EO M61 CT_SB	630	RU
1 SFIC	Match existing Keymark keyway	26	MC
1 Surface Closer (PA, stop)	DC8210 A11	689	RU
1 Kick Plate	K1050 10" (high) CSK BEV	US32D	RO
1 Rain Guard	346_ x Width of Frame Head (Omit at Overhangs)		PE
1 Gasketing	2891_PK (Head), 290_PK (Jamb x2)		PE
1 Sweep	315_N		PE
1 Threshold	252x3_FG		PE
1 Position Switch	DPS-M/W_		SU

Notes: Future Access Control - conduit in frame w/ pull line and prep door for raceway.

Emergency exit only
Egress always free but alarm will sound
Shunt alarm at device with mechanical key.
Door position switch monitors open/closed status.

Set: 8.0

Doors: 150.2, 150.4

6 Hinge (Qty as Specified), Hvy Wt	T4A3386 (size per spec, NRP as applicable)	US32D	MK
2 Electric Power Transfer	EL-CEPT	630	SU
1 Mullion	CR90xKM series M57 x height req'd		RU
2 Rim Exit Device, Exit Only	ED5200 EO M92 MELR	630	RU
1 Mullion Cylinder Kit	CRMCK1 CT_B	630	RU
1 SFIC	Match existing Keymark keyway	26	MC
2 Surface Closer (PA, stop)	DC8210 A11	689	RU
2 Kick Plate	K1050 10" (high) CSK BEV	US32D	RO
1 Rain Guard	346_ x Width of Frame Head (Omit at Overhangs)		PE
1 Gasketing (Mullion)	5110_		PE
1 Gasketing	2891_PK (Head), 290_PK (Jamb x2)		PE
2 Sweep	315_N		PE
1 Threshold	252x3_FG		PE
2 Frame Harness	QC-C3000P		MK
2 Door Harness	QC-C**** x Required Length		MK
2 Position Switch	DPS-M/W_		SU
1 Power Supply (w/enclosure)	AQL_E_series		SU
1 Wiring Diagram	Elevation and Point to Point as Specified		OT

Notes: 1. Door position switch monitors open/closed status.
2. Motion sensor (REX) signals alarm system of an authorized exit without alarm condition.

Set: 9.0

Doors: 149.2, 164.2

3 Hinge (Qty as Specified), Hvy Wt	T4A3386 (size per spec, NRP as applicable)	US32D	MK
1 Electric Power Transfer	EL-CEPT	630	SU
1 Access Control Mort Lock	ML20606 x SN200-SEC NSA CT_SB	626	RU
1 SFIC	Match existing Keymark keyway	26	MC
1 Surface Closer (PA, stop)	DC8210 A11	689	RU
1 Kick Plate	K1050 10" (high) CSK BEV	US32D	RO
1 Rain Guard	346_ x Width of Frame Head (Omit at Overhangs)		PE
1 Gasketing	2891_PK (Head), 290_PK (Jamb x2)		PE
1 Sweep	315_N		PE
1 Threshold	252x3_FG		PE
1 Frame Harness	QC-C3000P		MK
1 Door Harness	QC-C**** x Required Length		MK
1 Power Supply (w/enclosure)	AQL_E_series		SU
1 Wiring Diagram	Elevation and Point to Point as Specified		OT

Notes: Application:
-Card reader is integrated with lock and mounted on face of door.

Door normally closed and locked.
Entrance by presenting a valid card to card-reader.
Egress allowed at all times.
Loss of power maintains security from lock side, entrance by mechanical key only.
Door monitored for door ajar and forced open.
EL NOTE: internal door position monitoring, standard feature, is built into latching hardware through the use of latch bolt and deadlatch monitoring.

Set: 10.0

Doors: 144.1, 145.1, 148.1

6 Hinge (Qty as Specified), Hvy Wt	T4A3386 (size per spec, NRP as applicable)	US32D	MK
1 Electric Power Transfer	EL-CEPT	630	SU
1 Dust Proof Strike	570	US26D	RO
1 Self-Latching Flush Bolt Set	2845 / 2945	US26D	RO
1 Access Control Mort Lock	ML20606 x SN200-SEC NSA CT_SB	626	RU
1 SFIC	Match existing Keymark keyway	26	MC
2 Mounting Bracket	2601_	US28	RO
1 Coordinator	2600 series (mounting as req'd)	US28	RO
2 Surface Closer (PA, stop)	DC8210 A11	689	RU
2 Kick Plate	K1050 10" (high) CSK BEV	US32D	RO
1 Security Astragal	353_ x P491		PE
1 Rain Guard	346_ x Width of Frame Head (Omit at Overhangs)		PE
1 Gasketing	2891_PK (Head), 290_PK (Jamb x2)		PE
2 Sweep	315_N		PE
1 Threshold	252x3_FG		PE
1 Frame Harness	QC-C3000P		MK
1 Door Harness	QC-C**** x Required Length		MK
1 Position Switch	DPS-M/W_		SU
1 Power Supply (w/enclosure)	AQL_E_series		SU
1 Wiring Diagram	Elevation and Point to Point as Specified		OT

Notes: Door normally closed and locked.
Entrance by presenting a valid card to card-reader.
Egress allowed at all times.
Loss of power maintains security from lock side, entrance by mechanical key only.
Door monitored for door ajar and forced open."

Set: 11.0 - Not Used

Set: 11.1

Doors: 121.1, 174.2, 208.1, 208.2, 214

2 Continuous Hinge (ALUM)	_FM_SLF-HD1 x Required Length		PE
1 Mullion	CR90xKM series M57 x height req'd		RU
2 Rim Exit Device, Classroom	ED5200 N955ET CT_SB	630	RU
1 Mullion Cylinder Kit	CRMCK1 CT_B	630	RU
3 SFIC	Match existing Keymark keyway	26	MC
2 Surface Closer (Stop-arm)	DC6210 A4	689	RU
1 Gasketing	Included by Aluminum door supplier		OT
1 Gasketing (Mullion)	5110_		PE

Notes: Coordinate hardware with Aluminum Door and Frame manufacturer. Provide special templates, brackets, spacers, drop plates and fasteners as required. Confirm hardware finish with architect prior to ordering.

Set: 12.0

Doors: 206.1, 206.2, 206.3, 206.4

1 Continuous Hinge (ALUM)	_FM_SLF-HD1 x Required Length		PE
1 Rim Exit Device, Classroom	ED5200 N955ET CT_SB	630	RU
1 SFIC	Match existing Keymark keyway	26	MC
1 Surface Closer (Stop-arm)	DC6210 A4	689	RU
1 Gasketing	Included by Aluminum door supplier		OT

Notes: Coordinate hardware with Aluminum Door and Frame manufacturer. Provide special templates, brackets, spacers, drop plates and fasteners as required. Confirm hardware finish with architect prior to ordering.

Set: 13.0 - Not Used

Set: 14.0 - Not Used

Set: 15.0 - Not Used

Set: 15.1

Doors: 125.1

1 Continuous Hinge (ALUM)	_FM_SLF-HD1 x Required Length		PE
1 Classroom Lock	ML2003 NSA CT_SB	626	RU
1 SFIC	Match existing Keymark keyway	26	MC
1 Surface Closer (Stop-arm)	DC6210 A4	689	RU
1 Gasketing	Included by Aluminum door supplier		OT

Notes:

Coordinate hardware with Aluminum Door and Frame manufacturer. Provide special templates, brackets, spacers, drop plates and fasteners as required. Confirm hardware finish with architect prior to ordering.

Set: 15.2

Doors: 143

1 Continuous Hinge (ALUM)	_FM_SLF-HD1 x Required Length		PE
1 Classroom Lock	ML2003 NSA CT_SB	626	RU
1 SFIC	Match existing Keymark keyway	26	MC
1 Surface Closer	DC6200/DC6210- mounting as req'd	689	RU
1 Door Stop	400 series as req'd	US26D	RO
1 Gasketing	Included by Aluminum door supplier		OT

Notes: Coordinate hardware with Aluminum Door and Frame manufacturer. Provide special templates, brackets, spacers, drop plates and fasteners as required. Confirm hardware finish with architect prior to ordering.

Set: 16.0

Doors: 100V.6, 100V.7, 100V.8

2 Continuous Hinge (ALUM)	_FM_SLF-HD1 x Required Length		PE
2 Dummy Bar	ED5000DB	630	RU
2 Pull (offset)	RM201 Mtg-Type as req'd	US32D	RO
2 Surface Closer (Stop-arm)	DC6210 A4	689	RU
1 Gasketing	Included by Aluminum door supplier		OT

Notes: Coordinate hardware with Aluminum Door and Frame manufacturer. Provide special templates, brackets, spacers, drop plates and fasteners as required. Confirm hardware finish with architect prior to ordering.

Set: 17.0

Doors: 100V.5

1 Continuous Hinge (ALUM)	_FM_SLF-HD1 x Required Length		PE
1 Dummy Bar	ED5000DB	630	RU
1 Pull (offset)	RM201 Mtg-Type as req'd	US32D	RO
1 Concealed Overhead Stop	1-x36	630	NO
1 Automatic Opener	6300 series - mounting as req'd	689	NO
1 Gasketing	Included by Aluminum door supplier		OT
2 Door Switch	505		NO

Notes: Coordinate hardware with Aluminum Door and Frame manufacturer. Provide special templates, brackets, spacers, drop plates and fasteners as required. Confirm hardware finish with architect prior to ordering.

Push/Pull operation - free ingress and egress.
Using either the push or pull side actuator switch activates automatic operator.
Automatic operator functions as a normal mechanical door closer without the use of the actuator switches.
Loss of power disables automatic operator's electrical opening capability, yet operator will function as a normal mechanical door closer.
Free ingress and egress at all times.

Set: 18.0 - Not Used

Set: 19.0 - Not Used

Set: 19.1

Doors: 101.4, 116.4, 121.2, 150.7, 150.8, 150.9

6 Hinge (Qty as Specified), Hvy Wt	T4A3786 (size per spec, NRP as applicable)	US26D	MK
1 Mullion	CR90xKM series M57 x height req'd		RU
2 Rim Exit Device, Classroom	ED5200 N955ET CT_SB	630	RU
1 Mullion Cylinder Kit	CRMCK1 CT_B	630	RU
3 SFIC	Match existing Keymark keyway	26	MC
2 Surface Closer (Stop-arm)	DC6210 A4	689	RU
2 Kick Plate	K1050 10" (high) CSK BEV	US32D	RO
1 Gasketing	S88_(size as required)		PE
1 Gasketing (Mullion)	5110_		PE

Notes:

Set: 19.2

Doors: 116.5

6 Hinge (Qty as Specified), Hvy Wt	T4A3786 (size per spec, NRP as applicable)	US26D	MK
1 Mullion	CR90xKM series M57 x height req'd		RU
2 Rim Exit Device, Classroom	ED5200 N955ET CT_SB	630	RU
1 Mullion Cylinder Kit	CRMCK1 CT_B	630	RU
3 SFIC	Match existing Keymark keyway	26	MC
2 Surface Closer	DC6200/DC6210- mounting as req'd	689	RU
2 Kick Plate	K1050 10" (high) CSK BEV	US32D	RO
2 Door Stop	400 series as req'd	US26D	RO
1 Gasketing	S88_(size as required)		PE
1 Gasketing (Mullion)	5110_		PE

Notes:

Set: 20.0 - Not Used

Set: 21.0

Doors: 160.1, 162.2

3 Hinge (Qty as Specified), Hvy Wt	T4A3786 (size per spec, NRP as applicable)	US26D	MK
1 Electric Power Transfer	EL-CEPT	630	SU
1 Rim Exit Device	ED5200N-SN200 N9605ET CT_SB	630	RU
1 SFIC	Match existing Keymark keyway	26	MC
1 Surface Closer (Stop-arm)	DC6210 A4	689	RU
1 Kick Plate	K1050 10" (high) CSK BEV	US32D	RO
1 Gasketing	S88_(size as required)		PE
1 Frame Harness	QC-C3000P		MK
1 Door Harness	QC-C**** x Required Length		MK
1 Power Supply (w/enclosure)	AQL_E_series		SU
1 Wiring Diagram	Elevation and Point to Point as Specified		OT

Notes: Application:
-Card reader is integrated with lock and mounted on face of door.

Door normally closed and locked.
Entrance by presenting a valid card to card-reader.
Egress allowed at all times.
Loss of power maintains security from lock side, entrance by mechanical key only.
Door monitored for door ajar and forced open.
EL NOTES:
-exit device is furnished with door position switch (DPS) as a standard feature.
-internal switch within latching hardware allows an individual to freely leave without sending an alarm to the access control system.

Set: 22.0

Doors: S2.1

3 Hinge (Qty as Specified), Hvy Wt	T4A3786 (size per spec, NRP as applicable)	US26D	MK
1 Rim Exit Device, Nightlatch	ED5200 N957ET CT_SB	630	RU
1 SFIC	Match existing Keymark keyway	26	MC
1 Surface Closer	DC6200/DC6210- mounting as req'd	689	RU
1 Kick Plate	K1050 10" (high) CSK BEV	US32D	RO
1 Door Stop	400 series as req'd	US26D	RO
1 Gasketing	S88_(size as required)		PE

Set: 22.1

Doors: 101.5, 116.3

3 Hinge (Qty as Specified), Hvy Wt	T4A3786 (size per spec, NRP as applicable)	US26D	MK
1 Rim Exit Device, Classroom	ED5200 N955ET CT_SB	630	RU
1 SFIC	Match existing Keymark keyway	26	MC
1 Surface Closer (Stop-arm)	DC6210 A4	689	RU
1 Kick Plate	K1050 10" (high) CSK BEV	US32D	RO
1 Gasketing	S88_(size as required)		PE

Set: 22.2

Doors: 160.2

3 Hinge (Qty as Specified), Hvy Wt	T4A3786 (size per spec, NRP as applicable)	US26D	MK
1 Rim Exit Device, Classroom	ED5200 N955ET CT_SB	630	RU
1 SFIC	Match existing Keymark keyway	26	MC
1 Surface Closer	DC6200/DC6210- mounting as req'd	689	RU
1 Kick Plate	K1050 10" (high) CSK BEV	US32D	RO
1 Door Stop	400 series as req'd	US26D	RO
1 Gasketing	S88_(size as required)		PE

Set: 23.0

Doors: S2.2

3 Hinge (Qty as Specified), Hvy Wt	T4A3786 (size per spec, NRP as applicable)	US26D	MK
1 Rim Exit Device, Nightlatch	ED5200 110957ET M61 CT_SB	630	RU
2 SFIC	Match existing Keymark keyway	26	MC
1 Surface Closer	DC6200/DC6210- mounting as req'd	689	RU
1 Kick Plate	K1050 10" (high) CSK BEV	US32D	RO
1 Door Stop	400 series as req'd	US26D	RO
1 Gasketing	S88_(size as required)		PE

Notes: Ingress by mechanical key only
Egress is alarmed and can be turned of / reset by mechanical key.

Set: 24.0

Doors: 109.1, 110.1, 122, 123, 124.1, 124.2, 142.1, 142.2, 145.2, 146, 148.2, 172, 204, 207.2, 211, 211A, 213A, 216A, 219

2 Hinge (Qty as Specified), Hvy Wt	T4A3786 (size per spec, NRP as applicable)	US26D	MK
1 Hinge, Hvy Wt, QC	T4A3786 QCxx (size per spec)	US26D	MK
1 Access Control Mort Lock	ML20606 x SN200-SEC NSA CT_SB	626	RU
1 SFIC	Match existing Keymark keyway	26	MC
1 Surface Closer	DC6200/DC6210- mounting as req'd	689	RU
1 Kick Plate	K1050 10" (high) CSK BEV	US32D	RO
1 Door Stop	400 series as req'd	US26D	RO
1 Gasketing	S88_(size as required)		PE
1 Frame Harness	QC-C3000P		MK
1 Door Harness	QC-C**** x Required Length		MK
1 Power Supply (w/enclosure)	AQL_E_series		SU
1 Wiring Diagram	Elevation and Point to Point as Specified		OT

Notes: Application:
-Card reader is integrated with lock and mounted on face of door.

Door normally closed and locked.
Entrance by presenting a valid card to card-reader.
Egress allowed at all times.
Loss of power maintains security from lock side, entrance by mechanical key only.
Door monitored for door ajar and forced open.
EL NOTE: internal door position monitoring, standard feature, is built into latching hardware through the use of latch bolt and deadlatch monitoring.

Set: 25.0

Doors: 149.4, 213.2

2 Hinge (Qty as Specified), Hvy Wt	T4A3786 (size per spec, NRP as applicable)	US26D	MK
1 Hinge, Hvy Wt, QC	T4A3786 QCxx (size per spec)	US26D	MK
1 Access Control Mort Lock	ML20606 x SN200-SEC NSA CT_SB	626	RU
1 SFIC	Match existing Keymark keyway	26	MC
1 Surface Closer (Stop-arm)	DC6210 A4	689	RU
1 Kick Plate	K1050 10" (high) CSK BEV	US32D	RO
1 Gasketing	S88_(size as required)		PE
1 Frame Harness	QC-C3000P		MK
1 Door Harness	QC-C**** x Required Length		MK
1 Power Supply (w/enclosure)	AQL_E_series		SU
1 Wiring Diagram	Elevation and Point to Point as Specified		OT

Notes: Application:
-Card reader is integrated with lock and mounted on face of door.

Door normally closed and locked.
Entrance by presenting a valid card to card-reader.
Egress allowed at all times.
Loss of power maintains security from lock side, entrance by mechanical key only.
Door monitored for door ajar and forced open.
EL NOTE: internal door position monitoring, standard feature, is built into latching hardware through the use of latch bolt and deadlatch monitoring.

Set: 26.0

Doors: 103.1, 103.4, 216

2	Hinge (Qty as Specified), Hvy Wt	T4A3786 (size per spec, NRP as applicable)	US26D MK
1	Hinge, Hvy Wt, QC	T4A3786 QCxx (size per spec)	US26D MK
1	Access Control Mort Lock	ML20606 x SN200-SEC NSA CT_SB	626 RU
1	SFIC	Match existing Keymark keyway	26 MC
1	Surface Overhead Stop	9-x36	689 NO
1	Surface Closer	DC6200/DC6210- mounting as req'd	689 RU
1	Kick Plate	K1050 10" (high) CSK BEV	US32D RO
1	Gasketing	S88_(size as required)	PE
1	Frame Harness	QC-C3000P	MK
1	Door Harness	QC-C**** x Required Length	MK
1	Power Supply (w/enclosure)	AQL_E_series	SU
1	Wiring Diagram	Elevation and Point to Point as Specified	OT

Notes: Application:
-Card reader is integrated with lock and mounted on face of door.

Door normally closed and locked.
Entrance by presenting a valid card to card-reader.
Egress allowed at all times.
Loss of power maintains security from lock side, entrance by mechanical key only.
Door monitored for door ajar and forced open.
EL NOTE: internal door position monitoring, standard feature, is built into latching hardware through the use of latch bolt and deadlatch monitoring.

Set: 27.0

Doors: 144.2, 218

5	Hinge (Qty as Specified), Hvy Wt	T4A3786 (size per spec, NRP as applicable)	US26D MK
1	Hinge, Hvy Wt, QC	T4A3786 QCxx (size per spec)	US26D MK
1	Dust Proof Strike	570	US26D RO
1	Self-Latching Flush Bolt Set	2845 / 2945	US26D RO
1	Access Control Mort Lock	ML20606 x SN200-SEC NSA CT_SB	626 RU
1	SFIC	Match existing Keymark keyway	26 MC
2	Mounting Bracket	2601_	US28 RO
1	Coordinator	2600 series (mounting as req'd)	US28 RO
2	Surface Closer	DC6200/DC6210- mounting as req'd	689 RU
2	Kick Plate	K1050 10" (high) CSK BEV	US32D RO
2	Door Stop	400 series as req'd	US26D RO
1	Astragal	357_ (Size as Req'd) x S88_	PE
1	Gasketing	S88_(size as required)	PE
1	Frame Harness	QC-C3000P	MK
1	Door Harness	QC-C**** x Required Length	MK
1	Position Switch	DPS-M/W_	SU
1	Power Supply (w/enclosure)	AQL_E_series	SU
1	Wiring Diagram	Elevation and Point to Point as Specified	OT

Notes: Application:
-Card reader is integrated with lock and mounted on face of door.

Door normally closed and locked.
Entrance by presenting a valid card to card-reader.
Egress allowed at all times.
Loss of power maintains security from lock side, entrance by mechanical key only.
Door monitored for door ajar and forced open.
EL NOTE: internal door position monitoring, standard feature, is built into latching hardware through the use of latch bolt and deadlatch monitoring.

Set: 28.0

Doors: 213.1, 220

5	Hinge (Qty as Specified), Hvy Wt	T4A3786 (size per spec, NRP as applicable)	US26D MK
1	Hinge, Hvy Wt, QC	T4A3786 QCxx (size per spec)	US26D MK
1	Dust Proof Strike	570	US26D RO
1	Self-Latching Flush Bolt Set	2845 / 2945	US26D RO
1	Access Control Mort Lock	ML20606 x SN200-SEC NSA CT_SB	626 RU
1	SFIC	Match existing Keymark keyway	26 MC
2	Mounting Bracket	2601_	US28 RO
1	Coordinator	2600 series (mounting as req'd)	US28 RO
2	Surface Closer (Stop-arm)	DC6210 A4	689 RU
2	Kick Plate	K1050 10" (high) CSK BEV	US32D RO
1	Astragal	357_ (Size as Req'd) x S88_	PE
1	Gasketing	S88_(size as required)	PE
1	Frame Harness	QC-C3000P	MK
1	Door Harness	QC-C**** x Required Length	MK
1	Position Switch	DPS-M/W_	SU
1	Power Supply (w/enclosure)	AQL_E_series	SU
1	Wiring Diagram	Elevation and Point to Point as Specified	OT

Notes: Application:
-Card reader is integrated with lock and mounted on face of door.

Door normally closed and locked.
Entrance by presenting a valid card to card-reader.
Egress allowed at all times.
Loss of power maintains security from lock side, entrance by mechanical key only.
Door monitored for door ajar and forced open.
EL NOTE: internal door position monitoring, standard feature, is built into latching hardware through the use of latch bolt and deadlatch monitoring.

Set: 29.0

Doors: 117

5 Hinge (Qty as Specified), Hvy Wt	T4A3786 (size per spec, NRP as applicable)	US26D	MK
1 Hinge, Hvy Wt, QC	T4A3786 QCxx (size per spec)	US26D	MK
1 Dust Proof Strike	570	US26D	RO
1 Self-Latching Flush Bolt Set	2845 / 2945	US26D	RO
1 Access Control Mort Lock	ML20606 x SN200-SEC NSA CT_SB	626	RU
1 SFIC	Match existing Keymark keyway	26	MC
2 Mounting Bracket	2601_	US28	RO
1 Coordinator	2600 series (mounting as req'd)	US28	RO
2 Surface Overhead Stop	9-x36	689	NO
2 Surface Closer	DC6200/DC6210- mounting as req'd	689	RU
2 Kick Plate	K1050 10" (high) CSK BEV	US32D	RO
1 Astragal	357_ (Size as Req'd) x S88_		PE
1 Gasketing	S88_(size as required)		PE
1 Frame Harness	QC-C3000P		MK
1 Door Harness	QC-C**** x Required Length		MK
1 Position Switch	DPS-M/W_		SU
1 Power Supply (w/enclosure)	AQL_E_series		SU
1 Wiring Diagram	Elevation and Point to Point as Specified		OT

Notes: Application:
-Card reader is integrated with lock and mounted on face of door.

Door normally closed and locked.
Entrance by presenting a valid card to card-reader.
Egress allowed at all times.
Loss of power maintains security from lock side, entrance by mechanical key only.
Door monitored for door ajar and forced open.
EL NOTE: internal door position monitoring, standard feature, is built into latching hardware through the use of latch bolt and deadlatch monitoring.

Set: 29.1

Doors: 161

6 Hinge (Qty as Specified)	TA2714 (size per spec, NRP as applicable)	US26D	MK
1 Dust Proof Strike	570	US26D	RO
1 Self-Latching Flush Bolt Set	2845 / 2945	US26D	RO
1 Storeroom Lock	ML2057 NSA CT_SB	626	RU
1 SFIC	Match existing Keymark keyway	26	MC
2 Mounting Bracket	2601_	US28	RO
1 Coordinator	2600 series (mounting as req'd)	US28	RO
2 Surface Overhead Stop	9-x36	689	NO
2 Surface Closer	DC6200/DC6210- mounting as req'd	689	RU
2 Kick Plate	K1050 10" (high) CSK BEV	US32D	RO
1 Astragal	357_ (Size as Req'd) x S88_		PE
1 Gasketing	S88_(size as required)		PE

Set: 30.0

Doors: 143A, 148.3

3 Hinge (Qty as Specified)	TA2714 (size per spec, NRP as applicable)	US26D	MK
1 Storeroom Lock	ML2057 NSA CT_SB	626	RU
1 SFIC	Match existing Keymark keyway	26	MC
1 Surface Closer	DC6200/DC6210- mounting as req'd	689	RU
1 Kick Plate	K1050 10" (high) CSK BEV	US32D	RO
1 Door Stop	400 series as req'd	US26D	RO
1 Gasketing	S88_(size as required)		PE

Set: 31.0

Doors: 134, 147.2

3 Hinge (Qty as Specified)	TA2714 (size per spec, NRP as applicable)	US26D	MK
1 Storeroom Lock	ML2057 NSA CT_SB	626	RU
1 SFIC	Match existing Keymark keyway	26	MC
1 Surface Closer (Stop-arm)	DC6210 A4	689	RU
1 Kick Plate	K1050 10" (high) CSK BEV	US32D	RO
1 Gasketing	S88_(size as required)		PE

Set: 32.0

Doors: 105, 106, 107, 108, 110.2, 111, 112, 113, 114, 125.2, 127, 129, 131, 136, 138, 140, 173

3 Hinge (Qty as Specified)	TA2714 (size per spec, NRP as applicable)	US26D	MK
1 Classroom Lock	ML2003 NSA CT_SB	626	RU
1 SFIC	Match existing Keymark keyway	26	MC
1 Surface Closer	DC6200/DC6210- mounting as req'd	689	RU
1 Kick Plate	K1050 10" (high) CSK BEV	US32D	RO
1 Door Stop	400 series as req'd	US26D	RO
1 Gasketing	S88_(size as required)		PE

Set: 32.1

Doors: 104, 115, 126, 130, 133, 137, 141

3 Hinge (Qty as Specified)	TA2714 (size per spec, NRP as applicable)	US26D	MK
1 Entrance Lock	ML2053 NSA CT_SB	626	RU
1 SFIC	Match existing Keymark keyway	26	MC
1 Surface Closer	DC6200/DC6210- mounting as req'd	689	RU
1 Kick Plate	K1050 10" (high) CSK BEV	US32D	RO
1 Door Stop	400 series as req'd	US26D	RO
1 Gasketing	S88_(size as required)		PE

Set: 33.0

Doors: 120, 170, 171, 202

3 Hinge (Qty as Specified)	TA2314 (size per spec, NRP as applicable)	US32D	MK
1 Privacy Lock	ML2030 NSA M19VN	626	RU
1 Surface Closer	DC6200/DC6210- mounting as req'd	689	RU
1 Kick Plate	K1050 10" (high) CSK BEV	US32D	RO
1 Mop Plate	K1050 4" high 4BE CSK	US32D	RO
1 Door Stop	400 series as req'd	US26D	RO
1 Gasketing	S88_(size as required)		PE
1 Coat Hook	RM812	US26D	RO

Notes: mop plate at in-swing only.

Set: 34.0

Doors: 201, 203, 209, 210, 215, 217

3 Hinge (Qty as Specified), Hvy Wt	T4A3786 (size per spec, NRP as applicable)	US26D	MK
1 Deadbolt	DL4117 CT_SB	626	RU
1 SFIC	Match existing Keymark keyway	26	MC
1 Pull Plate	111x70C	US32D	RO
1 Push Plate	70C	US32D	RO
1 Surface Closer	DC6200/DC6210- mounting as req'd	689	RU
1 Kick Plate	K1050 10" (high) CSK BEV	US32D	RO
1 Door Stop	400 series as req'd	US26D	RO
1 Gasketing	S88_(size as required)		PE

Set: 35.0

Doors: 101.2, 103.2, 103.3, 109.2, 116.2, 149.1, 149.3, 150.3, 150.6, 164.1, 207.1, E1

1 SFIC	Match existing Keymark keyway	26	MC
1 SFIC Cylinder Housing	Type as required to accept Keymark SFIC	26	MC
1 Balance of Hardware	By Others		OT

Notes: Verify cylinder requirements with door manufacturer, adjust as req'd

Set: 36.0

Doors: Fence Gates as indicated in the Drawings

1 Cylinder Lock	CLX3357	US32D
1 Lever	NZD	US32D RU
1 Gate Lock Box	By Chain Link Fence Manufacturer	
1 Balance of Hardware	By Chain Link Fence Manufacturer	

END OF SECTION

SECTION 08 8000
GLAZING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Insulating glass units.

B. Glazing units.

C. Glazing compounds.

1.02 RELATED REQUIREMENTS

A. Section 06 4100 - Architectural Wood Casework: Cabinets glass shelvesand glazed doors.

B. Section 07 2600 - Vapor Retarders.

C. Section 07 2700 - Air Barriers.

D. Section 07 9200 - Joint Sealants: Sealants for other than glazing purposes.

E. Section 08 1113 - Hollow Metal Doors and Frames: Glazed lites in doors and borrowed lites.

F. Section 08 4313 - Aluminum-Framed Storefronts

1.03 REFERENCE STANDARDS

A. 16 CFR 1201 - Safety Standard for Architectural Glazing Materials.

B. ANSI Z97.1 - American National Standard for Safety Glazing Materials Used in Buildings - Safety Performance Specifications and Methods of Test.

C. ASTM C864 - Standard Specification for Dense Elastomeric Compression Seal Gaskets, Setting Blocks, and Spacers.

D. ASTM C920 - Standard Specification for Elastomeric Joint Sealants.

E. ASTM C1036 - Standard Specification for Flat Glass.

F. ASTM C1048 - Standard Specification for Heat-Strengthened and Fully Tempered Flat Glass.

G. ASTM C1172 - Standard Specification for Laminated Architectural Flat Glass.

H. ASTM C1193 - Standard Guide for Use of Joint Sealants.

I. ASTM C1376 - Standard Specification for Pyrolytic and Vacuum Deposition Coatings on Flat Glass.

J. ASTM E1300 - Standard Practice for Determining Load Resistance of Glass in Buildings.

K. ASTM E2190 - Standard Specification for Insulating Glass Unit Performance and Evaluation.

L. GANA (SM) - GANA Sealant Manual.

M. NFRC 100 - Procedure for Determining Fenestration Product U-factors.

N. NFRC 200 - Procedure for Determining Fenestration Product Solar Heat Gain Coefficient and Visible Transmittance at Normal Incidence.

O. NFRC 300 - Test Method for Determining the Solar Optical Properties of Glazing Materials and Systems.

1.04 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements for submittal procedures.

B. Product Data on Insulating Glass Unit and Glazing Unit Glazing Types: Provide structural, physical and environmental characteristics, size limitations, special handling and installation requirements.
   1. On mirror glass: mastic, and edge trim (if indicated).

C. Product Data on Glazing Compounds and Accessories: Provide chemical, functional, and environmental characteristics, limitations, special application requirements, and identify available colors.

D. Samples: Submit two samples 12 by 12 inch in sizeof each type of insulated glass units showing coloration and thermal spacer design.

E. Warranty Documentation: Submit manufacturer warranty and ensure that forms have been completed in Owner's name and registered with manufacturer.

1.05 QUALITY ASSURANCE

A. Perform Work in accordance with GANA (GM) for glazing installation methods.

B. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum five years of documented experience.

C. Installer Qualifications: Company specializing in performing work of the type specified and approved by manufacturer.

1.06 FIELD CONDITIONS

A. Do not install glazing when ambient temperature is less than 40 degrees F.

B. Maintain minimum ambient temperature before, during and 24 hours after installation of glazing compounds.

C. Store products in manufacturer's unopened packaging until ready for installation.

1.07 WARRANTY

A. See Section 01 7800 - Closeout Submittals for additional warranty requirements.

B. Insulating Glass Units: Provide a ten (10) year manufacturer warranty to include coverage for seal failure, interpane dusting or misting, including replacement of failed units.

C. Laminated Glass: Provide a five (5) year manufacturer warranty to include coverage for delamination, including providing products to replace failed units.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Glass Fabricators:
1. Oldcastle; www.obe.com
2. Viracon, Inc: www.viracon.com.
3. Substitutions: See Section 01 6000 - Product Requirements.

B. Float Glass Manufacturers:
1. Cardinal Glass Industries: www.cardinalcorp.com/#sle.
2. Guardian Glass, LLC: www.guardianglass.com.
3. Pilkington North America Inc: www.pilkington.com/na/#sle.
4. PPG Industries, Inc: www.ppgideascapes.com.
5. Substitutions: See Section 01 6000 - Product Requirements.

2.02 PERFORMANCE REQUIREMENTS - EXTERIOR GLAZING ASSEMBLIES

A. Provide type and thickness of exterior glazing assemblies to support assembly dead loads, and to withstand live loads caused by positive and negative wind pressure acting normal to plane of glass.
1. Design Pressures: see Structural Notes in Drawings.
2. Comply with ASTM E1300 for design load resistance of glass type, thickness, dimensions, and maximum lateral deflection of supported glass.
3. Provide glass edge support system sufficiently stiff to limit the lateral deflection of supported glass edges to less than 1/175 of their lengths under specified design load.
4. Glass thicknesses listed are minimum.

B. Weather-Resistive Barrier Seals: Provide completed assemblies that maintain continuity of building enclosure water-resistive barrier, vapor retarder, and/or air barrier.
1. In conjunction with weather barrier related materials described in other sections, as follows:
   a. Vapor Retarders: See Section 07 2600.
   b. Air Barriers: See Section 07 2700.
2. To utilize inner pane of multiple pane insulating glass units for continuity of vapor retarder and/or air barrier seal.

3. To maintain a continuous vapor retarder and/or air barrier throughout glazed assembly from glass pane to heel bead of glazing sealant.

C. Thermal and Optical Performance: Provide exterior glazing products with performance properties as indicated. Performance properties are in accordance with manufacturer's published data as determined with the following procedures and/or test methods:
1. Center of Glass U-Value: Comply with NFRC 100 using Lawrence Berkeley National Laboratory (LBNL) WINDOW 7 computer program.
2. Center of Glass Solar Heat Gain Coefficient (SHGC): Comply with NFRC 200 using Lawrence Berkeley National Laboratory (LBNL) WINDOW 7 computer program.
3. Solar Optical Properties: Comply with NFRC 300 test method.

2.03 GLASS MATERIALS

A. Float Glass: Provide float glass based glazing unless otherwise indicated.
1. Annealed Type: ASTM C1036, Type I - Transparent Flat, Class 1 - Clear, Quality - Q3.
2. Kind HS - Heat-Strengthened Type: Complies with ASTM C1048.
3. Kind FT - Fully Tempered Type: Complies with ASTM C1048.
4. Fully Tempered Safety Glass: Complies with ANSI Z97.1 or 16 CFR 1201 criteria for safety glazing used in hazardous locations.

B. Laminated Glass: Float glass laminated in accordance with ASTM C1172.
1. Laminated Safety Glass: Complies with ANSI Z97.1 - Class A or 16 CFR 1201 - Category II impact test requirements.
a. Polyvinyl Butyral (PVB) Interlayer: 0.030 inch thick, minimum.

2.04 INSULATING GLASS UNITS

A. Manufacturers:
1. PPG Industries, Inc: www.ppgideascapes.com.
2. Viracon, Apogee Enterprises, Inc: www.viracon.com.
3. Substitutions: See Section 01 6000 - Product Requirements.

B. Insulating Glass Units: Types as indicated.
1. Durability: Certified by an independent testing agency to comply with ASTM E2190.
2. Coated Glass: Comply with requirements of ASTM C1376 for pyrolytic (hard-coat) or magnetic sputter vapor deposition (soft-coat) type coatings on flat glass; coated vision glass, Kind CV; coated overhead glass, Kind CO; or coated spandrel glass, Kind CS.
3. Glass Edges: Seamed, no exceptions.
4. Warm-Edge Spacers: Low conductivity thermoplastic and stainless steel.
a. Spacer Width: As required for specified insulating glass unit.
b. Spacer Height: Manufacturer's standard.
c. Products:
1) Technoform Glass Insulation; TGI-Spacer: www.glassinsulation.us/#sle.
2) Substitutions: See Section 01 6000 - Product Requirements.
5. Spacer Color: match framing color, no exceptions.
6. Edge Seal:
a. Dual-Sealed System: Provide polyisobutylene sealant as primary seal applied between spacer and glass panes, and silicone sealant as secondary seal applied around perimeter.
b. Single-Sealed Systems prohibited
7. Color: Black.
8. Purge interpane space with dry air, hermetically sealed.

C. Type G-1 - Insulating Glass Units: Vision glass, double glazed, warm-bronze, reflective exterior appearance.
1. Applications: typical exterior.
2. Space between lites filled with argon.
3. Outboard Lite: Annealed float glass, 1/4 inch thick, minimum.
a. Tint: Champane.

b. Coating: Low-E (passive type), on #2 surface.
4. Warm-edge spacer.
5. Inboard Lite: Annealed float glass, 1/4 inch thick, minimum.
a. Tint: Clear.
6. Total Thickness: 1 inch.
7. Thermal Transmittance (U-Value), Winter - Center of Glass: 0.24, minimum.
8. Visible Light Transmittance (VLT): 45 percent, minimum.
9. Solar Heat Gain Coefficient (SHGC): 25 percent, maximum.
10. Visible Light Reflectance, Outside: 26 percent, maximum.
11. Glazing Method: Dry glazing method, gasket glazing.
12. **BASIS OF DESIGN:** Solarban Champane (2) Solarbronze + Clear by Vitro Architectural Glass.

D. Type GL-4 - Insulating Glass Units: Spandrel insulated glazing.
1. Applications: Exterior spandrel glazing in locations as indicated.
2. Space between lites filled with argon.
3. Outboard Lite: Fully tempered float glass, 1/4 inch thick, minimum.
a. Tint: Bronze.
b. Coating: Same as on vision units, on #2 surface.
4. Inboard Lite: Fully tempered float glass, 1/4 inch thick.
a. Tint: Clear.
b. Opacifier: Ceramic frit, on #4 surface.
1) Opacifier Color: as selected by Architect.
5. Total Thickness: 1 inch.
6. Glazing Method: Dry glazing method, gasket glazing.
7. Spandrel Back Panel: Black anodized aluminum sandwich panel with 3” thick minimum mineral wool insulation.
8. Spandrel Panel Performance Requirements:
a. Thermal Transmittance (U-Value), Winter Nighttime - Center of Glass: 0.24, maximum.
b. Solar Heat Gain Coefficient (SHGC): 22 percent, maximum.

E. SafetyInsulating Glass Units: Safety glazing.
1. Applications:
a. Glazed lites in exterior doors.
b. Glazed sidelights and panels next to doors.
c. Other locations required by applicable federal, state, and local codes and regulations.
2. Glass Type: Same as typical IGU except use fully tempered float glass for both outboard and inboard lites.

2.05 GLAZING UNITS

A. Type GL-2 - Monolithic Interior Vision Glazing: non-fire-rated.
1. Applications: Interior glazing unless otherwise indicated.
2. Glass Type: Fully tempered float glass.
3. Tint: Clear.
4. Thickness: 1/4 inch, nominal.
5. Glazing Method: Dry glazing method, gasket glazing.

B. Type GL-3 - Imapct Resistant Glazing: Laminated glass, 2-Ply.
1. Applications: Locations as indicated on drawings.
2. Tint: Clear.
3. Thickness: 1/2 inch.
4. Outer Lite: Annealed glass.
5. Interlayer: Polyvinyl butyral (PVB), thickness as required to meet performance criteria.
6. Inside Lite: Annealed glass.

2.06 GLAZING COMPOUNDS

A. Butyl Sealant: Single component; ASTM C920 Grade NS, Class 12-1/2, Uses M and A, Shore A hardness of 10 to 20; black color.

B. Manufacturers:
1. Bostik Inc: www.bostik-us.com.
2. Dow Corning Corporation: www.dowcorning.com/construction.
3. Momentive Performance Materials, Inc: www.momentive.com.
4. Pecora Corporation: www.pecora.com.
5. GE Plastics: www.geplastics.com.
6. Substitutions: See Section 01 6000 - Product Requirements.

2.07 ACCESSORIES

A. Setting Blocks: Silicone, with 80 to 90 Shore A durometer hardness; ASTM C864 Option II. Length of 0.1 inch for each square foot of glazing or minimum 4 inch x width of glazing rabbet space minus 1/16 inch x height to suit glazing method and pane weight and area.

B. Glazing Gaskets: Resilient silicone extruded shape to suit glazing channel retaining slot; ASTM C864 Option I; color black.

C. Glazing Clips: Manufacturer's standard type.

2.08 FABRICATION

A. Mirror Edge Treatment: Flat polished. Seal edges of mirrors with edge sealer after edge treatment to prevent chemical or atmospheric penetration of glass coating.

B. Fabricate glass and other glazing products in sizes required to glaze openings indicated for Project, with edge and face clearances, edge and surface conditions, and bite complying with recommendations of product manufacturer and reference glazing standard as required to comply with system performance requirements.

PART 3 EXECUTION

3.01 VERIFICATION OF CONDITIONS

A. Verify that openings for glazing are correctly sized and within tolerances, including those for size, squareness, and offsets at corners.

B. Verify that the minimum required face and edge clearances are being provided.

C. Verify that surfaces of glazing channels or recesses are clean, free of obstructions that may impede moisture movement, weeps are clear, and support framing is ready to receive glazing system.

D. Verify that sealing between joints of glass framing members has been completed effectively.

E. Proceed with glazing system installation only after unsatisfactory conditions have been corrected.

3.02 PREPARATION

A. Clean contact surfaces with appropriate solvent and wipe dry immediately before glazing. Remove coatings that are not tightly bonded to substrates.

B. Seal porous glazing channels or recesses with substrate compatible primer or sealer.

C. Prime surfaces scheduled to receive sealant where required for proper sealant adhesion.

3.03 INSTALLATION, GENERAL

A. Install glazing in compliance with written instructions of glass, gaskets, and other glazing material manufacturers, unless more stringent requirements are indicated, including those in glazing referenced standards.

B. Install glazing sealants in accordance with ASTM C1193, GANA (SM), and manufacturer's instructions.

C. Do not exceed edge pressures around perimeter of glass lites as stipulated by glass manufacturer.

D. Set glass lites of system with uniform pattern, draw, bow, and similar characteristics.

E. Set glass lites in proper orientation so that coatings face exterior or interior as indicated.

F. Prevent glass from contact with any contaminating substances that may be the result of construction operations such as, and not limited to the following; weld splatter, fire-safing, plastering, mortar droppings, and paint.

3.04 INSTALLATION - DRY GLAZING METHOD (GASKET GLAZING)

A. Application - Exterior and/or Interior Glazed: Set glazing infills from either the exterior or the interior of the building.

B. Place setting blocks at 1/4 points with edge block no more than 6 inch from corners.

C. Rest glazing on setting blocks and push against fixed stop with sufficient pressure on gasket to attain full contact.

D. Install removable stops without displacing glazing gasket; exert pressure for full continuous contact.

3.05 CLEANING

A. Remove excess glazing materials from finish surfaces immediately after application using solvents or cleaners recommended by manufacturers.

B. Remove nonpermanent labels immediately after glazing installation is complete.

C. Clean glass and adjacent surfaces after sealants are fully cured.

D. Clean glass on both exposed surfaces not more than 4 days prior to Date of Substantial Completion in accordance with glass manufacturer's written recommendations.

3.06 PROTECTION

A. After installation, mark pane with an 'X' by using removable plastic tape or paste; do not mark heat absorbing or reflective glass units.

B. Remove and replace glass that is damaged during construction period prior to Date of Substantial Completion.

END OF SECTION

SECTION 09 0561
COMMON WORK RESULTS FOR FLOORING PREPARATION

PART 1 GENERAL

1.01 SECTION INCLUDES

A. This section applies to floors identified in Contract Documents that are receiving the following types of floor coverings:
   1. Carpet tile.
   2. Thin-set tile.
   3. Resilient Athletic Flooring.
   4. Synthetic Turf Flooring.

B. Preparation of new and existing concrete floor slabs for installation of floor coverings.

C. Testing of concrete floor slabs for moisture and alkalinity (pH).

D. Remediation of concrete floor slabs due to unsatisfactory moisture or alkalinity (pH) conditions.
   1. Contractor shall perform all specified remediation of concrete floor slabs. If such remediation is indicated by testing agency's report and is due to a condition not under Contractor's control or could not have been predicted by examination prior to entering into the contract, a contract modification will be issued.

E. Alternate flooring adhesive.

F. Remedial floor coatings.

1.02 RELATED REQUIREMENTS

A. Section 01 4000 - Quality Requirements: Additional requirements relating to testing agencies and testing.

B. Section 03 3000 - Cast-in-Place Concrete: Limitations on curing requirements for new concrete floor slabs.

1.03 DEFINITIONS

A. MVE: Moisture Vapor Emission.

B. MVER: Moisture Vapor Emission Rate; measured in lbs per1000 ft2 / 24 hours.

C. RH: Relative Humidity; measured in percentage.

D. VOC: Volatile Organic Compound; measured in grams/liter.

E. CSP: Concrete Surface Profile defined by ICRI.

1.04 REFERENCE STANDARDS

A. ASTM F710 - Standard Practice for Preparing Concrete Floors to Receive Resilient Flooring.

B. ASTM F1869 - Standard Test Method for Measuring Moisture Vapor Emission Rate of Concrete Subfloor Using Anhydrous Calcium Chloride.

C. ASTM F2170 - Standard Test Method for Determining Relative Humidity in Concrete Floor Slabs Using in situ Probes.

D. ASTM F3010 - Standard Practice for Two-Component Resin Based Membrane-Forming Moisture Mitigation Systems for Use Under Resilient Floor Coverings;2018.

1.05 ADMINISTRATIVE REQUIREMENTS

A. Coordinate scheduling of cleaning and testing, so that preliminary cleaning has been completed for at least 24 hours prior to testing.

B. Pre-Installation Meeting:
   1. Convene minimum two weeks prior to starting work of this section.
   2. Discuss contract document requirements, moisture tests, manufacturer recommendations, installer's recommendations, scheduling, and protection of work from damage by other trades.

3. Attendance required by: Contractor, Floor Installer, Manufacturer's Representative, Independent testing agency, Concrete Subcontractor, Ready Mix supplier.
4. Objective of conference is:
    a. Review methods and procedures.
    b. Tour job site representative areas to inspect and discuss condition of substrate.
    c. Review concrete finishing requirements.
    d. Review and finalize construction schedule to ensure that products of this section are supplied to affected trades in time to prevent interruption of construction progress.
    e. Review required inspections, testing, certifications, material usage procedures.
    f. Review environmental restrictions and forecasts.
    g. Confirm compatibility of MVE control coatings with other concrete chemicals specified.
    h. Record content of conference including attendance and topics.
5. Furnish record of pre-installation conference to all parties who are affected by MVE control systems work.

1.06 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements for submittal procedures.

B. Floor Covering and Adhesive Manufacturers' Product Literature: For each specific combination of substrate, floor covering, and adhesive to be used; showing:
1. Moisture and alkalinity (pH) limits and test methods.
2. Manufacturer's required bond/compatibility test procedure.

C. Remedial Materials Product Data: Manufacturer's published data on each product to be used for remediation.
1. Certificate: Manufacturer's certification of compatibility with types of flooring applied over remedial product.
2. Test reports indicating compliance with specified performance requirements, performed by nationally recognized independent testing agency.
3. Specimen Warranty: Copy of warranty to be issued by coating manufacturer and certificate of underwriter's coverage of warranty.

D. Testing Agency's Report:
1. Description of areas tested; include floor plans and photographs if helpful.
2. Summary of conditions encountered.
3. Moisture and alkalinity (pH) test reports.
4. Copies of specified test methods.
5. Recommendations for remediation of unsatisfactory surfaces.
6. Product data for recommended remedial coating.
7. Submit report to Architect.
8. Submit report not more than two business days after conclusion of testing.

E. Adhesive Bond and Compatibility Test Report.

1.07 QUALITY ASSURANCE

A. Supply all components of MVE Control System from single source manufacturer.

B. Moisture and alkalinity (pH) testing shall be performed by an independent testing agency employed and paid by Contractor.

C. Testing Agency Qualifications: Independent testing agency experienced in the types of testing specified.
1. Submit evidence of experience consisting of at least 3 test reports of the type required, with project Owner's project contact information.

D. Contractor's Responsibility Relating to Independent Agency Testing:
1. Provide access for and cooperate with testing agency.
2. Confirm date of start of testing at least 10 days prior to actual start.
3. Allow at least 4 business days on site for testing agency activities.
4. Achieve and maintain specified ambient conditions.

5. Notify Architect when specified ambient conditions have been achieved and when testing will start.

E. Remedial Coating Installer Qualifications: Company specializing in performing work of the type specified in this section, trained by or employed by coating manufacturer, and able to provide at least 3 project references showing at least 3 years' experience installing moisture emission coatings.

1.08 DELIVERY, STORAGE, AND HANDLING

A. Deliver, store, handle, and protect products in accordance with manufacturer's instructions and recommendations.

B. Deliver materials in manufacturer's packaging; include installation instructions.

C. Keep materials from freezing.

1.09 FIELD CONDITIONS

A. Maintain ambient temperature in spaces where concrete testing is being performed, and for at least 48 hours prior to testing, at not less than 65 degrees F or more than 85 degrees F.

B. Maintain relative humidity in spaces where concrete testing is being performed, and for at least 48 hours prior to testing, at not less than 40 percent and not more than 60 percent.

PART 2 PRODUCTS

2.01 MATERIALS

A. Alternate Flooring Adhesive: Floor covering manufacturer's recommended product, suitable for the moisture and pH conditions present; low-VOC. In the absence of any recommendation from flooring manufacturer, provide a product recommended by adhesive manufacturer as suitable for substrate and floor covering and for conditions present.

B. Remedial Floor Coating, Two-Component: Single-layer coating resistant to water vapor transmission meeting flooring manufacturer's emission limits, resistant to alkalinity (pH) level found, and suitable for flooring adhesion without further treatment.
   1. Material: Comply with ASTM F3010.
   2. Thickness: As required for application and in accordance with manufacturer's installation instructions.
   3. Products:
      a. Allied Construction Technologies, Inc; ACTECH 2170 FC Interior: www.actechperforms.com/#sle.
      b. ARDEX Engineered Cements; ARDEX MC RAPID: www.ardexamericas.com/#sle.
      c. Custom Building Products; TechMVC Moisture Vapor and Alkalinity Barrier: www.custombuildingproducts.com/#sle.
      d. Koster American Corporation; Koster VAP 1 2000: www.kosterusa.com/#sle.
      e. LATICRETE International, Inc; LATICRETE VAPOR BAN E: www.laticrete.com/#sle.
      f. Mapei Corporation; Planiseal VS or Paniseal VS Fast: www.mapei.com/#sle.
      g. Maxxon Corporation; Maxxon MVP Two-Part Epoxy: www.maxxon.com/#sle.
      h. TEC, an H.B. Fuller Construction Products Brand; TEC LiquiDam with TEC Level Set 200 SLU: www.tecspecialty.com.
      i. Tnemec Company, Inc; Series 208 Epoxoprime MVT: www.tnemec.com.
      j. UZIN UTZ NORTH AMERICA, INC; UZIN PE 460 with UZIN PE 280: https://us.uzin.com/#sle.
      k. Substitutions: See Section 01 6000 - Product Requirements.

PART 3 EXECUTION

3.01 CONCRETE SLAB PREPARATION

A. Perform following operations in the order indicated:
   1. Preliminary cleaning.
   2. Moisture vapor emission tests; 3 tests in the first 1000 square feet and one test in each additional 1000 square feet, unless otherwise indicated or required by flooring manufacturer.

3. Internal relative humidity tests; in same locations as moisture vapor emission tests, unless otherwise indicated.
4. Alkalinity (pH) tests; in same locations as moisture vapor emission tests, unless otherwise indicated.
5. Specified remediation, if required.
6. Patching, smoothing, and leveling, as required.
7. Other preparation specified.
8. Adhesive bond and compatibility test.
9. Protection.

B. Remediations:
1. Active Water Leaks or Continuing Moisture Migration to Surface of Slab: Correct this condition before doing any other remediation; re-test after correction.
2. Excessive Moisture Emission or Relative Humidity: If an adhesive that is resistant to the level of moisture present is available and acceptable to flooring manufacturer, use that adhesive for installation of the flooring; if not, apply remedial floor coating or remedial sheet membrane over entire suspect floor area.
3. Excessive Alkalinity (pH): If remedial floor coating is necessary to address excessive moisture, no additional remediation is required; if not, if an adhesive that is resistant to the level present is available and acceptable to the flooring manufacturer, use that adhesive for installation of the flooring; otherwise, apply a skim coat of specified patching compound over entire suspect floor area.

3.02 PRELIMINARY CLEANING

A. Clean floors of dust, solvents, paint, wax, oil, grease, asphalt, residual adhesive, adhesive removers, film-forming curing compounds, sealing compounds, alkaline salts, excessive laitance, mold, mildew, and other materials that might prevent adhesive bond.

B. Do not use solvents or other chemicals for cleaning.

3.03 MOISTURE VAPOR EMISSION TESTING

A. Where the floor covering manufacturer's requirements conflict with either the referenced test method or this specification, comply with the manufacturer's requirements.

B. Where this specification conflicts with the referenced test method, comply with the requirements of this section.

C. Test in accordance with ASTM F1869 and as follows.

D. Plastic sheet test and mat bond test may not be substituted for the specified ASTM test method, as those methods do not quantify the moisture content sufficiently.

E. In the event that test values exceed floor covering manufacturer's limits, perform remediation as indicated. In the absence of manufacturer limits, perform remediation if test values exceed 3 pounds per 1000 square feet per 24 hours.

F. Report: Report the information required by the test method.

3.04 INTERNAL RELATIVE HUMIDITY TESTING

A. Where the floor covering manufacturer's requirements conflict with either the referenced test method or this specification, comply with the manufacturer's requirements.

B. Where this specification conflicts with the referenced test method, comply with the requirements of this section.

C. Test in accordance with ASTM F2170 Procedure A and as follows.

D. Testing with electrical impedance or resistance apparatus may not be substituted for the specified ASTM test method, as the values determined are not comparable to the ASTM test values and do not quantify the moisture content sufficiently.

E. In the event that test values exceed floor covering manufacturer's limits, perform remediation as indicated. In the absence of manufacturer limits, perform remediation if any test value exceeds 75 percent relative humidity.

F. Report: Report the information required by the test method.

3.05 ALKALINITY TESTING

A. Where the floor covering manufacturer's requirements conflict with either the referenced test method or this specification, comply with the manufacturer's requirements.

B. The following procedure is the equivalent of that described in ASTM F710, repeated here for the Contractor's convenience.

1. Use a wide range alkalinity (pH) test paper, its associated chart, and distilled or deionized water.
2. Place several drops of water on a clean surface of concrete, forming a puddle approximately 1 inch in diameter. Allow the puddle to set for approximately 60 seconds, then dip the alkalinity (pH) test paper into the water, remove it, and compare immediately to chart to determine alkalinity (pH) reading.
3. Use of a digital pH meter with probe is acceptable; follow meter manufacturer's instructions.

C. In the event that test values exceed floor covering manufacturer's limits, perform remediation as indicated. In the absence of manufacturer limits, perform remediation if alkalinity (pH) test value is over 10.

3.06 PREPARATION

A. See individual floor covering section(s) for additional requirements.

B. Comply with requirements and recommendations of floor covering manufacturer.

C. Fill and smooth surface cracks, grooves, depressions, control joints and other non-moving joints, and other irregularities with patching compound.

D. Do not fill expansion joints, isolation joints, or other moving joints.

3.07 ADHESIVE BOND AND COMPATIBILITY TESTING

A. Comply with requirements and recommendations of floor covering manufacturer.

3.08 APPLICATION OF REMEDIAL FLOOR COATING

A. Comply with requirements and recommendations of coating manufacturer.

3.09 PROTECTION

A. Cover prepared floors with building paper or other durable covering.

END OF SECTION

SECTION 09 2116
GYPSUM BOARD ASSEMBLIES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Performance criteria for gypsum board assemblies.

B. Metal stud wall framing.

C. Metal channel ceiling framing.

D. Acoustic insulation.

E. Gypsum wallboard.

F. Joint treatment and accessories.

1.02 RELATED REQUIREMENTS

A. Section 05 4000 - Cold-Formed Metal Framing: Structural steel stud framing.

B. Section 07 8400 - Firestopping: Top-of-wall assemblies at fire-resistance-rated walls.

C. Section 07 9200 - Joint Sealants: Sealing acoustical gaps in construction other than gypsum board or plaster work.

1.03 REFERENCE STANDARDS

A. AISI S100 - North American Specification for the Design of Cold-Formed Steel Structural Members.

B. AISI S201 - North American Standard for Cold-Formed Steel Framing - Product Data.

C. AISI S220 - North American Standard for Cold-Formed Steel Nonstructural Framing.

D. AISI S240 - North American Standard for Cold-Formed Steel Structural Framing.

E. ASTM A36/A36M - Standard Specification for Carbon Structural Steel.

F. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.

G. ASTM A1003/A1003M - Standard Specification for Steel Sheet, Carbon, Metallic- and Nonmetallic-Coated for Cold-Formed Framing Members.

H. ASTM C1007 - Standard Specification for Installation of Load Bearing (Transverse and Axial) Steel Studs and Related Accessories.

I. ASTM C475/C475M - Standard Specification for Joint Compound and Joint Tape for Finishing Gypsum Board.

J. ASTM C665 - Standard Specification for Mineral-Fiber Blanket Thermal Insulation for Light Frame Construction and Manufactured Housing.

K. ASTM C754 - Standard Specification for Installation of Steel Framing Members to Receive Screw-Attached Gypsum Panel Products.

L. ASTM C840 - Standard Specification for Application and Finishing of Gypsum Board.

M. ASTM C954 - Standard Specification for Steel Drill Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Steel Studs from 0.033 in. (0.84 mm) to 0.112 in. (2.84 mm) in Thickness.

N. ASTM C1002 - Standard Specification for Steel Self-Piercing Tapping Screws for Application of Gypsum Panel Products or Metal Plaster Bases to Wood Studs or Steel Studs.

O. ASTM C1047 - Standard Specification for Accessories for Gypsum Wallboard and Gypsum Veneer Base.

P. ASTM C1178/C1178M - Standard Specification for Coated Glass Mat Water-Resistant Gypsum Backing Panel.

Q. ASTM C1396/C1396M - Standard Specification for Gypsum Board.

R. ASTM C1629/C1629M - Standard Classification for Abuse-Resistant Nondecorated Interior Gypsum Panel Products and Fiber-Reinforced Cement Panels.

S. ASTM D3273 - Standard Test Method for Resistance to Growth of Mold on the Surface of Interior Coatings in an Environmental Chamber.

T. ASTM E90 - Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements.

U. ASTM E413 - Classification for Rating Sound Insulation.

V. GA-216 - Application and Finishing of Gypsum Panel Products.

W. GA-600 - Fire Resistance and Sound Control Design Manual.

X. UL (FRD) - Fire Resistance Directory.

1.04 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements for submittal procedures.

B. Product Data:
1. Provide data on metal framing, gypsum board, accessories, and joint finishing system.
2. Provide manufacturer's data on partition head to structure connectors, showing compliance with requirements.

1.05 QUALITY ASSURANCE

A. Perform in accordance with ASTM C840. Comply with requirements of GA-600 for fire-rated assemblies.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Store gypsum products and accessories indoors and keep above freezing. Elevate boards above floor, on nonwicking supports, in accordance with manufacturer's recommendations.

B. Store metal products to prevent corrosion.

PART 2 PRODUCTS

2.01 GYPSUM BOARD ASSEMBLIES

Provide completed assemblies complying with ASTM C840 and GA-216.
1. See PART 3 for finishing requirements.

A. Interior Partitions, Indicated as Acoustic: Provide completed assemblies with the following characteristics:
1. Acoustic Attenuation: STC as indicated calculated in accordance with ASTM E413, based on tests conducted in accordance with ASTM E90.

B. Fire-Resistance-Rated Assemblies: Provide completed assemblies with the following characteristics:
1. UL Assembly Numbers: Provide construction equivalent to that listed for the particular assembly in the current UL (FRD).

2.02 METAL FRAMING MATERIALS

A. Material and Product Requirements: AISI S201 and AISI S220.

B. Steel Sheet: ASTM A1003/A1003M, subject to the ductility limitations indicated in AISI S220 or equivalent.

C. Manufacturers - Metal Framing, Connectors, and Accessories:
1. ClarkDietrich: www.clarkdietrich.com/#sle.
2. MarinoWARE: www.marinoware.com/#sle.
3. PAC International, Inc. www.pac-intl.com.
4. Phillips Manufacturing Co: www.phillipsmfg.com/#sle.
5. The Steel Network, Inc: www.SteelNetwork.com.
6. Substitutions: See Section 01 6000 - Product Requirements.

D. Structural Steel Framing for Application of Gypsum Board: See Section 05 4000.

E. Nonstructural Framing System Components: AISI S220; galvanized sheet steel, of size and properties necessary to comply with ASTM C754 for the spacing indicated, with maximum deflection of wall framing of L/120 at 5 psf.
   1. Studs: C-shaped with knurled or embossed faces.
   2. Runners: U shaped, sized to match studs.
   3. Ceiling Channels: C-shaped.
   4. Furring Members: Hat-shaped sections, minimum depth of 7/8 inch.
   5. Furring Members: Zee-shaped sections, minimum depth of 1 inch.

F. Partition Head to Structure Connections: Provide mechanical anchorage devices that accommodate deflection and prevent rotation of studs while maintaining structural performance of partition.
   1. Structural Performance: Maintain lateral load resistance and vertical movement capacity required by applicable code, when evaluated in accordance with AISI S100.
   2. Material: ASTM A653/A653M steel sheet, SS Grade 50, with G60 hot-dip galvanized coating.
   3. Provide components UL-listed for use in UL-listed fire-resistance-rated head of partition joint systems of fire rating and movement required.
   4. Provide mechanical anchorage devices as described above that accommodate deflection while maintaining the fire-resistance rating of the wall assembly.

G. Nonstructural Framing Accessories:
   1. Ceiling Hangers: Type and size as specified in ASTM C754 for spacing required.
   2. Partial Height Wall Framing Support: Provides stud reinforcement and anchored connection to floor.
   3. Framing Connectors: ASTM A653/A653M, G90 galvanized steel clips; secures cold rolled channel to wall studs for lateral bracing.
      a. Products:
         1) ClarkDietrich; FastBridge Clip (FB33): www.clarkdietrich.com/#sle.
         2) Substitutions: See Section 01 6000 - Product Requirements.
   4. Flexible Wood Backing: Fire-retardant-treated wood with sheet steel connectors.
      a. Products:
         1) ClarkDietrich; Danback: www.clarkdietrich.com/#sle.
         2) Substitutions: See Section 01 6000 - Product Requirements.

H. Grid Suspension Systems: Steel grid system of main tees and support bars connected to structure using hanging wire.
   1. Products:
      a. CertainTeed Corporation: www.certainteed.com/ceilings-and-walls/#sle.
      b. USG Corporation; Drywall Suspension System: www.usg.com/#sle.
      c. Substitutions: See Section 01 6000 - Product Requirements.

2.03 BOARD MATERIALS

A. Manufacturers - Gypsum-Based Board:
   1. American Gypsum Company: www.americangypsum.com/#sle.
   2. CertainTeed Corporation: www.certainteed.com/#sle.
   3. Georgia-Pacific Gypsum: www.gpgypsum.com/#sle.
   4. National Gypsum Company[<>]: www.nationalgypsum.com.
   5. PABCO Gypsum: www.pabcogypsum.com/#sle.
   6. USG Corporation: www.usg.com/#sle.
   7. Substitutions: See Section 01 6000 - Product Requirements.

B. Gypsum Wallboard: Paper-faced gypsum panels as defined in ASTM C1396/C1396M; sizes to minimize joints in place; ends square cut.
   1. Application: Use for vertical surfaces and ceilings, unless otherwise indicated.
   2. Mold Resistance: Score of 10, when tested in accordance with ASTM D3273.
      a. Mold-resistant board is required whenever board is being installed before the building is enclosed and conditioned.

b. Mold resistant board is required behind liner panels, at untiled toilets and janitorial areas, restrooms, and as indicated in wall types.

3. Thickness:
   a. Vertical Surfaces: 5/8 inch.
   b. Ceilings: 5/8 inch.
   c. Multi-Layer Assemblies: Thicknesses as indicated on drawings.
4. Paper-Faced Products:
   a. American Gypsum Company; FireBloc Type X Gypsum Wallboard: www.americangypsum.com/#sle.
   b. CertainTeed Corporation; Type X Drywall: www.certainteed.com/#sle.
   c. Georgia-Pacific Gypsum; ToughRock Fireguard X: www.gpgypsum.com/#sle.
   d. USG Corporation; Sheetrock Brand EcoSmart Panels Firecode X 5/8 in. (15.9 mm): www.usg.com/#sle.
   e. Substitutions: See Section 01 6000 - Product Requirements.
5. Mold-Resistant, Paper-Faced Products:
   a. American Gypsum Company; M-Bloc Type X: www.americangypsum.com/#sle.
   b. CertainTeed Corporation; M2Tech 5/8" Type X Moisture & Mold Resistant Drywall: www.certainteed.com/#sle.
   c. Georgia-Pacific Gypsum; ToughRock Fireguard X Mold-Guard: www.gpgypsum.com/#sle.
   d. USG Corporation; Sheetrock Brand EcoSmart Panels Mold Tough Firecode X 5/8 in. (15.9 mm): www.usg.com/#sle.
   e. Substitutions: See Section 01 6000 - Product Requirements.

C. Impact Resistant Wallboard:
1. Application: High-traffic areas indicated.
2. Surface Abrasion: Level 3, minimum, when tested in accordance with ASTM C1629/C1629M.
3. Indentation: Level 1, minimum, when tested in accordance with ASTM C1629/C1629M.
4. Soft Body Impact: Level 3, minimum, when tested in accordance with ASTM C1629/C1629M.
5. Hard Body Impact: Level 3, minimum, when tested in accordance with ASTM C1629/C1629M.
6. Mold Resistance: Score of 10, when tested in accordance with ASTM D3273.
7. Type: Fire-resistance-rated Type X, UL or WH listed.
8. Thickness: 5/8 inch.
9. Edges: Tapered.
10. Paper-Faced Type: Noncombustible gypsum core with paper face; comply with ASTM C1396/C1396M.

D. Backing Board For Wet Areas: One of the following products:
1. Application: Surfaces behind tile in wet areas, including manufactured housing, tub and shower surrounds, and shower ceilings.
2. Glass Mat Faced Board: Coated glass mat water-resistant gypsum backing panel as defined in ASTM C1178/C1178M.
   a. Regular Type: Thickness 1/2 inch.
   b. Fire-Resistance-Rated Type: Type X core, thickness 5/8 inch.

2.04 GYPSUM BOARD ACCESSORIES

A. Acoustic Insulation: ASTM C665; preformed mineral-fiber, friction fit type, unfaced; thickness as required for STC.

B. Acoustic Sealant: Acrylic emulsion latex or water-based elastomeric sealant; do not use solvent-based non-curing butyl sealant.

C. Beads, Joint Accessories, and Other Trim: ASTM C1047, rigid plastic, galvanized steel, or rolled zinc, unless noted otherwise.
1. Corner Beads: Low profile, for 90 degree outside corners.
   a. Products:
      1) CertainTeed Corporation; No-Coat Drywall Corner: www.certainteed.com/#sle.

2) Trim-Tex, Inc; Tear-Away Beads: www.trim-tex.com/#sle.
3) Amico "Zip Strip" preferred where applicable.
4) Substitutions: See Section 01 6000 - Product Requirements.

2. Expansion Joints:
   a. Type: V-shaped PVC with tear away fins.
   b. Products:
      1) Phillips Manufacturing Co; 093 Expansion Control Joint: www.phillipsmfg.com/#sle.
      2) Trim-Tex, Inc; Fire Rated 093V Expansion Bead: www.trim-tex.com/#sle.
      3) Substitutions: See Section 01 6000 - Product Requirements.

D. Joint Materials: ASTM C475/C475M and as recommended by gypsum board manufacturer for project conditions.
   1. Fiberglass Tape: 2 inch wide, coated glass fiber tape for joints and corners, except as otherwise indicated.
   2. Joint Compound: Drying type, vinyl-based, ready-mixed.
   3. Joint Compound: Setting type, field-mixed.

E. Screws for Fastening of Gypsum Panel Products to Cold-Formed Steel Studs Less than 0.033 inches in Thickness and Wood Members: ASTM C1002; self-piercing tapping screws, corrosion-resistant.

F. Screws for Fastening of Gypsum Panel Products to Steel Members from 0.033 to 0.112 inch in Thickness: ASTM C954; steel drill screws, corrosion-resistant.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that project conditions are appropriate for work of this section to commence.

3.02 FRAMING INSTALLATION

A. Metal Framing: Install in accordance with ASTM C754 and manufacturer's instructions.

B. Suspended Ceilings and Soffits: Space framing and furring members as indicated.
   1. Level ceiling system to a tolerance of 1/1200.
   2. Laterally brace entire suspension system.

C. Studs: Space studs as permitted by standard unless noted more restrictively on drawings.
   1. Extend partition framing to structure where indicated and to ceiling in other locations.
   2. Partitions Terminating at Ceiling: Attach ceiling runner securely to ceiling track in accordance with manufacturer's instructions.
   3. Partitions Terminating at Structure: Attach top runner to structure, maintain clearance between top of studs and structure, and connect studs to track using specified mechanical devices in accordance with manufacturer's instructions; verify free movement of top of stud connections; do not leave studs unattached to track.

D. Openings: Reinforce openings as required for weight of doors or operable panels, using not less than double studs at jambs.

E. Blocking: Install wood blocking or mechanically fastened steel sheet backing for support of:
   1. Framed openings.
   2. Wall-mounted cabinets.
   3. Countertop and shelf supports.
   4. Plumbing fixtures.
   5. Toilet partitions.
   6. Toilet accessories.
   7. Wall-mounted door hardware.
   8. Handrails
   9. Wall Hooks
   10. Chalkboards, tackboards, and markerboards.
   11. Owner provided wall mounted equipment, whether owner-installed or contractor-installed.

3.03 ACOUSTIC ACCESSORIES INSTALLATION

A. Acoustic Insulation: Place tightly within spaces, around cut openings, behind and around electrical and mechanical items within partitions, and tight to items passing through partitions.

B. Acoustic Sealant: Install in accordance with manufacturer's instructions.
   1. Place one bead continuously on substrate before installation of perimeter framing members.
   2. Place continuous bead at perimeter of each layer of gypsum board.

3.04 BOARD INSTALLATION

A. Comply with ASTM C840, GA-216, and manufacturer's instructions. Install to minimize butt end joints, especially in highly visible locations.

B. Single-Layer Nonrated: Install gypsum board in most economical direction, with ends and edges occurring over firm bearing.

C. Fire-Resistance-Rated Construction: Install gypsum board in strict compliance with requirements of assembly listing.

D. Exposed Gypsum Board in Interior Wet Areas: Seal joints, cut edges, and holes with water-resistant sealant.

3.05 INSTALLATION OF TRIM AND ACCESSORIES

A. Control Joints: Place control joints consistent with lines of building spaces and as indicated on drawings.
   1. Not more than 30 feet apart on walls and ceilings over 50 feet long.

B. Corner Beads: Install at external corners, using longest practical lengths.

C. Edge Trim: Install at locations where gypsum board abuts dissimilar materials.

3.06 JOINT TREATMENT

A. Paper Faced Gypsum Board: Use paper joint tape, embed with drying type joint compound and finish with drying type joint compound.

B. Finish gypsum board in accordance with levels defined in ASTM C840, as follows:
   1. Level 5: Walls and ceilings to receive semi-gloss or gloss paint finish and other areas specifically indicated.
      a. Walls to receive wall covering.
   2. Level 4: Walls and ceilings to receive paint finish or wall coverings, unless otherwise indicated.
   3. Level 2: In utility areas, behind cabinetry, and on backing board to receive tile finish.
   4. Level 1: Wall areas above finished ceilings, whether or not accessible in the completed construction.
   5. Level 0: Temporary partitions.

C. Tape, fill, and sand exposed joints, edges, and corners to produce smooth surface ready to receive finishes.
   1. Feather coats of joint compound so that camber is maximum 1/32 inch.
   2. Taping, filling, and sanding are not required at base layer of double-layer applications.

D. Where Level 5 finish is indicated, spray apply high build drywall surfacer over entire surface after joints have been properly treated; achieve a flat and tool mark-free finish.

3.07 TOLERANCES

A. Maximum Variation of Finished Gypsum Board Surface from True Flatness: 1/8 inch in 10 feet in any direction.

END OF SECTION

SECTION 09 3000
TILING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Tile for floor applications (QT-#, QTB-#, T-#).

B. Tile for wall and base applications (T-#).

C. Non-ceramic trim (MTLP-#).

D. Accessories, including:
   1. Waterproofing.

1.02 RELATED REQUIREMENTS

A. Section 09 2116 - Gypsum Board Assemblies: Tile backer board.

1.03 REFERENCE STANDARDS

A. ANSI A108/A118/A136 - American National Standard Specifications for the Installation of Ceramic Tile (Compendium).

B. ANSI A108.11 - American National Standard Specifications for Interior Installation of Cementitious Backer Units.

C. ANSI A108.19 - American National Standard Specifications for Interior Installation of Gauged Porcelain Tiles and Gauged Porcelain Tile Panels/Slabs by the Thin-Bed Method Bonded with Modified Dry-Set Cement Mortar or Improved Modified Dry-Set Cement Mortar.

D. ANSI A108.20 - American National Standard Specifications for Exterior Installation of Gauged Porcelain Tiles and Gauged Porcelain Tile Panels/Slabs.

E. ANSI A118.3 - American National Standard Specifications for Chemical Resistant, Water Cleanable Tile-Setting and -Grouting Epoxy and Water Cleanable Tile-Setting Epoxy Adhesive.

F. ANSI A118.4 - American National Standard Specifications for Modified Dry-Set Cement Mortar.

G. ANSI A118.7 - American National Standard Specifications for High Performance Cement Grouts for Tile Installation.

H. ANSI A118.9 - American National Standard Specifications for Test Methods and Specifications for Cementitious Backer Units.

I. ANSI A118.10 - American National Standard Specifications for Load Bearing, Bonded, Waterproof Membranes for Thin-Set Ceramic Tile and Dimension Stone Installation.

J. ANSI A118.12 - American National Standard Specifications for Crack Isolation Membranes for Thin-Set Ceramic Tile and Dimension Stone Installation.

K. ANSI A137.1 - American National Standard Specifications for Ceramic Tile.

L. ASTM C373 - Standard Test Methods for Determination of Water Absorption and Associated Properties by Vacuum Method for Pressed Ceramic Tiles and Glass Tiles and Boil Method for Extruded Ceramic Tiles and Non-tile Fired Ceramic Whiteware Products.

M. TCNA (HB) - Handbook for Ceramic, Glass, and Stone Tile Installation.

N. TCNA (HB-GP) - Handbook for Gauged Porcelain Tiles and Gauged Porcelain Tile Panels/Slabs Installation.

1.04 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements for submittal procedures.

B. Product Data: Provide manufacturers' data sheets on tile, mortar, grout, and accessories. Include instructions for using grouts and adhesives.

C. Shop Drawings: Indicate tile layout, patterns, color arrangement, perimeter conditions, junctions with dissimilar materials, control and expansion joints, thresholds, ceramic accessories, and setting details.

D. Samples: Mount tile and apply grout on two plywood panels, minimum 18 by 18 inches in size illustrating pattern, color variations, and grout joint size variations.

E. Samples:
   1. Full size unit of each type of composition of tile.
   2. Metal edge strip in 6 inch lengths.
   3. Physical sample deck of grout color options.

F. Installer's qualification statement.

G. Maintenance Data: Include recommended cleaning methods, cleaning materials, and stain removal methods.

H. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
   1. See Section 01 6000 - Product Requirements, for additional provisions.
   2. Extra Tile: Minimum of 2 boxes, up to 5% needed for project with a maximum of 5 boxes of each color.

1.05 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing the types of products specified in this section, with minimum five years of documented experience.

B. Installer Qualifications:
   1. Company specializing in performing tile installation, with minimum of five years of documented experience.

1.06 DELIVERY, STORAGE, AND HANDLING

A. See Section 01 7419 - Construction Waste Management and Disposal for packaging waste requirements.

B. Protect adhesives from freezing or overheating in accordance with manufacturer's instructions.

C. Deliver and store packaged materials in original containers with seals unbroken and labels intact until time of use. Comply with ANSI A137.1 for labeling tile packages.

D. Store tile and cementitious materials on elevated platforms, under cover, and in a dry location.

E. Store aggregates where grading and other requirement characteristics can be maintained and contamination can be avoided.

F. Store liquid materials in unopened containers and protected from freezing.

1.07 FIELD CONDITIONS

A. Do not install solvent-based products in an unventilated environment.

B. Maintain ambient and substrate temperature above 50 degrees F and below 100 degrees F during installation and curing of setting materials.

PART 2 PRODUCTS

2.01 TILE

A. Tile:
   1. Provide Basis of Design manufacturer listed in the Finish Schedule , or a pre-approved standard or custom product from another manufacturer with equivalent performance, material properties, features, general configuration, appearance, and warranty, approved prior to bid.
   2. Substitutions: See Section 01 6000 - Product Requirements.

B. Ceramic Tile: ANSI A137.1 standard grade.
   1. Moisture Absorption: 0 to 0.5 percent as tested in accordance with ASTM C373.
   2. Size: As indicated in Finish Schedule.
   3. Color: As indicated in Finish Schedule.
   4. Pattern: As indicated in Finish Schedule.

C. Quarry Tile: ANSI A137.1 standard grade.
   1. Moisture Absorption: Over 3.0 but not more than 5.0 percent as tested in accordance with ASTM C373.

2. Size: As indicated in Finish Schedule.
3. Color: As indicated in Finish Schedule.
4. Pattern: As indicated in Finish Schedule.
5. Trim Units: Matching cove base shapes in sizes coordinated with field tile.

D. Porcelain Tile: ANSI A137.1 standard grade.
1. Moisture Absorption: 0 to 0.5 percent as tested in accordance with ASTM C373.
2. Size: As indicated in Finish Schedule.
3. Color(s): As indicated.
4. Pattern: As indicated in Finish Schedule.

2.02 TRIM AND ACCESSORIES

A. Non-Ceramic Trim: Color as indicated in Finish Schedule, style and dimensions as indicated on drawings, set with tile mortar or adhesive.
1. Products:
a. Dural: us.dural.com.
b. Genesis APS International: www.genesis-aps.com/#sle.
c. Profilitec: www.profilitec.com/en/products.html.
d. **BASIS OF DESIGN:** Schluter-Systems: www.schluter.com/#sle.
1) (MTLP-1) Jolly: L-shaped profile with 1/8" (3.2 mm) wide top section and vertical wall section that together form the visible surface, integrated trapezoid-perforated anchoring leg, and integrated rout joint spacer.
2) (MTLP-2) Dilex-AHKA: Anodized aluminum profile with single integrated trapezoid-perforated anchoring leg and dovetailed channel, connected at a 90 degree angle by a cove-shaped 3/8" (10 mm) radius section that forms the visible surface.
3) (MTLP-3) DilexAHK: Anodized aluminum profile with integrated trapezoid-perforated anchoring leg, connected at a 90-degree angle by a cove-shaped section with 3/8" (10 mm) radius that forms the visible surface.
4) (MTLP-4) Reno-U:Profile with sloped exposed surface, 5/32" (4 mm) tall leading edge, integrated trapezoid-perforated anchoring leg, and integrated grout joint spacer.
5) (MTLP-5) Schiene: L-shaped profile with 1/8" (3.2 mm) wide top section and vertical wall section that together form the visible surface, integrated trapezoid-perforated anchoring leg, and integrated grout joint spacer.
6) (MTLP-6) RENO-RAMP: Anodized aluminum transition profile featuring a 5° to 10° sloped surface, a trapezoid-perforated anchoring leg, and an integrated joint spacer.
e. Substitutions: See Section 01 6000 - Product Requirements.

2.03 SETTING MATERIALS

A. Provide setting and grout materials from same manufacturer.

B. Latex-Portland Cement Mortar Bond Coat: ANSI A118.4.
1. Applications: Use this type of bond coat where indicated, and where no other type of bond coat is indicated.

C. Mortar Bed Materials: Pre-packaged mix of Portland cement, sand, latex additive, and water.

2.04 GROUTS

A. Provide setting and grout materials from same manufacturer.

B. High Performance Polymer Modified Grout: ANSI A118.7 polymer modified cement grout.
1. Applications: Standard interior non-wet locations.
2. Grout Joint Size: As indicated in TCNA guidelines.
3. Color(s): As indicated in Finish Schedule, or as selected by Architect from manufacturer’s full range.
4. Products:
a. ARDEX Engineered Cements; ARDEX FL: www.ardexamericas.com/#sle.
b. Bostik, Inc.; Product Dry Tile Grout (Unsanded): www.bostik-us.com.

c. Custom Building Products; Prism Color Consistent Grout: www.custombuildingproducts.com/#sle.
d. **BASIS OF DESIGN:** LATICRETE International, Inc; LATICRETE PERMACOLOR Grout: www.laticrete.com/#sle.
e. Mapei Corporation; Ultracolor Plus FA: www.mapei.com/#sle.
f. ProSpec, an Oldcastle brand; ProColor Unsanded Grout: www.prospec.com.
g. Substitutions: See Section 01 6000 - Product Requirements.

C. Epoxy Grout: ANSI A118.3 chemical resistant and water-cleanable epoxy grout.
1. Applications: Wet locations, including kitchens.
2. Grout Joints: As indicated in TCNA guidelines or as recommended by manufacturer.
3. Color: As indicated in Finish Schedule, or as selected by Architect from manufacturer's full range.
4. Products:
a. ARDEX Engineered Cements; ARDEX WA: www.ardexamericas.com/#sle.
b. Bostik: EZPoxy
c. Custom Building Products; CEG-IG 100% Solids Industrial Grade Epoxy Grout: www.custombuildingproducts.com/#sle.
d. H.B. Fuller Construction Products, Inc; TEC AccuColor EFX Epoxy Special Effects Grout: www.tecspecialty.com/#sle.
e. **BASIS OF DESIGN:** LATICRETE International, Inc; LATICRETE SPECTRALOCK PRO Premium Grout: www.laticrete.com/#sle.
f. Mapei Corporation; Kerapoxy CQ: www.mapei.com/#sle.
g. Merkrete, by Parex USA, Inc; Merkrete Pro Epoxy: www.merkrete.com/#sle.
h. Substitutions: See Section 01 6000 - Product Requirements.

2.05 ACCESSORY MATERIALS

A. Concrete Floor Slab Crack Isolation Membrane: Material complying with ANSI A118.12; not intended as waterproofing.
1. Crack Resistance: No failure at 1/8 inch gap, minimum.
2. Fluid or Trowel Applied Type:
a. Material: Synthetic rubber or Acrylic.
b. Thickness: 20 mils, maximum.
c. Products:
1) H.B. Fuller Construction Products, Inc; TEC HydraFlex Waterproofing Crack Isolation Membrane: www.tecspecialty.com/#sle.
2) LATICRETE International, Inc; LATICRETE FRACTURE BAN SC: www.laticrete.com/#sle.
3) Mapei Corporation; Mapelastic CI: www.mapei.com/#sle.
4) Merkrete, by Parex USA, Inc; Merkrete Fracture Guard: www.merkrete.com/#sle.
5) Sika Corp; SikaTile 200 Fracture Guard Rapid: www.sika.com/#sle.
6) Substitutions: See Section 01 6000 - Product Requirements.

B. Waterproofing Membrane at Floors: Specifically designed for bonding to cementitious substrate under thick mortar bed or thin-set tile; complying with ANSI A118.10.
1. Crack Resistance: No failure at 1/16-inch gap, minimum; comply with ANSI A118.12.
2. Fluid or Trowel Applied Type:
a. Material: Synthetic rubber or Acrylic.
b. Thickness: 25 mils, minimum, dry film thickness.
c. Products:
1) ARDEX Engineered Cements; ARDEX 8+9: www.ardexamericas.com/#sle.
2) Custom Building Products; RedGard Crack Prevention and Waterproofing Membrane: www.custombuildingproducts.com/#sle.
3) H.B. Fuller Construction Products, Inc; TEC HydraFlex Waterproofing Crack Isolation Membrane: www.tecspecialty.com/#sle.
4) LATICRETE International, Inc; LATICRETE HYDRO BAN: www.laticrete.com/#sle.

5) Mapei Corporation; Mapelastic AquaDefense: www.mapei.com/#sle.
6) Sika Corp; SikaTile 100 Moisture Guard: www.sika.com/#sle.
7) Substitutions: See Section 01 6000 - Product Requirements.

C. Waterproofing Membrane at Showers: Specifically designed for bonding to cementitious substrate under thick mortar bed or thin-set tile; complying with ANSI A118.10.
1. Fluid or Trowel Applied Type:
a. Material: Synthetic rubber or acrylic.
b. Thickness: 25 mils, minimum, dry film thickness.
c. Products:
1) LATICRETE International, Inc; HYDRO BAN: www.laticrete.com/#sle.
2) Merkrete, by Parex USA, Inc; Merkrete Hydro Guard 2000: www.merkrete.com/#sle.
3) USG Corporation; Durock Brand Liquid Waterproofing Membrane: www.usg.com/#sle.
4) Sika Corp; SikaTile 100 Moisture Guard: www.sika.com/#sle.
5) Substitutions: See Section 01 6000 - Product Requirements.

D. Backer Board: Cementitious type complying with ANSI A118.9; high density, glass fiber reinforced, 7/16 inch thick; 2-inch wide coated glass fiber tape for joints and corners.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify subfloor surfaces are smooth and flat within tolerances specified for that type of work and are ready to receive tile.

B. Verify wall surfaces are smooth and flat within tolerances specified for that type of work, are dust-free, and are ready to receive tile.

C. Verify that subfloor surfaces are dust free and free of substances that could impair bonding of setting materials to subfloor surfaces.

D. Cementitious Subfloor Surfaces: Verify that substrates are ready for tiling installation by testing for moisture and alkalinity (pH).
1. Test in accordance with Section 09 0561.
2. Obtain instructions if test results are not within limits recommended by tiling material manufacturer and setting material manufacturer.
3. Follow moisture and alkalinity remediation procedures in Section 09 0561.

E. Verify that required floor-mounted utilities are in correct location.

3.02 PREPARATION

A. Vacuum clean surfaces and damp clean.

B. Seal substrate surface cracks with filler.

C. Install cementitious backer board in accordance with ANSI A108.11 and board manufacturer's instructions. Tape joints and corners, cover with skim coat of setting material to feather edge.

3.03 INSTALLATION - GENERAL

A. Install tile, thresholds, and stair treads and grout in accordance with applicable requirements of ANSI A108/A118/A136, manufacturer's instructions, and TCNA (HB) or TCNA (HB-GP) recommendations, as applicable.

B. Lay tile to pattern indicated on drawings. Do not interrupt tile pattern through openings.

C. Cut and fit tile to penetrations through tile, leaving sealant joint space. Form corners and bases neatly. Align floor joints.

D. Place tile joints uniform in width, subject to variance in tolerance allowed in tile size. Make grout joints without voids, cracks, excess mortar or excess grout, or too little grout.

E. Form internal angles square and external angles bullnosed.

F. Depressed slab at tile floor: Fill depression with dry-pack mortared bed and slope as required to provide positive drainage to floor drain. Verify drain elevations prior to installation.

G. Install non-ceramic trim in accordance with manufacturer's instructions.

H. Sound tile after setting. Replace hollow sounding units.

I. Keep control and expansion joints free of mortar, grout, and adhesive.

J. Prior to grouting, allow installation to completely cure; minimum of 48 hours.

K. Grout tile joints unless otherwise indicated on drawings. Use standard grout unless otherwise indicated on drawings.

L. At changes in plane and tile-to-tile control joints, use tile sealant instead of grout, with either bond breaker tape or backer rod as appropriate to prevent three-sided bonding.

3.04 INSTALLATION - FLOORS - THIN-SET METHODS

A. Over interior concrete substrates, install in accordance with TCNA (HB) Method F113, dry-set or latex-Portland cement bond coat, on ground, with standard grout, unless otherwise indicated on drawings.
   1. Use uncoupling membrane under tile unless other underlayment is indicated on drawings.

B. Install tile-to-tile floor movement joints in accordance with TCNA (HB) Method EJ171F.

C. Where slab hold out occurs, furnish all labor, materials, and accessories necessary to install cementitious dry-pack mortar fill within recessed slab areas required for tile installations. Dry-pack shall be installed to required elevations and slopes, provide a sound, stable substrate for tile, and accomodate adjacent finish floor transitions. Coordinate required fill thicknesses with slab depressions, selected tile assembly, setting materials, and manufacturer requirements.

3.05 INSTALLATION - WALL TILE

A. Over cementitious backer units on studs, install in accordance with TCNA (HB) Method W244C, at wall tile.

3.06 CLEANING

A. Clean tile and grout surfaces.

END OF SECTION

SECTION 09 5100
ACOUSTICAL CEILINGS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Suspended metal grid ceiling system.

B. Acoustical units (ACT-#).

1.02 RELATED REQUIREMENTS

A. Section 09 8400 - Acoustical Decorative Panels.

1.03 REFERENCE STANDARDS

A. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.

B. ASTM C635/C635M - Standard Specification for Manufacture, Performance, and Testing of Metal Suspension Systems for Acoustical Tile and Lay-in Panel Ceilings.

C. ASTM E1264 - Standard Classification for Acoustical Ceiling Products.

1.04 ADMINISTRATIVE REQUIREMENTS

A. Sequence work to ensure acoustical ceilings are not installed until building is enclosed, sufficient heat is provided, dust generating activities have terminated, and overhead work is completed, tested, and approved.

B. Do not install acoustical units until after interior wet work is dry.

1.05 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements for submittal procedures.

B. Product Data: Provide data on suspension system components and acoustical units.

C. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
   1. See Section 01 6000 - Product Requirements, for additional provisions.
   2. Extra Acoustical Units: Minimum of 3 boxes, up to 5% needed for project with a maximum of 10 boxes.

1.06 QUALITY ASSURANCE

A. Suspension System Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.

B. Acoustical Unit Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.

1.07 FIELD CONDITIONS

A. Maintain uniform temperature of minimum 60 degrees F, and maximum humidity of 40 percent prior to, during, and after acoustical unit installation.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Acoustic Tiles/Panels:
   1. Provide Basis of Design manufacturer listed in the Finish Schedule , or a pre-approved standard or custom product from another manufacturer with equivalent performance, material properties, features, general configuration, appearance, and warranty, approved prior to bid.
   2. Substitutions: See Section 01 6000 - Product Requirements.
   3. Source limitations: Obtain each type of acoustical ceiling tile and its supporting suspension system from a single source.

2.02 ACOUSTICAL UNITS

A. Acoustical Units - General: ASTM E1264, Class A.

B. Acoustical Tiles (ACT-1): Mineral fiber with membrane-faced overlay, with the following characteristics:
   1. Classification: ASTM E1264 Type A.
   2. Size: as indicated in Finish Schedule.
   3. Thickness: 1 inch.
   4. Noise Reduction Coefficient (NRC) Range: 0.90 minimum, in accordance with ASTM E1264.
   5. Tile Edge: as indicated in Finish Schedule.
   6. Color: as indicated in Finish Schedule.
   7. Suspension System: Exposed grid.
   8. Products:
      a. **BASIS OF DESIGN:** USG Corporation; Mars High-NRC Acoustical Panels: www.usg.com/#sle.
      b. Substitutions: See Section 01 6000 - Product Requirements.

C. Acoustical Panels, (ACT-2): Gypsum, with the following characteristics:
   1. Classification: ASTM E1264 Type G.
   2. Size: as indicated in Finish Schedule.
   3. Thickness: 1/2 inch.
   4. Panel Edge: as indicated in Finish Schedule.
   5. Color: as indicated in Finish Schedule.
   6. Suspension System: Exposed grid.
   7. Products:
      a. **BASIS OF DESIGN:** USG Corporation; Sheetrock Lay-In Gypsum Ceiling Panels: www.usg.com/#sle.
      b. Substitutions: See Section 01 6000 - Product Requirements.

2.03 SUSPENSION SYSTEMS

A. Metal Suspension Systems - General: Complying with ASTM C635/C635M; die cut and interlocking components, with perimeter moldings, hold-down clips, stabilizer bars, clips, and splices as required.
   1. Materials:
      a. Steel Grid: ASTM A653/A653M, G30 coating, unless otherwise indicated.

B. Exposed Suspension System, ACT-2: Hot-dip galvanized steel grid with aluminum cap; integrated co-extruded gaskets.
   1. Structural Classification: Heavy-duty, when tested in accordance with ASTM C635/C635M.
   2. Profile: Tee; 15/16 inch face width.
   3. Finish: Baked enamel.
   4. Products:
      a. **BASIS OF DESIGN:** USG Corporation; Donn Brand DXLA/DXCE 15/16 inch Acoustical Suspension System: www.usg.com/#sle.
      b. Substitutions: See Section 01 6000 - Product Requirements.

C. Exposed Suspension System, ACT-1: Hot-dip galvanized steel grid and cap.
   1. Structural Classification: Intermediate-duty, when tested in accordance with ASTM C635/C635M.
   2. Profile: Tee; 15/16 inch face width.
   3. Finish: Baked enamel.
   4. Products:
      a. **BASIS OF DESIGN:** USG Corporation; Donn Brand DX/DXL 15/16 inch Acoustical Suspension System: www.usg.com/#sle.
      b. Substitutions: See Section 01 6000 - Product Requirements.

2.04 ACCESSORIES

A. Support Channels and Hangers: Galvanized steel; size and type to suit application, seismic requirements, and ceiling system flatness requirement specified.

B. Hanger Wire: 12 gauge, 0.08 inch galvanized steel wire.

C. Perimeter Moldings: Same metal and finish as grid.
   1. Angle Molding: L-shaped, for mounting at same elevation as face of grid.
   2. Acoustical Sealant For Perimeter Moldings: Non-hardening, non-skinning, for use in conjunction with suspended ceiling system.

D. Metal Edge Trim for Suspension Systems: Steel or extruded aluminum; provide attachment clips, splice plates, and preformed corner pieces for complete trim system.
   1. Trim Height: as indicated in drawings..
   2. Finish: Baked enamel.
   3. Color: White.
   4. Products:
      a. Armstrong World Industries, Inc; AXIOM Classic: www.armstrongceilings.com/#sle.
      b. Flannery, Inc; Strata Ceiling Trims: www.flannerytrim.com/#sle.
      c. Tamlyn; PACT Acoustical Trim: www.xtremeias.com/#sle.
      d. USG Corporation; Compasso Suspension Trim: www.usg.com/#sle.
      e. Substitutions: See Section 01 6000 - Product Requirements.
      f. Brake metal is prohibited.

E. Touch-up Paint: Type and color to match acoustical and grid units.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify existing conditions before starting work.

B. Verify that layout of hangers will not interfere with other work.

3.02 PREPARATION

A. Install after major above-ceiling work is complete.

B. Coordinate the location of hangers with other work.

C. Provide hanger clips during steel deck erection. Provide additional hangers and inserts as required.

3.03 INSTALLATION - SUSPENSION SYSTEM

A. Rigidly secure system, including integral mechanical and electrical components, for maximum deflection of 1:360.

B. Locate system on room axis according to reflected plan.

C. Perimeter Molding: Install at intersection of ceiling and vertical surfaces and at junctions with other interruptions.
   1. Use longest practical lengths.

D. Suspension System, Non-Seismic: Hang suspension system independent of walls, columns, ducts, pipes and conduit. Where carrying members are spliced, avoid visible displacement of face plane of adjacent members.

E. Where ducts or other equipment prevent the regular spacing of hangers, reinforce the nearest affected hangers and related carrying channels to span the extra distance.

F. Do not support components on main runners or cross runners if weight causes total dead load to exceed deflection capability.

G. Support fixture loads using supplementary hangers located within 6 inches of each corner, or support components independently.

H. Do not eccentrically load system or induce rotation of runners.

3.04 INSTALLATION - ACOUSTICAL UNITS

A. Install acoustical units in accordance with manufacturer's instructions.

B. Fit acoustical units in place, free from damaged edges or other defects detrimental to appearance and function.

C. Fit border trim neatly against abutting surfaces.

D. Install acoustical units level, in uniform plane, and free from twist, warp, and dents.

E. Cutting Acoustical Units:
   1. Make field cut edges of same profile as factory edges.
   2. Double cut and field paint exposed reveal edges.

F. Install hold-down clips on panels within 20 ft of an exterior door.

3.05 TOLERANCES

A. Maximum Variation from Flat and Level Surface: 1/8 inch in 10 feet.

B. Maximum Variation from Plumb of Grid Members Caused by Eccentric Loads: 2 degrees.

END OF SECTION

SECTION 09 5426
SUSPENDED WOOD CEILINGS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Linear wood planks (WDC-1).

B. Metal suspension system.

1.02 RELATED REQUIREMENTS

A. Section 07 6200 - Sheet Metal Flashing and Trim: Coordination with J trim.

B. Section 09 5100 - Acoustical Ceilings: Traditional ceiling tiles and suspension systems.

C. Section 26 50 00 - Lighting: Coordination with wood ceiling wall wash.

1.03 REFERENCE STANDARDS

A. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.

B. ASTM C635/C635M - Standard Specification for Manufacture, Performance, and Testing of Metal Suspension Systems for Acoustical Tile and Lay-in Panel Ceilings.

C. ASTM C636/C636M - Standard Practice for Installation of Metal Ceiling Suspension Systems for Acoustical Tile and Lay-In Panels.

D. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials.

E. CISCA (WC) - Wood Ceilings Technical Guidelines.

1.04 ADMINISTRATIVE REQUIREMENTS

A. Sequence work to ensure ceilings are not installed until building is enclosed, dust generating activities have terminated, and overhead work is completed.

1.05 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements for submittal procedures.

B. Shop Drawings: Indicate grid layout and related dimensioning, attachment of wood ceiling components to grid, accessory attachments, junctions with other ceiling finishes, and mechanical and electrical items installed in the ceiling.

C. Product Data: Provide data on wood ceiling components and suspension system components.

D. Samples: Submit two full width by 24 inch samples illustrating material and finish of wood ceiling components.

E. Samples: Submit two samples each, 12 inches long, of suspension system main runner, cross runner, perimeter molding, and acoustical mat.

1.06 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section, with at least three years documented experience.

B. Installer Qualifications: Company specializing in performing work of the type specified and with at least three years documented experience and approved by manufacturer.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Deliver wood ceiling components to project site in original, unopened packages.

B. Store in fully enclosed space, flat, level and off the floor.

1.08 FIELD CONDITIONS

A. Do not install suspended wood ceiling system until wet construction work is complete and permanent heat and air conditioning is installed and operating.

B. Maintain room temperature between 60 degrees F and 75 degrees F and relative humidity between 35 to 55 percent before, during, and after installation.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Provide Basis of Design manufacturer indicated, or a standard or custom product from another manufacturer, approved prior to bid, with equivalent performance, material properties, features, general configuration, appearance, and warranty.

B. Wood Slat System:
1. Fifth Wall Designs: www.fifthwalldesigns.com
2. **BASIS OF DESIGN:** 9Wood; 9100-A Hybrid Panel: www.9wood.com/#sle.
3. Certainteed Architectural: www.certainteed.com/ceilings-and-walls/#sle.
4. Redbud.
5. Rulon International: www.rulonco.com/#sle.
6. Substitutions: See Section 01 6000 - Product Requirements.

2.02 SUSPENDED WOOD CEILING SYSTEM

A. Performance Requirements:
1. Design for maximum deflection of 1/360 of span.
2. Surface Burning Characteristics: Flame spread index of 25, smoke developed index of 450, when tested in accordance with ASTM E84.

B. Wood-Based Materials:
1. Solid Wood: Clear, dry, sound, plain sawn, selected for well-matched species, grain and color, no defects.

C. Linear Wood Panels: Solid wood.
1. Type: Pre-assembled module of linear planks with battens attached perpendicularly to back of planks.
   a. System Thickness: 1-7/8 inch.
   b. Plank Spacing (Reveal): 22/32 inch.
   c. Members/LF: 6 members per LF.
   d. Acoustical Backer: Duct liner, 2 inch thick.
      1) Color: Black.
   e. Fire Rating: Class A Components.
2. Reveal scrim: Manufacturer's standard non-woven fabric, black.
3. Wood Veneer Species: White Oak.
   a. Factory Finish: as indicated in Finish Schedule.
4. Attachment to Suspension Grid: Direct screw attachment to suspension grid.
5. Suspension System: Type specified below.

D. Metal Suspension System:
1. General: Comply with ASTM C635/C635M; die cut and interlocking components, with perimeter moldings, hold down clips, stabilizer bars, clips, and splices as required.
   a. Materials:
      1) Steel Grid: ASTM A653/A653M, G30 coating, unless otherwise indicated.
2. Concealed Suspension System: Hot-dipped galvanized steel grid and cap.
   a. Structural Classification: Heavy-duty, when tested in accordance with ASTM C635/C635M.
   b. Profile: Tee; 15/16 inch face width.
   c. Finish/Color: Baked enamel, black.
3. Support Channels and Hangers: Galvanized steel; size and type to suit application, seismic requirements, and ceiling system flatness requirement.

E. Accessories: Manufacturer's standard accessories for installation method indicated, including fasteners, trim, perimeter angles, clips and mounting rails as required.

F. Hinges for access panel detail: Continuous piano hinge.

G. Edge closure components at terminations.

H. Touch-up stain or finish compatible with factory-applied coating.

2.03 FABRICATION

A. Shop fabricate wood ceiling components to the greatest extent possible.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify existing conditions before starting work.

B. Do not install ceiling until after interior wet work is dry.

3.02 PREPARATION

A. Layout wood ceiling components in pattern according to reflected ceiling plan and as shown on shop drawings.

B. Acclimate wood ceiling materials by removing from packaging in installation area a minimum of 48 hours prior to installation.

3.03 INSTALLATION

A. General: Install suspended wood ceiling system in accordance with CISCA (WC).

B. Suspension System:
1. Install suspension system in accordance with ASTM C636/C636M and manufacturer's instructions and as supplemented in this section.
2. Rigidly secure system, including integral mechanical and electrical components, for maximum deflection of 1:360.
3. Hang suspension system independent of walls, columns, ducts, pipes and conduit. Where carrying members are spliced, avoid visible displacement of face plane of adjacent members.
4. Where ducts or other equipment prevent the regular spacing of hangers, reinforce the nearest affected hangers and related carrying channels to span the extra distance.
5. Do not support components on main runners or cross runners if weight causes total dead load to exceed deflection capability.
6. Support fixture loads using supplementary hangers located within 6 inches of each corner, or support components independently.
7. Do not eccentrically load system or induce rotation of runners.

C. Wood Ceiling:
1. Install wood ceilings in accordance with manufacturer's instructions.
2. Fit wood components in place, free from damaged edges or other defects detrimental to appearance and function.
3. Install components in uniform plane, and free from twist, warp, and dents.
4. Cut to fit irregular grid and perimeter edge trim.
5. Make field cut edges of same profile as factory edges, seal and finish according to manufacturer.
6. Install clips, stabilizer bars, and other attachments as indicated to secure wood ceiling components tight to the grid system.
7. Install acoustical backer above wood ceiling components; fit tight between grid members.

3.04 TOLERANCES

A. Maximum Variation from Flat and Level Surface: 1/8 inch in 10 feet.

3.05 CLEANING

A. See Section 01 7000 - Execution and Closeout Requirements for additional requirements.

B. Touch up nicks and exposed fasteners with approved finish.

C. Clean and touch up minor finish damage. Remove and replace components that cannot be successfully cleaned and repaired.

3.06 CLOSEOUT ACTIVITIES

A. See Section 01 78 23-Operations and Maintenance Manual for additional requirements.

B. Training: Train Owner's personnel on operation and maintenance of system.
   1. Training Reference: Operation and maintenance manual and additional training materials as required.
   2. Provide minimum of one hour of training.

3.07 PROTECTION

A. Protect completed work from damage until substantial completion.

B. Do not permit foot traffic or use of installed slats as work surface.

END OF SECTION

SECTION 09 6253
SYNTHETIC TURF FLOORING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Synthetic turf flooring (TURF-1).

B. Synthetic turf flooring tiles (TURF-2).

1.02 REFERENCE STANDARDS

A. ASTM F1936 - Standard Specification for Impact Attenuation of Turf Playing Systems as Measured in the Field.

1.03 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Product Data: Indicate materials of construction, compliance with specified standards, installation procedures, and safety limitations.

C. Shop Drawings:
   1. Synthetic Turf Flooring:
      a. Indicate transitions.
      b. Indicate graphic/lines patterns.

D. Samples: Provide color samples of each product showing full range of colors.

1.04 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section, with at least three years of documented experience.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Deliver, handle, and store synthetic turf flooring to project site complying with manufacturer's recommendations.

B. Store materials in a dry, covered area elevated above grade.

1.06 FIELD CONDITIONS

A. Required Ambient Conditions:
   1. Temperature: Above 45 degrees F.
   2. Relative Humidity: Not more than adhesive manufacturer's requirements.
   3. Substrate Surface: Dry.
   4. Substrate Temperature: Not less than 65 degrees F.

B. Maintain ambient conditions during installation and for 48 hours afterward.

1.07 WARRANTY

A. See Section 01 7800 - Closeout Submittals for additional warranty requirements.

B. Manufacturer Warranty: Provide ten-year manufacturer warranty for excessive wear, fiber tensile strength, deterioration or fading from UV light, seam integrity, and shock absorption. Complete forms in Owner's name and register with manufacturer.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Synthetic Turf Flooring:
   1. **BASIS OF DESIGN (TURF-1):** FieldTurf; Classic HD.
   2. Substitutions: See Section 01 6000 - Product Requirements.

B. Synthetic Turf Flooring Tiles:
   1. **BASIS OF DESIGN (TURF-2):** ECORE; RageTurf Rally.
   2. Substitutions: See Section 01 6000 - Product Requirements.

2.02 SYNTHETIC TURF FLOORING

A. Synthetic Turf Flooring:
   1. Fiber: Slit-Film.
   2. Infill: 3-layer
   3. Backing: Finger-unit/SureLock.

B. Synthetic Turf Flooring: Vulcanized Composition Rubber granules encapsulated in a wear and water-resistant elastomeric network, with fusion bonded Polyethylene turf wear layer.
   1. Thickness: as indicated in Finish Schedule
   2. Color: as indicated in Finish Schedule.
   3. Field Graphic: Hash marks as indicated on Drawings; coordinate color with Architect.

PART 3 EXECUTION

3.01 EXAMINATION

A. Measure the location of synthetic grass elements, including access and egress points, hard surfaces, perimeter of existing synthetic turf flooring, and walls.

B. Verify that subfloor surfaces are smooth and flat within the tolerances specified for that type of work and are ready to receive synthetic turf flooring.

3.02 PREPARATION

A. Protection of In-Place Conditions: Doors and Walls.

B. Lay out project perimeter as indicated on drawings prior to starting work.

C. Measure the location of synthetic turf elements, including access and egress points, hard surfaces, seams, supports for gaming equipment, supports for play equipment, perimeter of existing synthetic turf flooring, and walls.

D. Level protrusions greater than 1/32 inch high.

3.03 SYNTHETIC TURF

A. Install synthetic turf flooring according to manufacturer's installation instructions.

B. Securing: Staple synthetic turf flooring to edging 1 inch on center.

C. Field Graphics:
   1. Comply with governing body for layout markings.
   2. Comply with manufacturer's recommendations for dimensions and color patterns indicated on drawings.

3.04 FIELD QUALITY CONTROL

A. See Section 01 4000 - Quality Requirements for additional requirements.

B. Owner or Owner's representative will inspect synthetic grass after installation to verify that surfacing is of proper type and meets specified design safety and accessibility requirements.

C. Repair or replace rejected work until compliant with specified requirements and design criteria.

D. Confirm impact attenuation complies with ASTM F1936.

E. Nonconforming Work: The Contractor shall promptly correct, remove, and replace work rejected by the Architect.

F. Replace damaged products before Date of Substantial Completion.

3.05 PROTECTION

A. Protect installed products until Date of Substantial Completion.

B. Restore adjacent existing areas that have been damaged by work of this section.

END OF SECTION

SECTION 09 6500
RESILIENT BASE

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Resilient base (RB-#).

B. Installation accessories.

1.02 RELATED REQUIREMENTS

A. Section 01 6116 - Volatile Organic Compound (VOC) Content Restrictions.

B. Section 03 3000 - Cast-in-Place Concrete: Restrictions on curing compounds for concrete slabs and floors to receive adhesive-applied resilient flooring.

C. Section 09 0561 - Common Work Results for Flooring Preparation: Concrete slab moisture and alkalinity testing and remediation procedures.

D. Section 09 3000 - Tiling: Transitions associated with tile flooring.

E. Section 09 65 66 - Resilient Athletic Flooring.

F. Section 09 68 13 - Tile Carpeting.

1.03 REFERENCE STANDARDS

A. ASTM F1861 - Standard Specification for Resilient Wall Base.

1.04 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements for submittal procedures.

B. Product Data: Provide data on specified products, describing physical and performance characteristics; including sizes, patterns and colors available; and installation instructions.

C. Shop Drawings: Indicate seaming plans.

D. Verification Samples: Submit two samples, 6 by 6 inch in size illustrating color and pattern for each resilient product specified.

E. Concrete Subfloor Test Report: Submit a copy of the moisture and alkalinity (pH) test reports.

F. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
   1. See Section 01 6000 - Product Requirements, for quantities and additional provisions.
   2. Extra Resilient Base: One full unopened box (Typically 120 Linear Feet), whichever is greater, from the same production dye lot.
   3. Turn over to owner, for storage on-site or off-site.

1.05 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing specified flooring with minimum three years documented experience.

B. Installer Qualifications: Company specializing in installing specified flooring and approved by flooring manufacturer.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Upon receipt, immediately remove any shrink-wrap and check materials for damage and the correct style, color, quantity and run numbers.

B. Store all materials off of the floor in an acclimatized, weather-tight space.

C. Maintain temperature in storage area between 50 degrees F and 90 degrees F.

D. Protect roll materials from damage by storing on end.

E. Do not double stack pallets.

1.07 FIELD CONDITIONS

A. Store materials for not less than 1 week prior to installation in area of installation at temperature range recommended by manufacturer.

B. Maintain ambient temperatures within range recommended by manufacturer, but not less than 70 degrees F or more than 85 degrees F , in spaces to receive resilient sheet flooring for at least 48 hours prior to, during and 48 hours after the application of the flooring is required.

C. After installation and until Substantial Completion, maintain ambient temperatures within range recommended by manufacturer, but not less than 55 degrees F or more than 95 degrees F.

D. Areas of the base and accessories that are subject to direct sunlight through doors or windows should have them covered using blinds, curtains, cardboard or similar for the time of the installation and 72 hours after the installation to allow the adhesive to cure. Note: These areas should be installed using wet adhesives only.

1.08 WARRANTY

A. Wear:
   1. RB & MTLP: Two Year

1.09 ADMINISTRATIVE REQUIREMENTS

A. Preinstallation meting: Convene a preinstallation meeting one week before starting work of this section; require atendance by affected installers

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Resilient Base:
   1. Provide Basis of Design manufacturer listed in the Finish Schedule, or an approved standard or custom product from another manufacturer, approved prior to bid, with equivalent performance, material properties, features, general configuration, appearance, and warranty.
   2. Substitutions: See Section 01 6000 - Product Requirements.

2.02 RESILIENT BASE

A. Resilient Base: ASTM F1861, Type(s) as indicated below.
   1. Manufacturers:
      a. Armstrong World Industries, Inc.
      b. Mannington Commercial: www.manningtoncommercial.com#sle.
      c. Roppe Corporation: www.roppe.com/#sle.
      d. **BASIS OF DESIGN:** Johnsonite, a Tarkett Company: www.johnsonite.com.
      e. Mannington Commercial Flooring;
      f. Substitutions: See Section 01 6000 - Product Requirements.
   2. Type: as indicated in Finish Schedule
   3. Height: As indicated in Finish Schedule.
   4. Thickness: As indicated in Finish Schedule.
   5. Top Set Style:
      a. Style B Coved; locations as indicated in Interior Finish Schedule.
      b. Traditional base: Style B Coved.
   6. Length: Roll. 4 foot sections prohibited.
   7. Outside and Inside Corners: Job formed.
   8. Color(s): as indicated in Finish Schedule.

2.03 ACCESSORIES

A. Primers and Adhesives: Waterproof; types recommended by flooring manufacturer for substrates required (including cmu).
   1. VOC Content Limits: As specified in Section 01 6116.

B. Metal Trim: Color as indicated in Finish Schedule, style and dimensions as indicated on drawings, set with adhesive.

1. Products:
   a. Dural: us.dural.com.
   b. Genesis APS International: www.genesis-aps.com/#sle.
   c. Profilitec: www.profilitec.com/en/products.html.
   d. Schluter-Systems: www.schluter.com/#sle.
      1) (MTLP-7) Transition from RAF to Concrete: VINPRO-U
      2) (MTLP-8) Transition from Carpet to Concrete:
   e. Substitutions: See Section 01 6000 - Product Requirements.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that wall surfaces are smooth and flat within the tolerances specified for that type of work, are dust-free, and are ready to receive resilient base.

B. Cementitious Subfloor Surfaces: Verify that substrates are ready for resilient flooring installation by testing for moisture and alkalinity (pH).
   1. Test in accordance with Section 09 0561.
   2. Obtain instructions if test results are not within limits recommended by resilient flooring manufacturer and adhesive materials manufacturer.
   3. Follow moisture and alkalinity remediation procedures in Section 09 0561.

C. Verify that required floor-mounted utilities are in correct location.

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.

D. Vacuum and clean substrate. If required, only use water based sweeping compounds. Do not use any wax or oil based compounds that leave behind a residue that may interfere with the adhesive bond.

E. Apply primer as required to prevent "bleed-through" or interference with adhesion by substances that cannot be removed.

F. Perform mat bond tests in each major area (1 per ~1,000 sq. ft.) consisting of the proposed subfloor preparation, mitigation and leveling or smoothing products. Do not proceed with installation until all the results of the bond test are acceptable.

G. If required, install moisture mitigation system per manufacturer’s instructions.
   1. Provide written confirmation and photographs to the building owner and end user that the subfloor was prepared correctly prior to the application of the membrane, and that the membrane was applied correctly (without pin-holes) including confirmation of the gallons used and total square feet installed.

3.03 INSTALLATION - GENERAL

A. Starting installation constitutes acceptance of sub-floor and wall conditions.

B. Install in accordance with manufacturer's written instructions for substrates encountered.

C. Install edge strips at unprotected or exposed edges, where flooring terminates, and where indicated.
   1. Metal Strips: Attach to substrate before installation of flooring using stainless steel screws.
   2. Resilient Strips: Attach to substrate using adhesive.

3.04 INSTALLATION - RESILIENT BASE

A. Follow manufacturer's installation instructions specific to substrate involved.

B. Fit joints tightly and make vertical. Maintain minimum dimension of 18 inches between joints.

C. Miter internal corners. At external corners, 'V' cut back of base strip to 2/3 of its thickness and fold. At exposed ends, use premolded units.

D. Install base on solid backing. Bond tightly to wall and floor surfaces.

E. Scribe and fit to door frames and other interruptions.

3.05 CLEANING

A. Remove excess adhesive from floor, base, and wall surfaces without damage.

B. Clean in accordance with manufacturer's written instructions.

3.06 PROTECTION

A. Place protective coverings over finished floors; do not remove coverings until after Date of Substantial Completion.

END OF SECTION

SECTION 09 6566
RESILIENT ATHLETIC FLOORING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Rubber sheet athletic flooring, adhesively installed (RAF-#).

1.02 RELATED REQUIREMENTS

A. Section 09 6500 - Resilient Base: Resilient base and metal transitions.

1.03 REFERENCE STANDARDS

A. ASTM D412 - Standard Test Methods for Vulcanized Rubber and Thermoplastic Elastomers--Tension.

B. ASTM D2240 - Standard Test Method for Rubber Property--Durometer Hardness.

1.04 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Product Data: Manufacturer's printed data sheets for products specified.

C. Shop Drawings: Fabrication and installation details, and layout, colors, and equipment locations.

D. Verification Samples: Actual flooring material specified, not less than 12 inch square.

E. Concrete Subfloor Test Report: Submit a copy of the moisture and alkalinity (pH) test reports.

F. Maintenance Materials:
   1. Provide extra stock materials from original dye lots, for use in facility operations and maintenance.
   2. Quantity: Minimum of 2 boxes, up to 5% needed for project with a maximum of 5 boxes; Rolled Goods Minimum of 15 LF, up to 5% with a maximum of 1 full roll.

1.05 QUALITY ASSURANCE

A. Manufacturer Qualifications:
   1. Manufacturer must have a minimum of five (5) years of experience in the manufacturing of prefabricated resilient athletic flooring.

B. Installer Qualifications: An experienced installer certified in writing by the flooring manufacturer to be qualified for installation of specified flooring system.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials to project site in unopened containers clearly labeled with manufacturer's name and identification of contents.

B. Store materials in dry and clean location until needed for installation.

C. During installation, handle in a manner that will prevent marring and soiling of finished surfaces.

1.07 FIELD CONDITIONS

A. Maintain temperature in spaces to receive adhesively installed resilient flooring within range of 70 to 95 degrees F for not less than 48 hours before the beginning of installation and for not less than 48 hours after installation has been completed. Subsequently, do not allow temperature in installed spaces to drop below 50 degrees F or to go above 100 degrees F.

B. Recommended ambient humidity control level is between 40 and 60%

C. Concrete subfloors, on or below grade, must be installed over a permanent effective vapor retarder, respecting current versions of the standard practice ASTM E1643 and the standard ASTM E1745. The vapor retarder must be placed directly underneath the concrete slab, above the granular fill, as per Manufacturer’s instructions. The vapor retarder must have a perm rating of 0.1 or less and must have a minimum thickness of 10 mil (0.010in).

D. No concrete sealers or curing compounds are applied or mixed with the subfloors

E. Installation of the resilient athletic flooring to be carried out no sooner than the specified curing time of concrete subfloor (normal density concrete curing time is approximately 28 days for development of design strength). Refer to current version of ASTM F710.

F. The subfloor surface must be free of any paint, wax, oil, grease, sealer, curing compound, solvent or any other contaminants that may inhibit bond. All contaminants must be removed from the surface via mechanical abatement. Use of abatement chemicals is not recommended.

G. Concrete to have smooth, dense finish, and be highly compacted with a tolerance of 1/8'' in a 10ft radius (3.2mm in 3.05m radius). Floor Flatness (FF) and Floor Levelness (FL) numbers are not recognized.

H. Installation of resilient athletic flooring will not commence until the building is enclosed and all other trades have completed their work. It is the Project Coordinator's responsibility to maintain a secure and clean working area before, during and after the installation of the resilient athletic flooring.

1.08 WARRANTY

A. The resilient athletic flooring is warranted to be free from manufacturing defects for a period of five (5) years from the date of shipment from the Manufacturer.

PART 2 PRODUCTS

2.01 PREFORMED ATHLETIC FLOORING

A. Provide Basis of Design manufacturer listed, or a standard or custom product from another manufacturer, approved prior to bid, with equivalent performance, material properties, features, general configuration, appearance, and warranty:

B. Manufacturers:
1. Gerflor USA, Inc; www.gerflorusa.com
2. Connor Sports: www.connorsports.com
3. Mondo America, Inc: www.mondoworldwide.com/#sle.
4. **BASIS OF DESIGN:** Ecore Commercial: www.ecoreintl.com.
   a. RAF1, RAF2: Compact-Flec Ice.
   b. RAF3: Moxie Motivate Plus.
   c. RAF4: Balanced Motivate Class I.
5. Kiefer USA: www.kieferusa.com
6. Tarkett Sports: www.tarkettsportsindoor.com
7. Substitutions: See Section 01 6000 - Product Requirements.

C. Rubber Sheet Flooring (RAF1, RAF2): Prefabricated sport surface-vulcanized in two layered construction, consisting of EPDM, natural rubber, mineral fibers, stabilizing agents, color pigments, and a non-permeable, textured wear resistant shock absorbing surface layer with marbling color, bonded by vulcanization.
1. Thickness: as indicated in Finish Schedule.
2. Sheet Width: Minimum 48 inches.
3. Durometer Hardness, Wear Layer, Type A: Minimum of 68 plus/minus 3, when tested in accordance with ASTM D2240.
4. Durometer Hardness, Bottom Layer, Type A: Minimum of 66 plus/minus 3, when tested in accordance with ASTM D2240.
5. Tensile Strength ASTM D412 - >350 psi
6. Resistance of Indentation EN1516 - <0.3mm
7. Surface Texture: Slip Resistant Sealskin Texture.
8. Color: as indicated in Finish Schedule.

D. Rubber Sheet Flooring (RAF3): Post-consumer vulcanized composition rubber granules encapsulated in a wear and water-resistant elastomeric network with a fusion bonded Calenddered Rubber Surface Layer.
1. Thickness: as indicated in Finish Schedule.
2. Sheet Width: Minimum 48 inches.
3. Surface Texture: Manufacturer Standard.
4. Color: as indicated in Finish Schedule.

E. Rubber Sheet Flooring (RAF4): Post-consumer vulcanized composition rubber granules encapsulated in a wear and water-resistant elasomeric network fusion bonded to a heterogeneous vinyl wear layer with a urethane topcoat.
   1. Thickness: as indicated in Finish Schedule.
   2. Sheet Width: Minimum 70 inches.
   3. Color: as indicated in Finish Schedule.

2.02 ACCESSORIES

A. Subfloor Filler Compound: Latex-modified portland cement based or blended hydraulic-cement-based formulation as recommended by flooring manufacturer for substrate conditions.

B. Transition Strips: See Section 09 6500 - Resilient Base.

PART 3 EXECUTION

3.01 EXAMINATION

A. Examine substrates for conditions detrimental to installation of athletic flooring. Proceed with installation only after unsatisfactory conditions have been corrected.

B. Verify that surfaces are flat to tolerances acceptable to flooring manufacturer, free of cracks that might telegraph through flooring, clean, dry, and free of curing compounds, surface hardeners, and other chemicals that might interfere with bonding of athletic flooring to substrate.

C. Installation of the resilient athletic flooring to be carried out no sooner that the specified curing time of concrete subfloor (normal density concrete curing time is approximately 28 days for development of design strength).

3.02 PREPARATION

A. Prepare floor substrates as recommended by flooring manufacturers.

B. Concrete: Use leveling compound as necessary to achieve substrate flatness of plus or minus 1/8 inch within 10 ft radius.

C. Broom clean areas to receive athletic flooring immediately before beginning installation.

3.03 INSTALLATION

A. Starting installation constitutes acceptance of subfloor conditions.

B. Install in accordance with manufacturer's written instructions and approved shop drawings.

C. Resilient Sheet Flooring:
   1. Unroll flooring and allow to relax before beginning installation.
   2. Mix adhesive thoroughly and apply to substrate with notched trowel. Roll flooring into fresh adhesive,butting factory edges and compression fitting.
   3. Roll entire flooring surface with steel roller to assure adhesion to substrate and eliminate air bubbles.
   4. Immediately remove any adhesive from flooring surface, using chemical recommended by flooring manufacturer.
   5. Weld seams using techniques and equipment recommended by manufacturer.
   6. Lay out game lines using tape and taping machine approved by flooring manufacturer. Apply game line paint with roller, and allow to dry before removing tape.

D. Rubber Tile Flooring:
   1. Lay out center lines in spaces to receive tile flooring, based on location of principal walls. Start tile installation from center, and adjust as necessary to avoid tiles less than one-half width at perimeter.
   2. Lay tiles square with room axis, matching for color and pattern by selecting from cartons and mixing as recommended by manufacturer.

E. Scribe Flooring to walls, columns, cabinets, floor outlets and other appurtenances to produce tight joints.

3.04 CLEANING

A. Clean flooring using methods recommended by manufacturer.

3.05 PROTECTION

A. Protect finished athletic flooring from construction traffic, with 1/8" Masonite during and after the installation, to ensure that it is without damage upon Date of Substantial Completion.

B. Repair material must come from the same dye lot as original manufactured product initially installed. Repairs are to be performed by qualified installers/technicians only.

END OF SECTION

SECTION 09 6813
TILE CARPETING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Carpet tile (CPT-#), fully adhered.
   1. Walk-off mat/carpet (WOM-#).

B. Accessories.

1.02 RELATED REQUIREMENTS

A. Section 01 6116 - Volatile Organic Compound (VOC) Content Restrictions.

B. Section 03 3000 - Cast-in-Place Concrete: Restrictions on curing compounds for concrete slabs and floors to receive adhesive-applied flooring.

C. Section 09 0561 - Common Work Results for Flooring Preparation: Concrete slab moisture and alkalinity testing and remediation procedures.

D. Section 09 3000 - Tiling 09 3000 - Tiling; Coordination of transitions.

E. Section 09 6500 - Resilient Base; Resilient base and metal flooring transitions.

1.03 REFERENCE STANDARDS

A. CRI 104 - Standard for Installation of Commercial Carpet.

1.04 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide data on specified products, describing physical and performance characteristics; sizes, patterns, colors available, and method of installation.

C. Shop Drawings: Indicate layout of joints and direction of carpet pile.

D. Samples: Submit two carpet tiles illustrating color and pattern design for each carpet color selected.

E. Concrete Subfloor Test Report: Submit a copy of the moisture and alkalinity (pH) test reports.

F. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
   1. See Section 01 6000 - Product Requirements, for quantities and additional provisions.
   2. Extra Carpet Tile: Minimum of 3 boxes, up to 5% needed for project with a maximum of 10 boxes.
   3. Turn over to owner, for storage on-site or off-site.

1.05 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing specified carpet tile with minimum five years documented experience.

B. Installer Qualifications: Company specializing in installing carpet tile and approved by carpet tile manufacturer.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Protect adhesives from freezing or overheating in accordance with manufacturer's instructions.

1.07 FIELD CONDITIONS

A. Store materials in area of installation for minimum period of 24 hours prior to installation.

B. Maintain minimum 70 degrees F ambient temperature 24 hours prior to, during and 24 hours after installation.

C. Ventilate installation area during installation and for 72 hours after installation.

1.08 WARRANTY

A. See Section 01 7800 - Closeout Submittals, for additional warranty requirements.

B. Provide ten year manufacturer warranty for wear.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Provide Basis of Design manufacturer listed, or a standard or custom product from another manufacturer, approved prior to bid, with equivalent performance, material properties, features, general configuration, appearance, and warranty.
   1. Substitutions: See Section 01 6000 - Product Requirements.

2.02 MATERIALS

A. Tile Carpeting (CPT-1): Textile composite flooring (fiber face wear layer thermally fused to a cushioned backing), manufactured in one color dye lot.
   1. Product: Kinetex manufactured by J+J Flooring Group.
   2. Tile Size: as indicated in Finish Schedule
   3. Style / Colors / Patterns: as indicated in Finish Schedule
   4. Install Method: as indicated in Finish Schedule
   5. Critical Radiant Flux: Minimum of 0.22 watts/sq cm, when tested in accordance with ASTM E648 or NFPA 253.
   6. Surface Flammability Ignition: Pass ASTM D2859 (the "pill test").

B. Walk-Off Carpet/ Entry Mat: Heterogenous construction
   1. Tile Size: as indicated in Interior Finish Schedule
   2. Manufacturer and Model: Refer to Interior Finish Schedule.
   3. Colors/Patterns: Refer to Interior Finish Schedule.
   4. Install Method: Refer to Interior Finish Schedule.

2.03 ACCESSORIES

A. Subfloor Filler: White premix latex; type recommended by flooring material manufacturer.

B. Transition Strips:
   1. Carpet to Concrete: see Section 09 6566.

C. Adhesives: Recommended by carpet tile manufacturer; releasable type.
   1. Compatible with materials being adhered; maximum VOC content as specified in Section 01 6116.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that subfloor surfaces are smooth and flat within tolerances specified for that type of work and are ready to receive carpet tile.

B. Verify that wall surfaces are smooth and flat within the tolerances specified for that type of work, are dust-free, and are ready to receive carpet tile.

C. Verify that subfloor surfaces are dust-free and free of substances that could impair bonding of adhesive materials to subfloor surfaces.

D. Cementitious Subfloor Surfaces: Verify that substrates are ready for flooring installation by testing for moisture and alkalinity (pH).
   1. Test in accordance with Section 09 0561.
   2. Obtain instructions if test results are not within limits recommended by flooring material manufacturer and adhesive materials manufacturer.
   3. Follow moisture and alkalinity remediation procedures in Section 09 0561.

E. Verify that required floor-mounted utilities are in correct location.

3.02 PREPARATION

A. Prepare floor substrates for installation of flooring in accordance with Section 09 0561.

3.03 INSTALLATION

A. Starting installation constitutes acceptance of subfloor conditions.

B. Install carpet tile in accordance with manufacturer's instructions and CRI 104 (Commercial).

C. Blend carpet from different cartons to ensure minimal variation in color match.
   1. Maintain dye lot integrity do not mix dye lots in same area.

D. Cut carpet tile clean. Fit carpet tight to intersection with vertical surfaces without gaps.

E. Lay out carpet and locate seams in accordance with shop drawings.
   1. Locate seams in area of least traffic, out of areas of pivoting traffic, and parallel to main traffic.
   2. Do not locate seams perpendicular through door openings.
   3. Align run of pile in same direction as anticipated traffic and in same direction on adjacent pieces.
   4. Locate change of color or pattern between rooms under door centerline.
   5. Provide monolithic color, pattern, and texture match within any one area.
   6. Provide floor fill and adhesive tape as needed at metal carpet transition.

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.

3.04 CLEANING

A. Remove excess adhesive without damage, from floor, base, and wall surfaces.

B. Clean and vacuum carpet surfaces.

END OF SECTION

SECTION 09 7200
WALL COVERINGS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Wall coverings (VW-C#).

1.02 REFERENCE STANDARDS

A. ASTM D1308 - Standard Test Method for Effect of Household Chemicals on Clear and Pigmented Coating Systems.

B. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials.

C. ASTM F793/F793M - Standard Classification of Wall Coverings and Ceiling Coverings by Use Characteristics.

1.03 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements for submittal procedures.

B. Product Data: Manufacturer's data sheets for wall covering and adhesive. Indicate compliance with specified flame spread and smoke developed ratings.

C. Shop Drawings: Indicate wall elevations with seaming layout.

D. Samples: Submit two samples of wall covering, 12 by 12 inch in size illustrating color, finish, and texture.

1.04 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section with minimum five years of documented experience.

B. Installer Qualifications: Company specializing in performing work of the type specified and with at least five years of documented experience.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Inspect roll materials for damage upon arrival.

B. Protect packaged adhesive from temperature cycling and cold temperatures.

C. Do not store roll goods on end.

1.06 FIELD CONDITIONS

A. Maintain adhesive and wall covering manufacturer's recommended temperature ranges 24 hours before, during, and after installation.

B. Provide lighting level of 80 fc measured mid-height at substrate surfaces.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Wall Coverings:

1. Provide Basis of Design manufacturer listed, or a standard or custom product from another manufacturer, approved prior to bid, with equivalent performance, material properties, features, general configuration, appearance, and warranty.
2. Substitutions: See Section 01 6000 - Product Requirements.

2.02 WALL COVERINGS

A. Performance Requirements:

1. Surface Burning Characteristics: Flame spread index of 25, maximum, and smoke developed index of 50, maximum, when tested in accordance with ASTM E84.
2. Chemical and Stain Resistance: No visible staining or discoloration and no damage to surface texture when tested in accordance with ASTM D1308.

B. Wall Covering (VWC-1):

1. Comply with ASTM E83 - Class A and NFPA 286.
2. Total Weight: 35 oz/sq yd.
3. Roll Width: as indicated on Finish Schedule.
4. Style/Pattern/ Color: See Interior Finish Schedule.

C. Wall Covering (VWC-2): Fabric-backed vinyl roll stock.
1. Comply with ASTM F793/F793M, Category V, Type II.
2. Total Weight: 20 oz/sq yd.
3. Roll Width: as indicated on Finish Schedule.
4. Style/Pattern/ Color: See Interior Finish Schedule.

2.03 ACCESSORIES

A. Adhesive: Type recommended by wall covering manufacturer.

B. Substrate Filler: As recommended by adhesive and wall covering manufacturers; compatible with substrate.

C. Termination Trim: Extruded aluminum j-cap, clear anodized/satin finish; 1/4 inch maximum face dimension.
1. Application: Exposed outside edges or corners.
2. Length: Full Height of wall covering installation as indicated on drawings.
3. Product:
a. Extrude-A-Trim J-Channel
b. Eagle E-80 J-Cap
c. Fry Reglet: WCTBT125-217; www.fryreglet.comIndoff
d. IND-9 / J-Cap (www.ahutton.com)
e. Koroseal JT12-00
f. Substitutions: See Section 01 6000 - Product Requirements.

D. Substrate Primer and Sealer: Manufacturer's recommended type.
1. For vinyl wall coverings:
a. Required for Level 5 painted gypsum board and unpainted MDF substrates.
b. Follow with pigmented primer.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify substrate surfaces are primed and meet manufacturer's requirements to receive work.
1. Verify walls were constructed with a Level 5 finish.

B. Measure moisture content of substrates with electronic moisture meter. Do not apply wall coverings if moisture content of substrate exceeds level recommended by wall covering manufacturer.

C. Verify flatness tolerance of surfaces does not vary more than 1/8 inch in 10 feet or at rate greater than 1/16 inch/ft.

D. Notify Architect of detrimental conditions affecting wall covering installation.

E. Correct detrimental conditions before starting installation.

3.02 PREPARATION

A. Remove wall plates and accessories impeding wall covering installation.

B. Substrate Priming and Preparation:
1. Fill cracks in substrate and correct irregularities with filler; sand smooth.
2. For marks capable of bleeding through surface finishes, seal with shellac.
3. Apply one coat of primer sealer to substrate surfaces. Allow to dry. Lightly sand smooth.

C. Wash impervious surfaces with tetra-sodium phosphate; rinse and neutralize; wipe dry.

D. Surface Appurtenances: Remove or mask electrical plates, hardware, light fixture trim, escutcheons, and fittings before preparing surfaces or finishing.

E. Surfaces: Correct defects and clean surfaces that affect work of this section.

F. Vacuum surfaces to remove loose particles.

G. Acclimatize wall-covering materials by removing them from packaging in the installation areas not lkess than 24 hours bwefore installation.

3.03 INSTALLATION

A. Apply adhesive and wall covering in accordance with manufacturer's instructions.

B. Apply adhesive to wall immediately before applying wall covering.

C. Use wall covering in roll number sequence.

D. Razor trim edges of wall covering. Do not razor trim on gypsum board surfaces.

E. Smoothly apply wall covering without wrinkles, gaps, or overlaps. Eliminate air pockets and ensure full bond to substrate surface.

F. Butt edges tightly.

G. Horizontal seams are not permitted.

H. Do not seam within 2 inches of internal corners or within 6 inches of external corners.

I. Install wall covering before installing bases and items attached to, abutting, or located within 1 inch of wall surface.

J. Do not install wall covering more than 1/4 inch below top of resilient base.

K. Cover spaces above and below windows and above doors in pattern sequence from roll.

L. Where wall covering tucks into reveals, metal wallboard, or plaster stops, use contact adhesive within 6 inches of wall covering termination. Ensure complete contact bond.

M. Install termination trim.

N. Remove excess adhesive from seams while wet and before proceeding to next wall covering sheet.

O. Reinstall wall plates and accessories removed to accommodate work of this section.

3.04 CLEANING

A. See Section 01 7000 - Execution and Closeout Requirements for additional requirements.

B. Clean wall coverings of dust, dirt, excess adhesive, and other contaminants.

3.05 PROTECTION

A. Protect installed products from damage until Date of Substantial Completion.

END OF SECTION

SECTION 09 7700
INTERIOR WALL PANELING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Slatwall Paneling (SLAT-1).

1.02 REFERENCE STANDARDS

A. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials.

1.03 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Product Data: Submit manufacturer's descriptive literature for each specified product. Include anchorage devices specific to project substrate types.

C. Shop Drawings: Submit elevations for each application and location. Indicate details of joints and attachments.

D. Samples: Submit two samples 12 by 12 inches in size, indicating finish and color for each type of panels.

E. Manufacturer's Instructions: Provide manufacturer's installation instructions.

1.04 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section, with at least five years of documented experience.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Deliver products to project site in manufacturer's original packaging, marked with manufacturer's product identification.

B. Store panels flat, indoors, on a clean, dry surface. Remove packaging and allow panels to acclimate to room temperature for 48 hours prior to installation.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Slatwall Paneling:
   1. **BASIS OF DESIGN:** Marlite; Slatwall Panel: www.marlite.com.
   2. Substitutions: See Section 01 6000 - Product Requirements.

2.02 REGULATORY REQUIREMENTS

A. Surface Burning Classification: Provide wall paneling assemblies meeting Class A when tested in accordance with ASTM E84.

2.03 SLATWALL PANELING

A. Panel Configuration: Engineered groove machined into wood composite substrate.
   1. Panel thickness – 3/4 inch thick with nominal 1/2 inch deep slotted grove.
   2. Panel face dimensions: 48 inch by As indicated on the drawings.
   3. Dimensions: as indicated on drawings.
   4. Grooves: 3/16 inch and 3 inch on center.
      a. Trim: 7000 series aluminum insert.

B. High internal bond wood composite substrate. Slatwall panels shall have formaldehyde emissions of 0.3 PPM or less and shall comply with HUD 24 CFR Part 3280 Standards set fourth for particleboard panels.
   1. Standard Slatwall
      a. Medium density wood fiberboard conforming to ANSI A208.2, industrial-grade MDF or other wood fiber substrates having not less than 75% recycled wood waste.

C. Panel Finish: Low Pressure Laminate (Melamine treated paper) bonded to wood fiber substrate by hot melt adhesive.

1. Finish: as indicated in Finish Schedule.

D. Panel Trim: Aluminum; as indicated on drawings.

E. Installation Accessories: as recommended by manufacturer.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that substrate surfaces for adhered items are clean and smooth.
1. Test painted or wall covering surfaces for adhesion in inconspicuous area, as recommended by manufacturer.

B. Start of installation constitutes acceptance of project conditions.

3.02 INSTALLATION

A. Install panels in accordance with manufacturer's instructions.

B. Locate wall studs to secure panels with drywall screws into grooves at stud locations.

C. Install panels with manufacturer's recommended gaps for panel field and corner joints.

3.03 PROTECTION

A. Protect installed interior wall paneling from subsequent construction operations.

END OF SECTION

SECTION 09 8400
ACOUSTICAL DECORATIVE PANELS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Acoustical ceiling baffles. (SCU-#).

B. Mounting accessories.

1.02 RELATED REQUIREMENTS

A. Section 06 1000 - Rough Carpentry: Dimensional lumber and plywood for quadratic residue diffusers.

1.03 REFERENCE STANDARDS

A. ASTM C423 - Standard Test Method for Sound Absorption and Sound Absorption Coefficients by the Reverberation Room Method.

B. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials.

C. ASTM E795 - Standard Practices for Mounting Test Specimens during Sound Absorption Tests.

1.04 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements for submittal procedures.

B. Product Data: Manufacturer's printed data sheets for products specified.

C. Shop Drawings: Fabrication and installation details, panel layout and fabric orientation.

D. Verification Samples: Fabricated samples of each type of panel specified; 12 by 12 inch, showing construction, edge details, and fabric covering.

E. Test Reports: Certified test data from an independent test agency verifying that panels meet specified requirements for acoustical and fire performance.

1.05 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing products of the type specified in this section, with at least three years of documented experience.

B. Single-Source Responsibility: Provide acoustical panel units and installation components for each type by a single manufacturer.

C. Coordination of Work: Coordinate acoustical wall work with installers of related work including, but not limited to building insulation, gypsum board, light fixtures, mechanical systems, electrical systems, and sprinklers.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Protect acoustical units from moisture during shipment, storage, and handling. Deliver in factory-wrapped bundles; do not open bundles until units are needed for installation.

B. Store units flat, in dry, well-ventilated space; do not stand on end.

C. Before installing acoustical wall panels, permit them to reach room temperature and a stabilized moisture content.

D. Protect edges from damage.

1.07 FIELD CONDITIONS

A. Maintain uniform temperature of minimum 60 degrees F, and maximum humidity of 70 percent prior to, during, and after installation.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Provide Basis of Design manufacturer listed in the Finish Schedule, or an approved standard or custom product from one of the other listed manufacturers with equivalent performance, material properties, features, general configuration, appearance, and warranty.

B. Acoustical Ceiling Baffles:
   1. Conwed Designscape/Wall Technology: www.conweddesignscape.com/#sle.
   2. **BASIS OF DESIGN:** Golterman & Sabo, Inc. (G&S Acoustics): www.golterman.com.
   3. Sound Concepts: www.sondconceptscan.com
   4. Wenger Corporation: www.wengercorp.com.
   5. Substitutions: See Section 01 6000 - Product Requirements.

2.02 SOUND-ABSORBING UNITS

A. General:
   1. Prefinished, factory assembled fabric-covered panels.
   2. Surface Burning Characteristics: Flame spread index of 25 or less and smoke developed index of 450 or less, when tested in accordance with ASTM E84.

B. Acoustical Baffles: Wrapped panels, with core 7 pcf (112 kg/cu m) fiberglass, seamless finish material wrapped and bonded on centerline of panels.
   1. Style: As indicated in Finish Schedule.
   2. Core Thickness: 2 inches (51 mm); NRC 1.75
   3. Size: As indicated in Finish Schedule.
   4. Finish Material: As indicated in Finish Schedule.
   5. Edges; Square and chemically hardened.
   6. Corners; Square.
   7. Mounting: Suspended; Grommets in PVC.

2.03 FABRICATION

A. Fabric Wrapped, General: Fabricate panels to sizes and configurations as indicated, with fabric facing installed without sagging, wrinkles, blisters, or visible seams.
   1. For panels suspended from ceiling, provide fabric covering both sides, with seams only at panel edges.

B. Tolerances: Fabricate to finished tolerance of plus or minus 1/16 inch for thickness, overall length and width, and squareness from corner to corner.

C. Factory-applied finishes on acoustical panels to be uniform, smooth, and without blemishes.

2.04 ACCESSORIES

A. Ceiling-Suspended Accessories: Manufacturer's standard accessories at locations as indicated on each acoustical unit, sized appropriately for weight of acoustical unit.
   1. Through-threaded eyelets bolted through concealed perimeter frame.
   2. Provide galvanized wire for suspension from ceiling at heights as indicated.

PART 3 EXECUTION

3.01 EXAMINATION

A. Examine substrates for conditions detrimental to installation of acoustical units. Proceed with installation only after unsatisfactory conditions have been corrected.

B. Field verify surface sizes before fabricating panels.

3.02 INSTALLATION

A. Install acoustical units in locations as indicated, following manufacturer's installation instructions.

B. Install mounting accessories and supports in accordance with shop drawings.

C. Align panels accurately, with edges plumb and top edges level. Scribe to fit accurately at adjoining work and penetrations.

D. Install acoustical units to construction tolerances of plus or minus 1/8 inch for the following:
   1. Plumb and level.
   2. Flatness.
   3. Width of joints.

3.03 CLEANING

A. Clean sound-absorptive panels upon completion of installation from dust and other foreign materials, following manufacturer's instructions.

3.04 PROTECTION

A. Provide protection of installed acoustical panels until Date of Substantial Completion.

B. Replace panels that cannot be cleaned and repaired to satisfaction of the Architect.

END OF SECTION

SECTION 09 9123
INTERIOR PAINTING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Surface preparation.

B. Field application of paints (PT-#, PT-E-#).

C. Scope: Finish interior surfaces exposed to view, unless fully factory-finished and unless otherwise indicated.
   1. Both sides and edges of plywood backboards for electrical and telecom equipment before installing equipment.
   2. Prime surfaces to receive wall coverings.
   3. Mechanical and Electrical:
      a. In finished areas, paint insulated and exposed pipes, conduit, boxes, insulated and exposed ducts, hangers, brackets, collars and supports, mechanical equipment, and electrical equipment, unless otherwise indicated.
      b. In finished areas, paint shop-primed items.
      c. Paint interior surfaces of air ducts and convector and baseboard heating cabinets that are visible through grilles and louvers with one coat of flat black paint to visible surfaces.
      d. Paint dampers exposed behind louvers, grilles, and convector and baseboard cabinets to match face panels.
   4. Gypsum Board: Finish all surfaces exposed to view.
   5. Steel Doors and Frames: Finish all surfaces exposed to view
      a. Paint all surfaces, including top and bottom edge surfaces
   6. Concrete Masonry Units (CMU): Finish all surfaces exposed to view.
   7. Precast Concrete: Finish all interior surfaces exposed to view.
   8. Wood: Finish all surfaces exposed to view, except those indicated to be stained, prefinished or not specified to receive additional field finishing.
   9. Shop-Primed Metal Items: Finish all surfaces exposed to view
      a. Ceiling Paint:
         1) Tag E: No ceiling in this room/area. Exposed structure, purlins, deck, electrical conduit, fire supression and mechanical systems to be painted. Aluminum ductwork to remain unpainted. See ceiling tag for finish.
         2) Tag F: No ceiling in this room/area. Exposed structure, purlins, deck, electrical conduit, fire supression and mechanical systems to be painted. See ceiling tag for finish. Paint adjacent wall to match to bottom of structure or as otherwise indicated on elevations.
         3) Tag G: No ceiling in this room/area. Paint exposed structural and MEP components as follows: Purlins, deck, electrical conduit, fire suppression and mechanical systems to be painted PT-1. Aluminum ductwork to remain unpainted. Primary structure (main beams/trusses) to be painted PT-2.

D. Do Not Paint or Finish the Following Items:
   1. Items factory-finished unless otherwise indicated; materials and products having factory-applied primers are not considered factory finished.
   2. Items indicated to receive other finishes.
   3. Items indicated to remain unfinished.
   4. Fire rating labels, equipment serial number and capacity labels, bar code labels, and operating parts of equipment.
   5. Acoustical materials, unless specifically indicated.
   6. Concealed pipes, ducts, and conduits.

1.02 RELATED REQUIREMENTS

A. Section 01 6116 - Volatile Organic Compound (VOC) Content Restrictions.

B. Section 07 0553 - Fire and Smoke Assembly Identification.

C. Section 09 9600 - High-Performance Coatings.

1.03 DEFINITIONS

A. Comply with ASTM D16 for interpretation of terms used in this section.

1.04 REFERENCE STANDARDS

A. 40 CFR 59, Subpart D - National Volatile Organic Compound Emission Standards for Architectural Coatings; U.S. Environmental Protection Agency.

B. ASTM D16 - Standard Terminology for Paint, Related Coatings, Materials, and Applications.

C. ASTM D4258 - Standard Practice for Surface Cleaning Concrete for Coating.

D. ASTM D4442 - Standard Test Methods for Direct Moisture Content Measurement of Wood and Wood-Based Materials.

E. MPI (APSM) - Master Painters Institute Architectural Painting Specification Manual.

F. SSPC-SP 1 - Solvent Cleaning.

G. SSPC-SP 2 - Hand Tool Cleaning.

H. SSPC-SP 13/NACE No.6 - Surface Preparation of Concrete.

1.05 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide complete list of products to be used, with the following information for each:
   1. Manufacturer's name, product name and/or catalog number, and general product category (e.g., "alkyd enamel").
   2. Cross-reference to specified paint system products to be used in project; include description of each system.
   3. If proposal of substitutions is allowed under submittal procedures, explanation of substitutions proposed.

C. Samples: Submit four paper "draw down" samples, 8-1/2 by 11 inches in size, illustrating range of colors available for each finishing product specified.
   1. Where sheen is specified, submit samples in only that sheen.
   2. Where sheen is not specified, discuss sheen options with Architect before preparing samples, to eliminate sheens not required.

D. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
   1. See Section 01 6000 - Product Requirements, for additional provisions.
   2. Extra Paint Materials: 1 gallon of each color, unopened and labeled "For Owner Use Only".
   3. Label each container with color in addition to the manufacturer's label.

1.06 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing the products specified, with minimum three years documented experience.

B. Applicator Qualifications: Company specializing in performing the type of work specified with minimum three years experience.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Deliver products to site in sealed and labeled containers; inspect to verify acceptability.

B. Container Label: Include manufacturer's name, type of paint, brand name, lot number, brand code, coverage, surface preparation, drying time, cleanup requirements, color designation, and instructions for mixing and reducing.

C. Paint Materials: Store at minimum ambient temperature of 45 degrees F and a maximum of 90 degrees F, in ventilated area, and as required by manufacturer's instructions.

1.08 FIELD CONDITIONS

A. Do not apply materials when surface and ambient temperatures are outside the temperature ranges required by the paint product manufacturer.

B. Follow manufacturer's recommended procedures for producing best results, including testing of substrates, moisture in substrates, and humidity and temperature limitations.

C. Do not apply materials when relative humidity exceeds 85 percent, at temperatures less than 5 degrees F above the dew point, or to damp or wet surfaces.

D. Minimum Application Temperatures for Paints: 50 degrees F for interiors unless required otherwise by manufacturer's instructions.

E. Provide lighting level of 80 fc measured mid-height at substrate surface.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Provide paints and finishes from the same manufacturer to the greatest extent possible.
   1. If a single manufacturer cannot provide specified products; minor exceptions will be permitted provided approval by Architect is obtained using the specified procedures for substitutions.
   2. Substitution of other products by the same manufacturer is preferred over substitution of products by a different manufacturer.

B. Paints:
   1. Benjamin Moore & Co: www.benjaminmoore.com.
   2. Diamond Vogel Paints: www.diamondvogel.com/#sle.
   3. Pittsburgh Paints: www.pittsburghpaints.com/#sle.
   4. **BASIS OF DESIGN:** Sherwin-Williams Company: www.sherwin-williams.com.

C. Primer Sealers: Same manufacturer as top coats.

D. Substitutions: See Section 01 6000 - Product Requirements.

2.02 PAINTS AND FINISHES - GENERAL

A. Paints and Finishes: Ready-mixed, unless intended to be a field-catalyzed paint.
   1. Provide paints and finishes of a soft paste consistency, capable of being readily and uniformly dispersed to a homogeneous coating, with good flow and brushing properties, and capable of drying or curing free of streaks or sags.
   2. Provide materials that are compatible with one another and the substrates indicated under conditions of service and application, as demonstrated by manufacturer based on testing and field experience.
   3. For opaque finishes, tint each coat including primer coat and intermediate coats, one-half shade lighter than succeeding coat, with final finish coat as base color.
   4. Supply each paint material in quantity required to complete entire project's work from a single production run.
   5. Do not reduce, thin, or dilute paint or finishes or add materials unless such procedure is specifically described in manufacturer's product instructions.

B. Volatile Organic Compound (VOC) Content:
   1. Provide paints and finishes that comply with the most stringent requirements specified in the following:
      a. 40 CFR 59, Subpart D--National Volatile Organic Compound Emission Standards for Architectural Coatings.
      b. Architectural coatings VOC limits of the State in which the Project is located.
   2. Determination of VOC Content: Testing and calculation in accordance with 40 CFR 59, Subpart D (EPA Method 24), exclusive of colorants added to a tint base and water added at project site; or other method acceptable to authorities having jurisdiction.

C. Sheens: Provide the sheens specified; where sheen is not specified, sheen will be selected later by Architect from the manufacturer's full line.

D. Colors: As indicated in Finish Schedule.
   1. Allow for same number of colors indicated in Finish Schedule, plus three additional samples, without additional cost to Owner.
   2. Extend colors to surface edges; colors may change at any edge as directed by Architect.
   3. In finished areas, finish pipes, ducts, conduit, and equipment the same color as the wall/ceiling under which they are mounted.

2.03 PAINT SYSTEMS - INTERIOR

A. Masonry, Opaque, Latex, 3 Coat:
   1. One coat of block filler. Applied to result in a dry film thickness of not less than 8.0 mils.
      a. Benjamin Moore: Benjamin Moore Block Filler 244.
      b. Diamond Vogel: Dia-Pro Acrylic Block Filler.
      c. Sherwin-Williams; B25w25 Preprite Block Filler.
   2. Top Coat: Two coats of latex enamel. Applied to result in a dry film thickness of not less than 1.6 mils per coat.
      a. Sheen: Eggshell.
      b. Benjamin Moore; Super Spec Latex Enamel No. 276.
      c. Diamond Vogel: Assure Interior Latex Enamel.
      d. Sherwin-Williams; Pro-Industrial Acrylic Enamel B66-650 Series.
      e. PPG Paints: Pitt-Glaze WB 16-551.

B. Masonry, Epoxy, 3 Coat:
   1. One coat of block filler. Applied to result in a dry film thickness of not less than 8/0 mils.
      a. Benjamin Moore: Benjamin Moore Block Filler 244.
      b. Diamond Vogel: Dia-Pro Acrylic Block Filler.
      c. PPG Paints; 6-15 SpeedHide Interior/Exterior Masonry Latex Block Filler.
      d. Sherwin-Williams; B25w25 Preprite Block Filler.
   2. Top Coat: Two coats of catalyzed, water-based, low VOC, low-odor epoxy enamel. Applied in a minimum of two coats at spreading rate recommended by manufacturer to achieve a total dry film thickness of 4.0 to 6.0 mils.
      a. Sheen: Satin.
      b. Benjamin Moore Corotech Pre-Catalyzed Waterborne Epoxy Semi-Gloss V341.
      c. Carboline: Sanitile 555 Waterborne epoxy.
      d. Diamond Vogel: Vers-E-Poxy 131 Waterborne Acrylic Epoxy

C. Concrete, Opaque, Latex, 3 Coat:
   1. One coat of latex primer sealer. Applied to result in a dry film thickness of not less than 1.5 mils.
      a. Benjamin Moore; Super Spec Masonry Interior/Exterior Acrylic High Build Masonry Primer N068
      b. Diamond Vogel: OmniPrep Universal Interior Primer.
      c. Sherwin-Williams; Loxon Masonry & Concrete Primer/Sealer A24W8300.
   2. Eggshell: Two coats of latex enamel. Applied to result in a dry film thickness of not less than 1.6 mils per coat.
      a. Benjamin Moore; Super Spec Latex Eggshell Enamel No. 274.
      b. Diamond Vogel: Assure Interior Latex Eggshell Enamel.
      c. Sherwin-Williams; ProMar 200 Interior Latex Eg-Shell Enamel B20W2200 Series.

D. Ferrous Metals, Unprimed, Acrylic, 3 Coat:
   1. One coat of alkyd primer. Applied to result in a dry film thickness of not less than 2.0 mils.
      a. Benjamin Moore; Ultra Spec Acrylic Metal Primer HP04.
      b. Diamond Vogel: Vers-Acryl 300 Acrylic DTM Primer.
      c. Sherwin-Williams; Pro-Cryl Universal Primer B66-310 Series, or B66A50 for very smooth surfaces.
   2. Semi-gloss: Two coats of acrylic enamel. Applied to result in a dry film thickness of not less than 1.7 mil per coat.
      a. Benjamin Moore; Ultra Spec 500 Zero VOC T546.

b. Diamond Vogel: Vers-Acryl 222 Acrylic Semi-Gloss.
c. Sherwin-Williams; Pro Industrial Acrylic Semi-Gloss Enamel B66-50 Series.

E. Ferrous Metals, Primed, Acrylic, 2 Coat:
1. Touch-up with alkyd primer.
2. Semi-gloss: Two coats of acrylic enamel; Applied to result in a dry film thickness of not less than 1.7 mil per coat.
a. Benjamin Moore; Ultra Spec 500 Zero VOC T546.
b. Diamond Vogel: Vers-Acryl 222 Acrylic Semi-Gloss.
c. Sherwin-Williams;Pro Industrial Acrylic Semi-Gloss Enamel B66-650 Series.

F. Ferrous Metals, Primed, Latex, 2 Coat - Sprayed: Exposed structure and ducts
1. Touch-up bare and damaged areas with compatible primer.
2. Flat: Two coats of sprayed dryfall enamel. Applied to result in a dry film thickness of not less than 2.5 mils per coat.
a. Benjamin Moore; Coronado Super Kote 5000 Dryfall Latex Flat.
b. Diamond Vogel: Luminance 300 Latex Dri-Mist Flat.
c. PPG Paints; 6-715XI (white) 6-713XI (black) Speedhide Flat Latex Dry Fog Spray Paint.
d. Sherwin-Williams; Pro Industrial Waterborne Acrylic Dryfall Flat B42 Series.

G. Galvanized Metals, Latex, 3 Coat:
1. One coat galvanize primer. Applied to result in a dry film thickness of not less than 2.0 mils.
a. Benjamin Moore; Ultra Spec Acrylic Metal Primer HP04.
b. Diamond Vogel: Vers-Acryl 300 Acrylic Maintenance Primer/Finish.
c. Sherwin-Williams; Pro-Cryl Universal Primer B66-1300 Series.
2. Semi-gloss: Two coats of low-odor zero-VOC acrylic enamel[<>]. Applied to result in a dry film thickness of not less than 1.5 mils per coat.
a. Benjamin Moore; Ultra Spec 500 Zero VOC T546.
b. Diamond Vogel: Vers-Acryl 222 Acrylic Semi-Gloss.
c. Sherwin Williams; Pro Industrial Acrylic Semi-Gloss Enamel B66-650 Series.

H. Gypsum Board/Plaster, Latex, 3 Coat: Walls and ceilings scheduled for painting, except those to receive epoxy or high performance coatings:
1. One coat of Zero-VOC latex primer sealer.
a. Benjamin Moore; EcoSpec Primer 372.
b. Diamond Vogel: Zero Plus Interior Zero VOC Latex Primer/Sealer.
c. Sherwin Williams; ProMar 200 Zero VOC Primer.
2. Eggshell (walls): Two coats of latex enamel. Applied to result in a dry film thickness of not less than 1.5 mils per coat.
a. Benjamin Moore; Ultra Spec 500 Zero VOC.
b. Diamond Vogel: Zero Plus Interior Zero VOC Latex Enamel.
c. Sherwin Williams; ProMar 200 Zero.
3. Flat (ceilings): Two coats of low-VOC, low-odor latex enamel. Applied to result in a dry film thickness of not less than 1.6 mils per coat.
a. Benjamin Moore; Ultra Spec 500 Zero VOC.
b. Diamond Vogel: Zero Plus Interior Zero VOCEnamel.
c. Sherwin-Williams; Pro Mar 200 Zero .
4. For walls receiving custom printed films, and vinyl or wood wallcoverings, coordinate primer and finish coats with film manufacturer and installer.

I. Gypsum Board/Plaster, Epoxy 3 Coat:
1. Locations: all restrooms walls, and any other rooms indicated for epoxy paint.
2. One coat of compatible primer sealer. Applied to result in a dry film thickness of not less than 1.5 mils.
3. Satin: Two coats of catalyzed, water-based, low V.O.C., low-odor epoxy enamel. applied in a minimum of two coats at spreading rate recommended by manufacturer to achieve a total dry film thickness of 4.0 to 6.0 mils.

a. Benjamin Moore: Corotech WB Amine Epoxy V440 Gloss.
b. Carboline: Sanitile 555 Waterborne epoxy.
c. Diamond Vogel: Vers-E-Poxy 131 Waterborne Acrylic Epoxy.
d. S-W: Pro Industrial Water Based Catalyzed Epoxy, B73-360 Series.

2.04 ACCESSORY MATERIALS

A. Accessory Materials: Provide primers, sealers, cleaning agents, cleaning cloths, sanding materials, and clean-up materials as required for final completion of painted surfaces and to achieve the finishes specified whether specifically indicated or not; commercial quality

B. Patching Material: Latex filler.

C. Fastener Head Cover Material: Latex filler.

PART 3 EXECUTION

3.01 EXAMINATION

A. Do not begin application of paints and finishes until substrates have been adequately prepared.

B. Verify that surfaces are ready to receive work as instructed by the product manufacturer.

C. Examine surfaces scheduled to be finished prior to commencement of work. Report any condition that may potentially affect proper application.

D. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

E. Test shop-applied primer for compatibility with subsequent cover materials.

F. Measure moisture content of surfaces using an electronic moisture meter. Do not apply finishes unless moisture content of surfaces is below the following maximums:
1. Gypsum Wallboard: 12 percent.
2. Masonry, Concrete, and Concrete Masonry Units: 12 percent.
3. Interior Wood: 15 percent, measured in accordance with ASTM D4442.

3.02 PREPARATION

A. Clean surfaces thoroughly and correct defects prior to application.

B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

C. Remove or repair existing paints or finishes that exhibit surface defects.

D. Remove or mask surface appurtenances, including electrical plates, hardware, light fixture trim, escutcheons, and fittings, prior to preparing surfaces or finishing.

E. Seal surfaces that might cause bleed through or staining of topcoat.

F. Remove mildew from impervious surfaces by scrubbing with solution of tetra-sodium phosphate and bleach. Rinse with clean water and allow surface to dry.

G. Concrete:
1. Clean concrete according to ASTM D4258. Allow to dry.
2. Prepare surface as recommended by top coat manufacturer and in accordance with SSPC-SP 13/NACE No.6.

H. Masonry:
1. Remove efflorescence and chalk. Do not coat surfaces if moisture content, alkalinity of surfaces, or if alkalinity of mortar joints exceed that permitted in manufacturer's written instructions. Allow to dry.
2. Prepare surface as recommended by top coat manufacturer.

I. Gypsum Board: Fill minor defects with filler compound. Spot prime defects after repair.

J. Galvanized Surfaces:
1. Remove surface contamination and oils and wash with solvent according to SSPC-SP 1.

2. Prepare surface according to SSPC-SP 2.

K. Ferrous Metal:
1. Solvent clean according to SSPC-SP 1.
2. Shop-Primed Surfaces: Sand and scrape to remove loose primer and rust. Feather edges to make touch-up patches inconspicuous. Clean surfaces with solvent. Prime bare steel surfaces.
3. Remove rust, loose mill scale, and other foreign substances using methods recommended in writing by paint manufacturer and blast cleaning according to SSPC-SP 6 "Commercial Blast Cleaning". Protect from corrosion until coated.
4. At structure to receive Dryfall mask structural elements as noted in drawings.

L. Wood Surfaces to Receive Opaque Finish: Wipe off dust and grit prior to priming. Seal knots, pitch streaks, and sappy sections with sealer. Fill nail holes and cracks after primer has dried; sand between coats. Back prime concealed surfaces before installation.

M. Metal Doors to be Painted: Prime metal door top and bottom edge surfaces.

3.03 APPLICATION

A. Remove unfinished louvers, grilles, covers, and access panels on mechanical and electrical components and paint separately.

B. Apply products in accordance with manufacturer's written instructions and recommendations in "MPI Architectural Painting Specification Manual".

C. Where adjacent sealant is to be painted, do not apply finish coats until sealant is applied.

D. Do not apply finishes to surfaces that are not dry. Allow applied coats to dry before next coat is applied. When manufacturer does not specify, allow 24 hours for interior paint and 48 hours for exterior paint to dry.

E. Apply each coat to uniform appearance in thicknesses specified by manufacturer.

F. Dark Colors and Deep Clear Colors: Regardless of number of coats specified, apply as many coats as necessary for complete hide.

G. Sand wood and metal surfaces lightly between coats to achieve required finish.

H. Vacuum clean surfaces of loose particles. Use tack cloth to remove dust and particles just prior to applying next coat.

I. Reinstall electrical cover plates, hardware, light fixture trim, escutcheons, and fittings removed prior to finishing.

3.04 CLEANING

A. Collect waste material that could constitute a fire hazard, place in closed metal containers, and remove daily from site.

3.05 PROTECTION

A. Protect finishes until completion of project.

B. Touch-up damaged finishes after Substantial Completion.

3.06 COLOR SCHEDULE

A. As indicated in Finish Schedule.

END OF SECTION

SECTION 09 9600
HIGH-PERFORMANCE COATINGS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. High performance coatings, used at:
   1. Exterior exposed steel components, indicated to receive "HPC".

B. Surface preparation and cleaning, including but not limited to degreasing, profiling, washing, and rinsing.

1.02 RELATED REQUIREMENTS

A. Section 09 9123 - Interior Painting: Requirements for mechanical and electrical equipment surfaces.

1.03 REFERENCE STANDARDS

A. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products; 2017.

B. ASTM A780/A780M - Standard Practice for Repair of Damaged and Uncoated Areas of Hot-Dip Galvanized Coatings; 2009 (2015).

C. ASTM D6386 - Standard Practice for Preparation of Zinc (Hot-Dip Galvanized) Coated Iron and Steel Product and Hardware Surfaces for Painting; 2016a.

D. ASTM E376 - Standard Practice for Measuring Coating Thickness by Magnetic-Field or Eddy Current (Electromagnetic) Testing Methods; 2017.

1.04 ADMINISTRATIVE REQUIREMENTS

A. Coordination: Coordinate the application of shop-applied primer and hot-dip galvanized coating with fabrication of structural steel assemblies and steel stairs.

1.05 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements for submittal procedures.

B. Product Data: Provide complete list of all products to be used, with the following information for each:
   1. Manufacturer's name, product name, and catalog number, and general product category.
   2. Cross-reference to specified coating system product is to be used in; include description of each system.
   3. Manufacturer's installation instructions.

C. Samples: Submit two samples 8 by 8 inch in size illustrating colors available for selection.

D. Manufacturer's Installation Instructions: Indicate special procedures and perimeter conditions requiring special attention.

E. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.

F. Maintenance Data: Include cleaning procedures and repair and patching techniques.

G. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
   1. See Section 01 6000 - Product Requirements, for quantities and additional provisions.
   2. Extra Paint Materials: 1 gallon of each color, unopened and labeled "For Owner Use Only".
   3. Label each container with manufacturer's name, product number, color number, and applications where used.

1.06 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing the Products specified in this Section with minimum 5 years documented experience.

B. Applicator Qualifications: Company specializing in performing the Work of this Section with minimum 5 years documented experience.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Deliver products to site in sealed and labeled containers; inspect to verify acceptability.

B. Container Label: Include manufacturer's name, type of coating, brand name, lot number, brand code, coverage, surface preparation, drying time, cleanup requirements, color designation, and instructions for mixing and reducing.

C. Coating Materials: Store at minimum ambient temperature of 45 degrees F and a maximum of 90 degrees F, in ventilated area, and as required by manufacturer's instructions.

1.08 FIELD CONDITIONS

A. Follow manufacturer's recommended procedures for producing best results, including testing of substrates and humidity / temperature limitations.

B. Do not apply coatings during rain or snow, or when relative humidity is outside the humidity ranges required by the coating product manufacturer. Do not install materials when temperature is below 55 degrees F or above 90 degrees F. Maintain this temperature range, 24 hours before, during, and 72 hours after installation of coating.

C. Restrict traffic from area where coating is being applied or is curing.

1.09 WARRANTY

A. Correct defective Work within a one year period after Date of Substantial Completion. Include coverage for bond to substrate and degradation due to UV exposure.

B. Provide 5-year manufacturer warranty including coverage for product replacement.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Provide high-performance coating products from the same manufacturer.

B. High-Performance Coating System:
1. Carboline Company: www.carboline.com.
2. PPG Paints: www.ppgpaints.com/#sle.
3. Sherwin-Williams Company: www.protective.sherwin-williams.com/industries/#sle.
4. Tnemec Company, Inc.: www.tnemec.com.
5. Substitutions: Section 01 6000 - Product Requirements.

2.02 HIGH-PERFORMANCE COATING MATERIALS

A. General: Provide complete multi-coat high-performance coating systems formulated and recommended by manufacturer for the applications indicated, in the thicknesses required.
1. Colors: As selected by Architect from full range of manufacturer's colors.

B. Basis of Design High-Performance Coating System Over Exterior Exposed-to-View Non-Galvanized Steel (with shop-applied primer coat only):
1. Specified thicknesses are minimum.
2. Prime Coat: Tnemec Series 90-97 Tneme-Zinc, applied at 3 dry mils thickness.
3. Intermediate Coat: Tnemec Series 73 Endurashield, applied at 3 dry mils thickness.
4. Finish Coat: Tnemec Series 1071 (Semi-Gloss) Fluoronar, applied at 2.5 dry mils thickness.

C. Basis of Design High-Performance Coating System Over Exterior Exposed-to-View Hot-Dip Galvanized Steel (conforming to ASTM A123/A123M):
1. Specified thicknesses are minimum.
2. Base Coat: Tnemec Series 66 Hi-Build Epoxoline, applied at 3 dry mils thickness.
3. Intermediate Coat: Tnemec Series 66 Hi-Build Epoxoline, applied at 3 dry mils thickness.
4. Finish Coat: Tnemec Series 1071 (Semi-Gloss) Fluoronar, applied at 2.5 dry mils thickness.

2.03 ACCESSORY MATERIALS

A. Provide primers, sealers, cleaning agents, cleaning cloths, sanding materials, and clean-up materials as required to achieve the finishes specified, whether specifically indicated or not; commercial quality.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify existing conditions before starting Work.

B. Do not begin application of coating system until substrates have been properly prepared.

C. Verify that substrate surfaces are ready to receive work as instructed by the coating manufacturer. Obtain and follow manufacturer's instructions for examination and testing of substrates.

D. Examine surfaces scheduled to be finished prior to commencement of Work. Report any condition that may potentially affect proper application.

E. Primed Surfaces: Test primer for compatibility with subsequent cover materials.

F. Galvanized Surfaces: Determine the condition of the galvanized surface as newly galvanized, partially weathered, or fully weathered. Level of surface preparation required will depend on the condition of the galvanized coating.

3.02 PREPARATION AND CLEANING PRIOR TO COATING

A. Protect adjacent surfaces and materials not receiving coating from spatter and overspray; mask if necessary to provide adequate protection. Repair damage.

B. General: Clean surfaces of loose foreign matter. Remove substances that would bleed through finished coatings. Remove finish hardware, fixture covers, and accessories and store for reinstallation following coating application.

C. Primed Steel Surfaces:
   1. Sand and scrape to remove loose primer and rust. Feather edges to make touch-up patches inconspicuous. Clean surfaces with solvent.
   2. Remove rust, loose mill scale, and other foreign substances using methods recommended in writing by paint manufacturer and power tools according to SSPC-SP 11 "Power Tool Cleaning to Bare Metal", and protect from corrosion until coated.
   3. Remove tight rust and other foreign substances using "near-white blast cleaning" according to SSPC-SP10, and protect from corrosion until coated.

D. Galvanized Steel Surfaces, General: Preparation steps applicable to all exposure levels.
   1. Prepare surface according to SSPC-SP 2 to produce clean, lightly etched surfaces that promote adhesion of subsequently applied coatings. Remove high spots, bumps, runs, and drips of zinc or dross particles until surface is level and smooth with the surrounding area, without removing the base coating.
   2. Repair galvanized surfaces damaged by welding, flame cutting, or during handling, transport, erection, or surface preparation by one of the approved methods in accordance with ASTM A780, whenever damage exceeds 3/16 inch in width.
   3. Rinse cleaned surfaces with fresh potable water and allow to dry. Begin application of coating system within 24 hours.
   4. After cleaning, the surface shall be inspected for conformance to the required zinc thickness in accordance with ASTM A123/A123M utilizing a magnetic-field-type thickness instrument in accordance with ASTM E376. Galvanized surfaces falling below the required zinc thickness, before or after removal of any high spots, shall be repaired in accordance with ASTM A780.

E. Newly Galvanized Steel Surfaces: Exposed to atmosphere less than 48 hours. Do the following steps of preparation, in addition to "General" preparation steps above.
   1. Abrasive sweep or brush blast using a rapid nozzle movement to roughen the galvanized surface profile in accordance with ASTM D6386. The abrasive material must be chosen with care to provide a stripping action without removing excess zinc layers.
   2. Following abrasive blast cleaning, surfaces should be blown down with clean, compressed air.

F. Partially Weathered Galvanized Steel Surfaces: Exposed to atmosphere more than 48 hours up to one year. Do the following steps of preparation, in addition to "General" preparation steps above.
   1. Remove surface organic contamination and oils and wash with solvent according to SSPC-SP 1.

2. Abrasive sweep or brush blast using a rapid nozzle movement to roughen the galvanized surface profile in accordance with ASTM D6386. The abrasive material must be chosen with care to provide a stripping action without removing excess zinc layers.
3. Following abrasive blast cleaning, surfaces should be blown down with clean, compressed air.

G. Fully Weathered Galvanized Steel Surfaces: Exposed to atmosphere more than one year. Do the following steps of preparation, in addition to "General" preparation steps above.
1. Remove surface organic contamination and oils and wash with solvent according to SSPC-SP 1.
2. Abrasive sweep or brush blast using a rapid nozzle movement to roughen the galvanized surface profile in accordance with ASTM D6386. The abrasive material must be chosen with care to provide a stripping action without removing excess zinc layers.
3. Following abrasive blast cleaning, surfaces should be blown down with clean, compressed air.

3.03 HIGH-PERFORMANCE COATING APPLICATION

A. Apply coating system in accordance with manufacturer's written instructions, to minimum thicknesses specified.

B. Apply in uniform thickness coats, without runs, drips, pinholes, brush marks, or variations in color, texture, or finish. Finish edges, crevices, corners, and other changes in dimension with full coating thickness.

3.04 CLEANING AFTER COATING

A. Collect waste material that could constitute a fire hazard, place in closed metal containers, and remove daily from site.

B. Clean surfaces immediately of overspray, splatter, and excess material.

C. After coating has cured, clean and replace finish hardware, fixtures, and fittings previously removed.

3.05 PROTECTION

A. Protect finished Work from damage.

END OF SECTION

SECTION 10 1100
VISUAL DISPLAY UNITS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Markerboards (MB1).

B. Bulletin board cabinets (TB1).

C. Horizontal Sliding Display Case (VDC1).

D. Hardware and Accessories.

1.02 RELATED REQUIREMENTS

A. Section 06 1000 - Rough Carpentry: Blocking and supports.

B. Section 09 2116 - Gypsum Board Assemblies: Concealed supports in metal stud walls.

1.03 REFERENCE STANDARDS

A. ANSI A135.4 - Basic Hardboard.

B. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials.

1.04 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide manufacturer's data on markerboard, bulletin board cabinet, display case, trim and accessories.

C. Shop Drawings: Indicate wall elevations, dimensions, joint locations , special anchor details.

D. Samples: Submit two samples 6 by 6 inch in size illustrating materials and finish, color and texture of markerboard, trim, and tackable surfaces.

E. Maintenance Data: Include data on regular cleaning, stain removal.

1.05 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum five years documented experience.

1.06 PROJECT CONDITIONS

A. Field measure prior to preparation of Shop rawings and fabrication to ensure proper fit.

B. Comply with manufacturer's recommendations for acclimating area for interior moisture and temperature to approximate normal occupied conditions.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Schedule delivery of visual display boards with spaces sufficiently complete so that visual display boards can be installed upon delivery.

1.08 WARRANTY

A. See Section 01 7800 - Closeout Submittals, for additional warranty requirements.

B. Provide ten warranty for markerboard to include warranty against discoloration due to cleaning, crazing or cracking, and staining.

PART 2 PRODUCTS

2.01 VISUAL DISPLAY UNITS

A. Markerboards: Porcelain enamel on steel, laminated to core.
   1. Manufacturers:
      a. **BASIS OF DESIGN:** Claridge Products and Equipment, Inc; Series 2: www.claridgeproducts.com/#sle.
      b. Substitutions: See Section 01 6000 - Product Requirements.
   2. Face Color: As indicated in Finish Schedule.

3. Core: medium density fiberboard, 7/16 inch thick, laminated to face sheet.
4. Backing: Galvanized steel sheet, laminated to core.
5. Size: As indicated on Drawings.
6. Frame: Extruded aluminum, with concealed fasteners.
7. Frame Finish: as indicated in Finish Schedule.
8. Accessories: Provide tackstrip, plus the following:
    a. Concealed mounting brackets and connector kits.

B. Bulletin Board Cabinets: Factory-fabricated aluminum-framed unit with tackable panel on back inside surface and glazed doors at front.
1. Manufacturers:
    a. **BASIS OF DESIGN:** Claridge Products and Equipment, Inc; Imperial Bulletin Board Cabinet: www.claridgeproducts.com/#sle.
    b. Substitutions: See Section 01 6000 - Product Requirements.
2. Location: Interior.
3. Mounting: Surface mounted.
4. Size: as indicated in Finish Schedule.
5. Aluminum Frames: Extruded aluminum, with concealed fasteners. Finish as indicated on Finish Schedule.
6. Components:
    a. Glazed Doors: Sliding, tempered glass.

C. Horizontal Sliding Display Case: Cabinet with horizontal sliding glazed doors at front and glass shelves.
1. Manufacturers:
    a. **BASIS OF DESIGN:** Claridge Products and Equipment, Inc; 370 Series Recessed Display Case: www.claridgeproducts.com/#sle.
    b. Substitutions: See Section 01 6000 - Product Requirements.
2. Cabinet:
    a. Mounting: Recessed.
    b. Size: As indicated on drawings.
    c. Frame: Extruded aluminum, with concealed fasteners.
    d. Frame Finish: as indicated in Finish Schedule.
3. Components:
    a. Glazed Doors: Sliding, tempered glass with lock and key.
    b. Tackable Back Panel: as indicated in Finish Schedule.
    c. Glass shelves with standard and brackets: as indicated on drawings or manufacturer's standard.

2.02 MATERIALS

A. Hardboard for Cores: ANSI A135.4, Class 1 - Tempered, S2S (smooth two sides).

B. Steel Sheet Backing: 28 gauge, 0.0149 inch, galvanized.

2.03 ACCESSORIES

A. Temporary Protective Cover: Sheet polyethylene, 8 mil thick.

B. Mounting Brackets: Concealed.

PART 3 EXECUTION

3.01 EXAMINATION

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

B. Verify that internal wall blocking is ready to receive work and positioning dimensions are as indicated on shop drawings, and as required for owner-provided boards.

3.02 PREPARATION

A. Acclimate surfaces by removing from packaging in installation area not less than 24 hours before application.

B. Remove switchplates, wall plates, and surface-mounted fixtures where tackable wall paneling is applied. Reinstall items on completion of installation.

C. 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 boards in accordance with manufacturer's instructions.

B. Secure units level and plumb, and at the height indicated.

C. Butt Joints: Install with tight hairline joints.

D. Install tackable wall panels in accordance with manufacturer's recommendations on specified substrates with concealed attachments.

3.04 CLEANING AND PROTECTION

A. Clean board surfaces in accordance with manufacturer's instructions.

B. Cover with protective cover, taped to frame. Protect installed markerboards from damage during construction.

C. Remove temporary protective cover at Date of Substantial Completion.

END OF SECTION

SECTION 10 2113.19
PLASTIC TOILET COMPARTMENTS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Solid plastic toilet compartments (TP-1).

1.02 RELATED REQUIREMENTS

A. Section 06 1000 - Rough Carpentry: Blocking and supports.

B. Section 10 2800 - Toilet Accessories.

1.03 REFERENCE STANDARDS

A. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials.

B. ICC A117.1 - Accessible and Usable Buildings and Facilities; 2017.

C. NFPA 286 - Standard Methods of Fire Tests for Evaluating Contribution of Wall and Ceiling Interior Finish to Room Fire Growth.

1.04 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements for submittal procedures.

B. Product Data: Provide data on panel construction, hardware, and accessories.

C. Shop Drawings:
   1. Include plans, elevations, sections, details, and attachment details.
   2. Show locations of cutouts for compartment-mounted toilet accessories.
   3. Show location of centerlines of toilet fixtures.
   4. Show locations of floor drains.
   5. Show ceiling grid, ceiling mounted items, and overhead support or bracing locations.

D. Samples: For the following products, in manufacturer's standard sizes unless otherwise indicated:
   1. Each type of material, color, finish required for toilet compartments, prepared on 6 inch square. Samples of same thickness and material indicated for work.
   2. Include each type of hardware and accessory.

1.05 DELIVERY, STORAGE, AND HANDLING

A. See Section 01 7419 - Construction Waste Management and Disposal for packaging waste requirements.

B. Deliver, store, and handle materials and products in accordance with manufacturer's instructions and recommendations and industry standards.

C. Do not deliver materials or begin installation until building is enclosed, with complete protection from outside weather, and building temperature maintained at minimum of 60 degrees F.

D. Store products indoors in manufacturer's or fabricator's original containers and packaging, with labels clearly identifying product name and manufacturer. Protect products from damage.

E. Lay cartons flat; support to ensure flatness and prevent damage to prefinished surfaces.

F. Do not store where ambient temperature exceeds 120 degrees F.

1.06 FIELD CONDITIONS

A. Ambient Conditions: Maintain environmental conditions, such as temperature, humidity, and ventilation, within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's absolute limits.

1.07 WARRANTY

A. See Section 01 7800 - Closeout Submittals for additional warranty requirements.

B. Manufacturer Warranty: Provide 25-year manufacturer warranty for material against breakage, corrosion, and delamination. Complete forms in Owner's name and register with manufacturer.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Solid Plastic Toilet Compartments:
   1. All American Metal Corp - AAMCO: www.allamericanmetal.com/#sle.
   2. ASI Accurate Partitions: www.asi-accuratepartitions.com/#sle.
   3. **BASIS OF DESIGN:** ASI Global Partitions; HDPE Global Partitions: www.asi-globalpartitions.com/#sle.
   4. Hadrian: www.hadrian-inc.com/#sle.
   5. Metpar Corp: www.metpar.com/#sle.
   6. Partition Systems International of South Carolina: www.psisc.com/#sle.
   7. Scranton Products: www.scrantonproducts.com/#sle.
   8. Substitutions: Section 01 6000 - Product Requirements.

2.02 SOLID PLASTIC TOILET COMPARTMENTS

A. General Description: Factory-fabricated doors, pilasters, and divider panels made of solid, molded, high-density polyethylene (HDPE); floor-mounted, headrail-braced.

B. Color/ Texture: as indicated in Finish Schedule.

C. Doors:
   1. Thickness: 1 inch.
   2. Width: 24 inches.
   3. Width for Ambulatory and Handicapped Use: minimum door clearance of 32 inches.
   4. Height: 55 inches.
   5. Shiplap cut edges on partiton to remove sightlines.

D. Panels:
   1. Thickness: 1 inch.
   2. Height: 55 inches.
   3. Depth: As indicated on drawings.

E. Pilasters:
   1. Thickness: 1 inch.
   2. Width: As required to fit space; minimum 3 inches.

F. Urinal Screens: Without doors; to match compartments; mounted to wall with two continuous panel brackets.

2.03 FABRICATION

A. Fabricate toilet compartment components to sizes indicated in shop drawings.

B. Coordinate requirements and provide cutouts for through-partition toilet accessories.

C. Provide shoes and caps at pilasters and posts to conceal anchorage, supports, and leveling mechanisms.

D. Provide manufacturer's standard corrosion-resistant supports, leveling mechanisms, anchors, and anchoring assemblies for pilasters and posts.

E. Floor-Anchored, Overhead-Braced Units: Provide supports, leveling mechanisms, and anchors at pilasters to suit floor conditions.

2.04 MATERIALS

A. Aluminum Castings: ASTM B26/B26M.

B. Aluminum Extrusions: ASTM B221 (ASTM B221M).

C. High-Density Polyethylene (HDPE):
   1. Composition: Formed from waterproof, nonabsorbent, HDPE resins.
   2. Properties: Mark-resistant, self-lubricating surface.
   3. Material Fire Ratings: ICC (IBC), Class B.

D. Stainless Steel Sheet, Plate, and Bar: ASTM A240/A240M or ASTM A666/A666M, Type 304, stretcher-leveled standard of flatness.

E. Stainless Steel Castings: ASTM A743/A743M.

2.05 ACCESSORIES

A. Pilaster Shoes: Stainless steel, satin finish, 3 inches high; concealing floor fastenings.
   1. Provide adjustment for floor variations with screw jack through steel saddles integral with pilaster.

B. Headrails: Extruded aluminum, anti-grip profile.
   1. Size: Manufacturer's standard size.

C. Wall and Pilaster Brackets: Stainless steel; continuous type.

D. Attachments, Screws, and Bolts: Stainless steel, tamper-proof type.
   1. Bracket Attachment to Panels and Pilasters: Through-bolts and nuts; tamper proof.
   2. Wood Blocking and Supports: See Section 06 1000.

E. Hinges: Stainless steel, manufacturer's standard finish.
   1. Continuous-type hinge, self-closing. Allow emergency access by lifting door.

F. Door Hardware: Stainless steel, manufacturer's standard finish.
   1. Door Latch: and occupancy indicator.
   2. Door Strike and Keeper with Rubber Bumper: Mount on pilaster in alignment with door latch.
   3. Provide door pull for outswinging doors.
   4. Provide outswinging doors with second door pull and door stop

G. Coat Hook with Rubber Bumper: One per compartment, mounted on door.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify dimensions, tolerances, and interfaces with other work.

B. Verify spacing of and between plumbing fixtures.

C. Verify location of built-in framing, anchorage, and bracing.

3.02 INSTALLATION

A. Install partitions secure, rigid, plumb, and level in accordance with manufacturer's written instructions.

B. Maintain 3/8-to-1/2-inch space between wall and panels and between wall and end pilasters.

C. Attach panel brackets securely to walls using anchor devices.

D. Attach panels and pilasters to brackets.

E. Overhead-Braced Unit: Secure pilasters to floor and level, plumn, and tighten. Set pilasters with anchors penetrating not less than 1-3/4 inches into structural floor unless otherwise indicated in manufacturers written instructions. Secure conitnuous head rail to each pilaster with no fewer than two fasteners. Hang doors to align tops of doors with tops of panels and adjust, so tops of doors are parallel with overhead brace when doors are in closed position.

F. Urinal Screens: Attach with anchoring devices to suit supporting structure. Set units level and plumb, rigid, and secured to resisit lateral impact.

G. Replace damaged or scratched materials with new materials. Do not touch up scratches or damaged finish in field.

3.03 TOLERANCES

A. Maximum Variation from True Position: 1/4 inch.

B. Maximum Variation from Plumb: 1/8 inch.

3.04 ADJUSTING

A. Adjust and align hardware to uniform clearance at vertical edge of doors, not exceeding 3/16 inch.

B. Adjust and lubricate hardware according to hardware manufacturer's written instruction for proper operation.

C. Adjust hinges to position doors 30 degress from closed position when unlatched. Return out-swinging doors to closed position.

D. Adjust adjacent components for consistency of line or plane.

END OF SECTION

SECTION 10 2600
WALL AND DOOR PROTECTION

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Corner guards (CG-#).

B. Protective wall panels (WP-#).

1.02 RELATED REQUIREMENTS

A. Section 06 1000 - Rough Carpentry: Blocking for wall and corner guard anchors.

B. Section 09 2116 - Gypsum Board Assemblies: Placement of supports in stud wall construction.

C. Section 09 6500 - Resilient Base; coordination with base height.

1.03 REFERENCE STANDARDS

A. ASTM D256 - Standard Test Methods for Determining the Izod Pendulum Impact Resistance of Plastics.

B. ASTM D543 - Standard Practices for Evaluating the Resistance of Plastics to Chemical Reagents.

C. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials.

D. ASTM E119 - Standard Test Methods for Fire Tests of Building Construction and Materials.

E. ASTM F476 - Standard Test Methods for Security of Swinging Door Assemblies.

F. ASTM G21 - Standard Practice for Determining Resistance of Synthetic Polymeric Materials to Fungi.

1.04 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements for submittal procedures.

B. Product Data: Indicate physical dimensions, features, and anchorage details.

C. Shop Drawings: Include plans, elevation, sections, and attachment details.

D. Samples: Submit samples illustrating component design, configurations, joinery, color and finish.
   1. Submit two sections of corner guards, 8 inches long.
   2. Submit two samples of protective wall covering, 6 by 6 inches square.

E. Maintenance Data: Manufacturer's instructions for care and cleaning of each type of product. Include information about both recommended and potentially detrimental cleaning materials and methods.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Deliver wall and door protection items in original, undamaged protective packaging. Label items to designate installation locations.

B. Protect work from moisture damage.

C. Protect work from UV light damage.

D. Do not deliver products to project site until areas for storage and installation are fully enclosed, and interior temperature and humidity are in compliance with manufacturer's recommendations for each type of item.

E. Store products in either horizontal or vertical position, in compliance with manufacturer's instructions.

1.06 WARRANTY

A. See Section 01 7800 - Closeout Submittals for additional warranty requirements.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Provide Basis of Design manufacturers listed in the Finish Schedule in the Drawings, or a standard or custom product from one of the other listed manufacturers with equivalent performance, material properties, features, general configuration, appearance, and warranty.

2.02 PERFORMANCE CRITERIA

A. Surface Burning Characteristics: Flame spread/Smoke developed index of 25/50, maximum, when tested in accordance with ASTM E84.

B. Impact Strength: Unless otherwise noted, provide protection products and assemblies that have been successfully tested for compliance with applicable provisions of ASTM D256 and/or ASTM F476.

C. Chemical and Stain Resistance: Unless otherwise noted, provide protection products and assemblies with chemical and stain resistance complying with applicable provisions of ASTM D543.

D. Fungal Resistance: Unless otherwise noted, provide protection products and assemblies which pass ASTM G21 testing.

2.03 PRODUCT TYPES

A. Corner Guards - Surface Mounted:
   1. Material: High impact vinyl.
   2. Performance: Resist lateral impact force of 100 lbs at any point without damage or permanent set.
   3. Fire Resistance: Where fire rating is specified for the wall in which the guard is mounted, provide assemblies that have been tested in accordance with ASTM E119 for the same rating as the wall.
   4. Surface Burning Characteristics: Provide assemblies with flame spread index of 25 or less and smoke developed index of 450 or less, when tested in accordance with ASTM E84.
   5. Mounting: Adhesive.
   6. Width of Wings: 1-1/2 inches.
   7. Corner: Square, typical. Verify any special angles required with drawings.
   8. Color: As indicated in Finish Schedule.
   9. Length: As indicated in Finish Schedule
   10. Basis of Design Product: InPro Tape-On Corner Guards or approved equal

B. Protective Wall Panels:
   1. Thickness: as indicated in Finish Schedule.
   2. Surface Burning Characteristics: Provide assemblies with flame spread index of 25 or less and smoke developed index of 450, when tested in accordance with ASTM E84.
   3. Color and Pattern: as indicated in Finish Schedule.
   4. Accessories: Provide manufacturer's standard trim and moldings in color as indicated on Finish Schedule.
      a. Vertical joints: none, provide matching color-matched sealant per manufacturers installation instructions.
   5. Mounting: Adhesive.
   6. Product: Koroseal; Koroguard Wall Protection or approved equal.

C. Adhesives and Primers: As recommended by manufacturer.

D. Mounting Brackets and Attachment Hardware: Appropriate to component and substrate.

E. Substrate Filler: As recommended by adhesive and wall covering manufacturers; compatible with substrate.

F. Substrate Primer and Sealer: Alkyd enamel type.

G. Sealant: sanitary type, color to match panel.

H. See Section 06 1000 for wood blocking for wall and corner guard anchors.

I. See Section 09 2116 for supports in stud wall construction.

2.04 FABRICATION

A. Fabricate components with tight joints, corners and seams.

B. Pre-drill holes for attachment.

C. Form end trim closure by capping and finishing smooth.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that rough openings, concealed blocking, and anchors are correctly sized and located.

B. Verify that field measurements are as indicated on drawings.

C. Verify that substrate surfaces for adhered items are clean and smooth.
   1. Test painted or wall covering surfaces for adhesion in inconspicuous area, as recommended by manufacturer. Follow adhesive manufacturer's recommendations for remedial measures at locations and/or application conditions where adhesion test's results are unsatisfactory.

D. Start of installation constitutes acceptance of project conditions.

3.02 PREPARATION

A. Acclimate product in temperatures between 65°F and 80°F and a humidity level less than 80% 24 hours in advance of installation.

B. The area of installation must temperature and humidity controlled for at least 48 hours after installation.

C. Prepare substrates according to manufacturer's recommendations.

3.03 INSTALLATION

A. Install components in accordance with manufacturer's instructions, level and plumb, secured rigidly in position to supporting construction.

B. Position protection components at elevations as indicated in drawings.

C. Position protective wall covering at the elevation indicated and scribe to base elevation as required for floor level variation.
   1. Full-Height Installation: Establish a plumb line located at edge of starting point of first sheet to ensure following sheets will be installed plumb.
   2. Wainscot Installation: Establish a level line at the specified height for entire length of run. Install by aligning top of edge of covering with this line.
   3. Install wall covering before installation of bases and items attached to or spaced slightly from wall surface.
   4. Do not seam within 2 inches (50 mm) of internal corners or within 6 inches (150 mm) of external corners.
   5. All moldings must provide for a minimum 1/8 inch expansion joint to insure proper installation
   6. Razor trim edges on flat work table. Do not razor cut on gypsum board surfaces.
   7. Apply adhesive with 1/8 inch V-notch trowel to an area of wall surface that can be completed within cure time of the adhesive.
      a. Apply adhesive to wall surface immediately prior to application of wall covering. Let contact adhesive set tack free.
   8. Apply wall covering smooth, without wrinkles, gaps or overlaps. Eliminate air pockets and ensure full bond to substrate surface. Butt edges tightly.
   9. Install trim pieces as required for a complete installation. Allow tolerance for thermal movement.
   10. At joints indicated to be caulked, allow for a minimum 1/16 inch wide gap between edges of sheets. Gaps are required to be of consistent width throughout the project.
      a. Seal all joints between sheets and exposed edges in accordance with manufacturer’s instructions and Section 07 92 00 using wet area sealant.
   11. Use a roller to ensure maximum contact with adhesive.
   12. At outside corners cut covering sheets to facilitate installation of trim pieces or corner guards.
   13. Remove excess adhesive while wet from seam before proceeding to next wall protection sheet. Wipe clean with dry cloth.

3.04 TOLERANCES

A. Maximum Variation From Required Height: 1/4 inch.

B. Maximum Variation From Level or Plane For Visible Length: 1/4 inch.

3.05 CLEANING

A. Clean wall and door protection items of excess adhesive, dust, dirt, and other contaminants.

END OF SECTION

SECTION 10 2800
TOILET ACCESSORIES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Commercial toilet accessories, including but not limited to:
   1. Framed Mirror
   2. Grab Bars - Standard Duty
   3. Sanitary Napkin Disposal Unit

B. Commercial shower and bath accessories, including but not limited to:
   1. Shower Curtain Rod
   2. Shower Curtain
   3. Folding Shower Seat
   4. Robe Hook

C. Diaper changing stations including Adult Changing Stations.

D. Utility room accessories, including but not limited to:
   1. Combination Utility Shelf/Mop and Broom Holder

E. Installation of owner-furnished items, including but not limited to:
   1. Toilet Paper Dispenser
   2. Paper Towel Dispenser
   3. Waste Receptacle

1.02 RELATED REQUIREMENTS

A. Section 06 1000 - Rough Carpentry: Concealed supports for accessories, including blocking.

B. Division 22 - Plumbing: Plumbing fixtures including sinks, under-lavatory pipe and supply covers, faucets, soap dispensers, shower components, ice bath and accessories.

C. Division 26 - Electrical: Electric hand dryers and coordination with Adult Changing Stations.

1.03 REFERENCE STANDARDS

A. ADA Standards - 2010 ADA Standards for Accessible Design.

B. ASTM C1036 - Standard Specification for Flat Glass.

C. ASTM C1048 - Standard Specification for Heat-Strengthened and Fully Tempered Flat Glass.

D. ASTM F2285 - Standard Consumer Safety Performance Specification for Diaper Changing Tables for Commercial Use.

1.04 ADMINISTRATIVE REQUIREMENTS

A. Coordinate the work with the placement of internal wall reinforcement, concealed ceiling supports, and reinforcement of toilet partitions to receive anchor attachments.

1.05 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Product Data: Submit data on accessories describing size, finish, details of function, and attachment methods.

C. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
   1. See Section 01 6000 - Product Requirements, for additional provisions.
   2. Extra Shower Curtain: Minimum of 5% needed for project.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Commercial Toilet, Shower, and Bath Accessories:
   1. AWJ Architectural Products: www.ajw.com.

2. American Specialties, Inc: www.americanspecialties.com/#sle.
3. Bradley Corporation: www.bradleycorp.com/#sle.
4. Bobrick Washroom Equipment, Inc.: www.bobrick.com.
5. Georgia-Pacific Professional: www.gppro.com/#sle.
6. Kimberly-Clark Corporation: www.kcprofessional.com/#sle.
7. Substitutions: Section 01 6000 - Product Requirements.

B. Diaper Changing Stations:
1. American Specialties, Inc: www.americanspecialties.com/#sle.
2. Bradley Corporation: www.bradleycorp.com/#sle.
3. Koala Kare Products: www.koalabear.com/#sle.
4. Substitutions: 01 6000 - Product Requirements.

C. Provide products of each category type by single manufacturer.

D. See plans and elevations for quantities and locations.

2.02 MATERIALS

A. Accessories - General: Shop assembled, free of dents and scratches and packaged complete with anchors and fittings, steel anchor plates, adapters, and anchor components for installation.
1. Grind welded joints smooth.
2. Fabricate units made of metal sheet of seamless sheets with flat surfaces.

B. Keys: Provide four keys for each accessory to Owner; master key lockable accessories.

C. Mirror Glass: Tempered safety glass, ASTM C1048; and ASTM C1036 Type I, Class 1, Quality Q2, with silvering as required.

2.03 FINISHES

A. Stainless Steel: Satin finish, unless otherwise noted.

B. Baked Enamel: Pretreat to clean condition, apply one coat primer and minimum two coats epoxy baked enamel.

2.04 COMMERCIAL TOILET ACCESSORIES

A. Toilet Paper Dispenser: Owner-furnished, Contractor-installed.

B. Paper Towel Dispenser: Owner-furnished, Contractor-installed.

C. Mirrors: Stainless steel framed, 1/4 inch thick tempered safety glass; ASTM C1048.
1. Size: As indicated on drawings.
2. Frame: 0.05 inchangle shapes, with mitered and welded and ground corners, and tamperproof hanging system; satin finish.
3. Backing: Full-mirror sized, minimum 0.03 inch galvanized steel sheet and nonabsorptive filler material.
4. Products:
a. Bobrick B-290
b. Substitutions: Section 01 6000 - Product Requirements.

D. Grab Bars: Stainless steel, peened peened surface.
1. Standard Duty Grab Bars:
a. Push/Pull Point Load: 250 pound-force, minimum.
b. Dimensions: 1-1/4 inch outside diameter, minimum 0.05 inch wall thickness, exposed flange mounting, 1-1/2 inch clearance between wall and inside of grab bar.
c. Nonslip grasping surface finish and snap flange concealed fasteners.
d. Length and Configuration: As indicated on drawings.
e. Products:
1) Bobrick B-6806 Series.
2) Substitutions: Section 01 6000 - Product Requirements.

E. Sanitary Napkin Disposal Unit: Stainless steel, surface-mounted, self-closing door, locking bottom panel with full-length stainless steel piano-type hinge, removable receptacle.
   1. Products:
      a. Bradley; Model 4A10-11.
      b. Substitutions: Section 01 6000 - Product Requirements.

2.05 COMMERCIAL SHOWER AND BATH ACCESSORIES

A. Shower Curtain Rod: Stainless steel tube, 1 inch outside diameter, 0.04 inch wall thickness, satin-finished, with 3 inch outside diameter, minimum 0.04 inch thick satin-finished stainless steel flanges, for installation with exposed fasteners.
   1. Products:
      a. Bradley; Model 9538.
      b. Substitutions: Section 01 6000 - Product Requirements.

B. Shower Curtain:
   1. Material: Opaque vinyl, 0.008 inch thick, matte finish, with antibacterial treatment, flameproof and stain-resistant.
   2. Shower Curtain Hooks: Chrome-plated or stainless steel spring wire designed for snap closure; Bradley Model 9536 or appproved equal.
   3. Products:
      a. Bradley; Model 9533.
      b. Substitutions: Section 01 6000 - Product Requirements.

C. Folding Shower Seat: Wall-mounted surface; welded tubular seat frame, structural support members, hinges, and mechanical fasteners of Type 304 stainless steel, L-shaped, right hand seat.
   1. Seat: Phenolic or polymeric composite one-piece seat or seat slats, of color as selected.
   2. Size: ADA Standards compliant.
   3. Products:
      a. Bradley; Model 9569.
      b. Substitutions: Section 01 6000 - Product Requirements.

D. Robe Hook: Heavy-duty stainless steel, single-prong, rectangular-shaped bracket and backplate for concealed attachment, satin finish.
   1. Products:
      a. Bradley; Model 9B1.
      b. Substitutions: Section 01 6000 - Product Requirements.

2.06 DIAPER CHANGING STATIONS

A. Diaper Changing Station: Wall-mounted folding diaper changing station for use in commercial toilet facilities, meeting or exceeding ASTM F2285.
   1. Style: Horizontal
   2. Material: Stainless steel.
   3. Mounting: Surface for CMU locations.
   4. Minimum Rated Load: 250 pounds.
   5. Features: Pneumatic cylinder, concealed hinge, ADA cam-buckle on safety strap, bag hook, liner dispenser, 5-year warranty.
   6. Products:
      a. Bradley 962-11.
      b. Koala Kare KB300-SS.
      c. Substitutions: 01 6000 - Product Requirements.

B. Diaper Changing Station: Wall-mounted folding diaper changing station for use in commercial toilet facilities, meeting or exceeding ASTM F2285.
   1. Style: Horizontal
   2. Mounting: Recessed for Gypsum Board/Tile locations.
   3. Minimum Rated Load: 250 pounds.

4. Features: Pneumatic cylinder, concealed hinge, ADA cam-buckle on safety strap, bag hook, liner dispenser, 5-year warranty.
5. Products:
    a. Bradley 962.
    b. Koala Kare KB310-SSRE.
    c. Substitutions: 01 6000 - Product Requirements.

C. Adult Changing Station: Wall-mounted, folding diaper changing station for use in commercial toilet facilities, height adjustable, with moveable safety rail.
1. Material: manufacturers standard.
2. Mounting: Surface.
3. Minimum Rated Load: 500 lb.
4. Height Range: 16 to 39 inches.
5. Products:
    a. Bradley; 9989.
    b. Koala Kare KB3000-AHL.
    c. Substitutions: See Section 01 6000 - Product Requirements.

2.07 UTILITY ROOM ACCESSORIES

A. Combination Utility Shelf/Mop and Broom Holder: 0.05 inch thick stainless steel, Type 304, with 1/2 inch returned edges, 0.06 inch steel wall brackets.
1. Hooks: Four, 0.06 inch stainless steel rag hooks at shelf front.
2. Mop/broom holders: Three spring-loaded rubber cam holders at shelf front.
3. Products:
    a. Bobrick; B-239 x 24 Surface-Mounted Utility Shelf / Mop Holders / Coat Hooks: www.bobrick.com.
    b. Substitutions: 01 6000 - Product Requirements.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify existing conditions before starting work.

B. Verify exact location of accessories for installation.

C. Verify that field measurements are as indicated on drawings.

D. See Section 06 1000 - Rough Carpentry for installation of blocking, reinforcing plates, and concealed anchors in walls and ceilings.

3.02 PREPARATION

A. Deliver inserts and rough-in frames to site for timely installation.

B. Provide templates and rough-in measurements as required.

3.03 INSTALLATION

A. Install accessories in accordance with manufacturers' instructions in locations indicated on drawings.

B. Install plumb and level, securely and rigidly anchored to substrate.

C. Mounting Heights: As required by accessibility regulations, unless otherwise indicated.

3.04 PROTECTION

A. Protect installed accessories from damage due to subsequent construction operations.

END OF SECTION

SECTION 10 4400
FIRE PROTECTION SPECIALTIES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Fire extinguishers.

B. Fire extinguisher cabinets.

1.02 RELATED REQUIREMENTS

A. Section 06 1000 - Rough Carpentry: Wood blocking.

B. Section 09 9123 - Interior Painting.

1.03 REFERENCE STANDARDS

A. ADAAG - Americans with Disabilities Act Accessibility Guidelines, 2010

B. FM (AG) - FM Approval Guide.

C. NFPA 10 - Standard for Portable Fire Extinguishers.

D. UL (DIR) - Online Certifications Directory.

1.04 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements for submittal procedures.

B. Product Data: Provide extinguisher operational features, extinguisher ratings and classifications, color and finish, and anchorage details.

C. Shop Drawings: Indicate locations of cabinets, cabinet physical dimensions, rough-in measurements for recessed cabinets, mounting measurements for wall bracket, and accessories required for complete installation.

D. Operation and Maintenance Data: Include test, refill, or recharge schedules and recertification requirements.

1.05 FIELD CONDITIONS

A. Do not install extinguishers when ambient temperature causes freezing of extinguisher ingredients.

1.06 WARRANTY

A. See Section 01 7800 - Closeout Submittals, for additional warranty requirements.

B. Provide five year manufacturer warranty for factory finishes and extinguishers.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Fire Extinguishers:
1. Activar Construction Products Group, Inc. - JL Industries: www.activarcpg.com/#sle.
2. Ansul, a Tyco Business: www.ansul.com.
3. Kidde, a unit of United Technologies Corp: www.kidde.com.
4. Nystrom, Inc: www.nystrom.com.
5. Potter-Roemer: www.potterroemer.com/#sle.
6. Pyro-Chem, a Tyco Business: www.pyrochem.com.
7. Substitutions: See Section 01 6000 - Product Requirements.

B. Fire Extinguisher Cabinets and Accessories:
1. Activar Construction Products Group - JL Industries: www.activarcpg.com/#sle.
2. Kidde, a unit of United Technologies Corp: www.kidde.com.
3. Larsen's Manufacturing Co: www.larsensmfg.com.
4. Nystrom, Inc: www.nystrom.com.
5. Potter-Roemer: www.potterroemer.com.
6. Substitutions: See Section 01 6000 - Product Requirements.

2.02 FIRE EXTINGUISHERS

A. General Requirements: Comply with product requirements of NFPA 10 and applicable codes, whichever is more stringent.
   1. Provide extinguishers labeled by UL (DIR) or FM (AG) for purpose specified and as indicated on drawings.

B. Multipurpose Dry Chemical Type Fire Extinguishers: Carbon steel tank, with pressure gage.
   1. Cartridge Operated: Spun shell.
   2. Class: A:B:C.
   3. Size: 20 pound.
   4. Finish: Baked polyester powder coat, red color.
   5. Temperature range: Minus 65 degrees F to 120 degrees F.

C. Wet-Chemical-Type Fire Extinguishers: Stainless steel tank, with pressure gauge.
   1. Location: Kitchen
   2. Class: K.
   3. Size: 1.6 gal.
   4. Temperature Range: Minus 20 to 120 degrees F.

2.03 FIRE EXTINGUISHER CABINETS

A. Cabinet Construction: Non-fire rated.
   1. Formed primed steel sheet; 20-gauge, 0.036-inch thick base metal.

B. Cabinet Configuration: Semi-recessed types.
   1. Rough Opening nominal dimensions of 11-1/2 inch wide by 25 inch high by 7-1/2 inch deep.
   2. Trim: Flat rolled edge, with 1-1/2 inch wide face.
   3. Provide cabinet enclosure with right-angle inside corners and seams and with formed perimeter trim and door stiles.

C. Door: 0.036 inch metal thickness, reinforced for flatness and rigidity cylinder prep for mortise thumb nuts. Hinge doors for 180 degree opening with continuous piano hinge.

D. Cabinet Mounting Hardware: Appropriate to cabinet, with predrilled holes for placement of anchors.

E. Fabrication: Weld, fill, and grind components smooth.

F. Finish of Cabinet Exterior Trim and Door
   1. Typical: Baked enamel, White color

G. Finish of Cabinet Interior: White colored enamel.

2.04 ACCESSORIES

A. Extinguisher Brackets: Formed steel, chrome-plated.

B. Extinguisher Theft Alarm: Battery-operated alarm, 10-second delay for disarming, activated by opening cabinet door.

C. Cabinet Signage: Label or lettering, vertical on hinge side.
   1. Lettering: “FIRE EXTINGUISHER” decal, or vinyl self-adhering, prespaced lettering in accordance with authorities having jurisdiction (AHJ).
   2. Color: As selected by Architect.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify dimensions, tolerances, and interfaces with other work.

B. Verify substrate and site conditions for product installation are in accordance with manufacturer's written instructions.

C. Verify rough openings for cabinet are sized and located in accordance with manufacturer's written instructions.

D. Notify Architect in writing of conditions detrimental to completion of work. Do not proceed with installation until detrimental conditions are corrected.

3.02 INSTALLATION

A. Locate extinguishers as indicated in Drawings.

B. Install in accordance with manufacturer's instructions.

C. Install cabinets plumb and level in wall openings, 48 inches from finished floor to highest operable part.

D. Secure rigidly in place.

E. Place extinguishers and accessories in cabinets.

END OF SECTION

SECTION 10 4433
EMERGENCY KEY CABINETS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Emergency key cabinets.

1.02 RELATED REQUIREMENTS

A. Section 06 1000 - Rough Carpentry: Wood blocking product and execution requirements.

1.03 SUBMITTALS

A. Product Data: Manufacturer’s technical literature for each product and system indicated.
   1. Include manufacturer's specifications for materials, finishes, construction details, installation instructions, and recommendations for maintenance.

B. Samples for Verification Purposes: 3 inch square sample of exposed metal to indicate compliance with finish specified.

1.04 QUALITY ASSURANCE

A. Local Authority Approval: Obtain approval of local fire department for keyway access and exact location and type of emergency key cabinet mounting prior to Product Data submittal.

B. Emergency key cabinet will be required at building entrance designated by the fire department.

1.05 COORDINATION

A. Coordinate installation of products and systems with interfacing and adjoining construction to provide a successful installation without failure.

PART 2 PRODUCTS

2.01 MANUFACTURERS AND PRODUCTS

A. Emergency Key Cabinets:
   1. **BASIS OF DESIGN:** Knox Company: 3200 Series; www.knoxbox.com.
   2. Substitutions: See Section 01 6000 - Product Requirements.

2.02 EMERGENCY KEY CABINET

A. Cabinet: 1/4 inch thick steel plate housing, 1/2 inch thick steel door with interior gasket seal and stainless steel door hinge. Box and lock shall be UL Listed.
   1. Lock shall have 1/8 inch thick stainless steel dust cover with tamper seal mounting capability.
   2. Lock shall have double-action rotating tumblers and hardened steel pins accessed by a biased cut key.
   3. Coordinate other necessary requirements with local fire department.

B. Finish: Manufacturer’s standard weather-resistant polyester powder coat.

C. Color: Black.

PART 3 EXECUTION

3.01 PREPARATION

A. Comply with manufacturer’s instructions, recommendations, and specifications for cleaning and surface preparation.

3.02 INSTALLATION OF EMERGENCY KEY CABINETS

A. Install in accordance with manufacturer's latest published requirements.

END OF SECTION

SECTION 10 5126
PLASTIC LOCKERS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Solid plastic lockers (LOCK-#).

B. Locker benches (BENCH-#).

1.02 RELATED REQUIREMENTS

A. Section 06 1000 - Rough Carpentry: Wood blocking and nailers.

1.03 REFERENCE STANDARDS

A. ADA Standards - 2010 ADA Standards for Accessible Design.

B. ICC A117.1 - Accessible and Usable Buildings and Facilities.

1.04 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Product Data: Manufacturer's published data on locker construction, sizes and accessories.

C. Shop Drawings: Indicate locker plan layout, numbering plan.

D. Samples: Submit two samples 6 by 6 inches in size, of each color scheduled.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Protect locker finish and adjacent surfaces from damage.

1.06 WARRANTY

A. See Section 01 7800 - Closeout Submittals for additional warranty requirements.

B. Manufacturer Warranty: Provide 10-year manufacturer warranty for materials and workmanship. Complete forms in Owner's name and register with manufacturer.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Solid Plastic Lockers:
   1. **BASIS OF DESIGN:** ASI Storage Solutions; Plastic Traditional: www.asi-storage.com/#sle.
   2. Columbia Lockers, a division of PSiSC: www.psisc.com/#sle.
   3. List Industries, Inc: www.listindustries.com/#sle.
   4. Scranton Products: www.scrantonproducts.com/#sle.
   5. Substitutions: See Section 01 6000 - Product Requirements.

2.02 LOCKER APPLICATIONS

A. Lockers: Solid plastic lockers, wall mounted with matching closed base.
   1. Width: 12 inches as indicated in Finish Schedule.
   2. Depth: as indicated in Finish Schedule.
   3. Height: as indicated in Finish Schedule.
   4. Locker Configuration: as indicated in Finish Schedule.
   5. Fittings: Size and configuration as indicated on drawings.
      a. Hooks: One double prong.
   6. Ventilation: By horizontal slots at the top and bottom of door.
   7. Locking: Padlock hasps, for padlocks provided by Owner.
   8. Provide sloped top.

B. Locker Benches: Stationary type; bench top of solid high density polyethylene (HDPE); painted steel pedestals.
   1. Depth: as indicated in Finish Schedule.
   2. Color: as indicated in Finish Schedule.

2.03 SOLID PLASTIC LOCKERS

A. Accessibility: Comply with ICC A117.1 and ADA Standards.

B. Lockers: Factory assembled, made of solid plastic panels, homogenous color throughout.
   1. Material: Solid high density polyethylene (HDPE).
   2. Doors: Full overlay without frame.
   3. Locker Body Construction: Manufacturer's standard for selected product.
   4. Color: As indicated in Finish Schedule.

C. Hinges: Full height of locker, manufacturer's standard heavy duty type.

D. Number Plates: Provide rectangular shaped aluminum plates. Form numbers 1 inch high of block font style with ADA designation, in contrasting color.

E. Built-In Lock Boxes: Same material as locker, manufacturer's standard size, with padlock hasps, for padlocks provided by Owner.

F. Locker Base: Solid plastic base, 4 inches high, field assembled.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that prepared bases are in correct position and configuration.

B. Verify bases and embedded anchors are properly sized.

3.02 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Place and secure on prepared base.

C. Install lockers plumb and square.

D. Secure lockers with anchor devices to suit substrate materials. Minimum Pullout Force: 100 pounds.

E. Install end panels.

F. Install fittings if not factory installed.

G. Replace components that do not operate smoothly.

3.03 CLEANING

A. Clean locker interiors and exterior surfaces.

END OF SECTION

SECTION 10 7516
GROUND-SET FLAGPOLES

PART 1 GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SUMMARY

A. Section includes ground-set flagpoles made from aluminum.

1.03 ACTION SUBMITTALS

A. Product Data: For each type of product.
   1. Include construction details, material descriptions, dimensions of individual components and profiles, operating characteristics, fittings, accessories, and finishes for flagpoles.

B. Shop Drawings: For flagpoles.
   1. Include plans, elevations, and attachment details. Show general arrangement, jointing, fittings, accessories, grounding, anchoring, and support. Include section, and details of foundation system.

C. Samples for Verification: For each type of exposed finish, in manufacturer's standard sizes.

D. Delegated-Design Submittal for Flagpoles: Furnish structural engineer sealed drawings and calculations, indicating final sizing of components and connections, including the footing.

1.04 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For flagpoles to include in operation and maintenance manuals.

1.05 DELIVERY, STORAGE & HANDLING

A. Spiral wrap flagpoles with heavy paper and enclose in a hard fiber tube or other protective container.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Source Limitations: Obtain flagpoles as complete units, including fittings, accessories, bases, and anchorage devices, from single source from single manufacturer.

B. Provide flagpole by the following manufacturer or an approved equivalent:
   1. Manufacturer: Pole-Tech, Inc.; 97 Gnarled Hollow Road, P.O. Box 715, East Setauket, New York 11733, P: (631) 689-5525, E: info@poletech.com.
      a. Model: PT306D.
      b. Size(s): 30-foot exposed height.
      c. Finishes: Clear Anodized.
      d. Mount: Ground-Set.
      e. Option(s) & Accessories: Spun aluminum clear anodized finial ball, revolving truck, external halyard, and 9-inch cleat.

2.02 PERFORMANCE REQUIREMENTS

A. Delegated Design: Engage a qualified professional engineer, as defined in Section 01 4000 "Quality Requirements," to design flagpole assemblies.

B. Structural Performance: Flagpole assemblies, including anchorages and supports, shall withstand design loads indicated within limits and under conditions indicated.
   1. Wind Loads: Determine according to NAAMM FP 1001. Basic wind speed for Project location is 115 miles per hour.
   2. Base flagpole design on polyester, nylon, or cotton flags of maximum standard size suitable for use with flagpole or flag size indicated, whichever is more stringent.

2.03 ALUMINUM FLAGPOLES

A. Aluminum Flagpoles: Seamless cone-tapered flagpoles fabricated from seamless extruded tubing complying with ASTM B 241, Alloy 6063-T6, with a minimum wall thickness of 1/4 inch.

B. Exposed Height: 30-feet.

C. Construct flagpoles in one piece if possible. If more than one piece is necessary, comply with the following:
   1. Fabricate shop and field joints without using fasteners, screw collars, or lead calking.
   2. Provide flush hairline joints using self-aligning, snug-fitting, internal sleeves.

D. Metal Foundation Tube: Manufacturer's standard corrugated-steel foundation tube, 16-guage wall thickness with 3/16-inch (min.) steel bottom plate and support plate; 3/4-inch- diameter, steel ground spike; and steel centering wedges welded together. Galvanize foundation tube after assembly. Furnish loose hardwood wedges at top of foundation tube for plumbing pole.
   1. Flashing Collar: Spun aluminum or same material and finish as flagpole.

2.04 FITTINGS

A. Finial Ball: Flush-seam ball, sized as indicated or, if not indicated, to match flagpole-butt diameter.
   1. 14-gauge spun aluminum with clear anodized finish.

B. External Halyard: Ball-bearing, nonfouling, revolving truck assembly of cast metal with continuous 2-3/8 inch diameter aluminum sheave, #10 white braided polypropylene halyard, and 9-inch cast-metal cleats with fasteners. Finish exposed metal surfaces to match flagpole.
   1. Halyards and Cleats: One at each flagpole.
   2. Halyard Flag Snaps: Bronze swivel snap hooks. Furnish two per halyard.

2.05 MISCELLANEOUS MATERIALS

A. Drainage Material: Crushed stone, or crushed or uncrushed gravel; coarse aggregate.

B. Sand: ASTM C 33/C 33M, fine aggregate.

C. Elastomeric Joint Sealant: Multicomponent nonsag urethane.

2.06 ALUMINUM FINISHES

A. Clear Anodic Finish: AAMA 611, AA-M12C22A41.

PART 3 EXECUTION

3.01 PREPARATION

A. Prepare uncoated metal flagpoles that are set in foundation tubes by painting below-grade portions with a heavy coat of bituminous paint.

B. Foundation Excavation: Excavate to neat clean lines in undisturbed soil. Remove loose soil and foreign matter from excavation and moisten earth before placing concrete. Place and compact drainage material at excavation bottom.

C. Foundation Tube: Place foundation tube, center, and brace to prevent displacement during concreting. Place concrete. Plumb and level foundation tube and allow concrete to cure.

D. Sleeves: Locate and secure sleeves in forms by bracing to reinforcement and forms.

E. Place concrete, as specified in Section 03 3000 Cast-in-Place Concrete. Compact concrete in place by using vibrators. Moist-cure exposed concrete for no fewer than seven days or use nonstaining curing compound.

F. Trowel exposed concrete surfaces to a smooth, dense finish, free of trowel marks, and uniform in texture and appearance. Provide positive slope for water runoff to perimeter of concrete base.

3.02 FLAGPOLE INSTALLATION

A. General: Install flagpoles where indicated and according to Shop Drawings and manufacturer's written instructions.

B. Foundation Tube: Place flagpole in tube, seated on bottom plate between steel centering wedges, and install hardwood wedges to secure flagpole in place. Place and compact sand in foundation tube and remove hardwood wedges. Seal top of foundation tube with a 2-inch layer of elastomeric joint sealant and cover with flashing collar.

END OF SECTION

SECTION 11 1313
LOADING DOCK BUMPERS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Loading dock bumpers of reinforced rubber pads with attachment frame.

1.02 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Product Data: Submit data on unit dimensions, method of anchorage, and details of construction.

C. Manufacturer's Installation Instructions: Submit installation requirements.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Loading Dock Bumpers:
   1. Blue Giant Equipment Corporation: www.bluegiant.com/#sle.
   2. Chalfant Sewing Fabricators, Inc: www.chalfantusa.com/#sle.
   3. Durable Corp: www.durablecorp.com/#sle.
   4. Substitutions: See Section 01 6000 - Product Requirements.

2.02 LOADING DOCK BUMPERS

A. Loading Dock Bumpers: Fabric reinforced rubber pads, ozone resistant, laminated and compressed in position using two galvanized steel rods with threaded ends, washers, and nuts between 3 inch high by 2-1/2 inch wide by 1/4 inch thick galvanized steel angle end plates.
   1. Projection From Wall: 4-1/2 inches.
   2. Vertical Height: 10 inches.
   3. Width: 24 inches.
   4. Profile: Rectangular.

B. Attachment Hardware: 3/4 inches diameter galvanized bolts with expansion shields.

C. Touch-up Primer: Zinc rich type.

2.03 MANUAL WHEEL CHOCKS

A. Manual Wheel Chocks: Provide truck trailer wheel chocks, two per loading dock, in compliance with applicable OSHA requirements.
   1. Black molded rubber, fiber reinforced, and at least 9-1/2 inch long by 6-1/2 inch wide by 8 inch high.
   2. Chain: Galvanized steel, at least 15 feet long with connection to chock and bracket.
   3. Bracket: Wall mounted metal bracket for storage of chock and chain when not in use.
   4. Caution Sign: Provide double wall mounted sign located adjacent to chock bracket, one readable from truck mirror and other from standard view to remind truck driver to remove wheel chocks.
      a. Text: CAUTION - Chock Wheels.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that anchor placement is acceptable.

3.02 INSTALLATION

A. Install dock bumpers in accordance with manufacturer's instructions.

B. Set plumb and level.

END OF SECTION

SECTION 1140 00 - FOODSERVICE EQUIPMENT

PART 1 GENERAL

1.01 SCOPE OF WORK

A. The Foodservice Equipment Contractor (FSEC) shall provide the labor, equipment, and materials specified in this Section in a timely manner consistent with the construction schedule. The FSEC shall procure, fabricate, store, deliver, unload, uncrate, assemble, set-in-place, level, and ready equipment for utility connections.
   1. The work in this Section shall be under a separate sub-contract or a prime contract by a single qualified FSEC who shall report to the Prime Contractor and/or Owner's Representative and coordinate with other subcontractors for this project.
   2. The FSEC shall submit written notification of any manufacturer or construction-related issues that are causing a delay in the equipment delivery and/or installation.
   3. All specified equipment shall be installed according to the Manufacturer's written instructions, original design, and applicable codes. The FSEC shall remove all installation debris and protective coverings from all finished surfaces. Wash, clean and polish all equipment, glass, plastic, hardware, accessories, fixtures, and fittings prior to the inspection and acceptance of the work for this section. Remove all factory applied film and adhesive residue before start-up.
   4. The FSEC shall provide a Project Manager as the primary point of contact to the Prime Contractor, Architect, and Owner's Representative for coordination and responding to questions pertaining to the foodservice equipment Scope of Work.
   5. Tests, permits, and inspections required by the authorized having jurisdiction (AHJs) and directly related to the construction and installation of the specified foodservice equipment shall be secured and paid for by the FSEC unless otherwise specified in this Section.
   6. The FSEC shall provide start-ups and demonstrations for all new Fabricated Equipment and serialized equipment specified in this Section.
   7. The FSEC shall provide warranties for all new foodservice equipment specified in this Section.
   8. The FSEC shall perform all operations in connection with the execution of the Work as represented in the plans and specifications including that which is reasonably inferred. The foodservice equipment bid drawings and specifications complement each other. Therefore, neither is complete without the other.
   9. The FSEC shall request written clarification when the drawings and specifications contain conflicting requirements. The FSEC shall provide the better quality or greater quantity of work or material. Costs incurred by failure to clarify conflicting requirements are the responsibility of the FSEC.
      a. Where model numbers, quantities, sizes, or gauges of material differ on plans and specifications, it shall be understood that the FSEC shall figure the larger quantities, larger size, and/or heavier gauge unless advised otherwise in writing.
      b. Where an item, accessory, or option is required for a piece of equipment that is shown on the plans or elevations it shall be deemed to be provided by the FSEC even if it is not listed in the item specifications.
      c. Where all or part of an item, accessory, or option is referred to in the singular number, it is intended that such reference shall apply to as many such items, accessories, or options as necessary to complete the installation.
   10. The Owner reserves the right to accept the manufacturer's replacement or equipment from a manufacturer specified as equal when equipment specified is no longer available. The Owner reserves the right to reject equipment when a specified manufacturer is sold, when sale is pending, when filing for Chapter 7 or 11 status, and receive equipment from a specified equal manufacturer.

B. Related Scopes of Work included in this Section:
   1. The general conditions and all applicable supplementary conditions including drawings, specifications, addendums, instruction to bidders, Division 00, and Division 01 shall apply to the Foodservice Equipment Contractor in providing all items, equipment, submittals, materials, transportation, installation, operation is, along with methods listed, mentioned, referenced, or reasonably inferred to the work in this Section.
   2. The FSEC shall coordinate and verify all items provided in this Section with all drawings, specifications, manufacturer's requirements, actual site conditions, building elements, and other equipment to ensure that there are no discrepancies or conflicts. This shall include but not limited to verification of quantities, dimensions, clearances, direction of operation, door swings, utilities, fabrication details, and required methods of installation for the Prime Contractor, Owner's Representative, and Subcontractors.

3. The FSEC shall coordinate mechanical and electrical rough-in services, manufactured equipment and fabricated equipment construction, ceiling heights, recessed floors, sleeves, wall openings, refrigeration lines, service access, existing building conditions that affect equipment, and all other building conditions required to accommodate the specified equipment including new, existing, Owner furnished and future equipment with other trades. Cut holes in equipment to accommodate pipes, drains, electrical conduit and outlets as required.
4. The FSEC shall coordinate temporary building openings required for equipment too large to be moved through the permanent building openings.
5. The FSEC shall coordinate existing/relocated, Owner furnished, and other Vendor furnished foodservice equipment as specified in this Section.
6. The FSEC shall provide necessary filler and trim panels and seal all vertical and horizontal edges of equipment adjacent to walls, ceilings and/or adjacent other equipment. All sealants shall be NSF and FDA approved for the application and shall not exceed a 3/8" bead width.
7. The foodservice equipment Bid Drawings shall not be used as construction documents or shop drawings. The foodservice equipment Bid Drawings and specifications complement each other. Therefore, neither is complete without the other. The bid drawings are for reference, assistance, and guidance only. The drawings indicated the preferred final location of equipment. The exact final location will be dictated by the building conditions.

C. Related Scopes of Work Excluded from this Section:
1. Division 22 – Plumbing: Refer to Division 22 for applicable requirements regarding the materials, plumbing and mechanical services required to complete the foodservice equipment installation, including but not limited to:
   a. Provide all plumbing rough-ins per the Foodservice Equipment Plumbing Rough-in Plans, and notify FC Design, the Architect, and the Plumbing Engineer of any code issues you find.
   b. Provide the required devices specified in Division 22, such as pipes, fittings, valves, backflow prevention devices, p-traps, tailpieces, atmospheric vents, air-gap assemblies, shock-arrestors, floor drains, floor sinks, and clean-outs required for the installation of the foodservice equipment, unless otherwise specified in this Section.
   c. Provide softened hot and/or cold water meeting the operational requirements of the specified warewashing machine(s).
   d. Install the FSEC furnished plumbing fixtures including faucets, disposers, overhead sprayers, hose reels, lever/modular waste drains, floor troughs, water filter systems, and quick disconnects.
   e. Extend the utilities from rough-in locations to final connection points on the equipment and interconnections between equipment and remote components. Provide required fittings, such as tee fittings, as needed. Purge all water supply lines prior to any foodservice equipment connections.
   f. Extend indirect waste piping from the specified foodservice equipment to an appropriate indirect waste fixture as shown on the Foodservice Equipment Plumbing Rough-in plans.
   g. Provide all grease trap(s)/interceptor(s), including permits and fee(s) required for the foodservice equipment installation, unless otherwise specified in this Section.
   h. Disconnect the utilities of the existing foodservice equipment that is relocated or removed.
   i. Verify the utility requirements of all Owner and Other Vendor furnished foodservice equipment with the Architect and/or Owner's Representative.
2. Division 26 – Electrical: Refer to Division 26 for the requirements regarding materials and electrical services to complete the foodservice installation including but not limited to:
   a. Provide all electrical rough-ins per the Foodservice Equipment Electrical Rough-in Plans, and notify FC Design, the Architect, and the Plumbing Engineer of any code issues you find.
   b. Provide electrical service panels, conduits, rough-ins, wiring, disconnect switches, outlets, switches, remote controls required for the foodservice equipment installation.
   c. Extend utilities from rough-in locations to final connection points on the equipment and interconnections to remote components, such as FSEC furnished control panels, and required devices specified in Division 26, such as electrical disconnects, unless otherwise specified in this Section.
   d. Disconnect the utilities of the existing foodservice equipment that is relocated or removed.
   e. Verify the utility requirements of all Owner and Other Vendor furnished foodservice equipment with the Architect and/or Owner's Representative.
3. Refer to the general construction documents, for applicable provisions regarding building works to complete the foodservice installation, including but not limited to:

a. The coordination and installation of foodservice equipment adjacent walls, floors and roof openings, sleeves, penetrations, and openings. Walk-in cooler/ freezer sub-floors, insulated floors and/or depressed slabs, waring slabs. Provide floor leveling grout and filler grout as required for the installation of the walk-in cooler/freezer.
b. Provide roof curbs, roof rails, and pitch pockets for the FSEC furnished remote refrigeration system compressors specified in this Section.
c. All cast-in-place concrete floors, exterior concrete footings and pads, insulated roof curbs and/or railings related to foodservice equipment, roof-top equipment stands, supports and pitch pockets. All finished walls, floors, and ceilings along with the installation of base curb framing, in filling and concrete capping of floor base curbs, risers, piping and soda line chases and building fire separation, enclosures, and wrapping piping. The Prime Contractor shall seal all openings in accordance with all federal, state, and local fire protection building and construction codes.

1.02 DEFINITIONS

A. FSEC: Foodservice Equipment Contractor. The company, organization and person(s) specifically contracted, and responsible for the Section 11 4000 Scope of Work. References to other Contractors and Divisions will be specific.

B. Furnish: Limited to the coordination, shipping, and delivery. Includes the materials/equipment itself.

C. Install: Remove packaging, assemble, set-in-place, level, and make the equipment ready for utility connections. Final connections shall be provided by the corresponding utility contractors [Reference 1.01 Subpart C]. Reset, anchor and/or seal items and accessories to adjacent surfaces, adjust, calibrate, and test, after all the final utility connections and interconnections have been made.

D. Provide: Furnish and install complete, adjusted, and ready for intended use. A combination of Furnish and Install.

E. Equal: Comparable in size and critical dimensions, capacity, features, options & Accessories, finishes, operation and require similar utility services. If equal items are submitted the FSEC shall pay all costs required to modify the work of any trade affected.

F. Buy-Out Equipment: Provide equipment offered as a standard catalog item, that which has a specific model number. The Manufacturer's catalog specification sheet or shop drawing shall identify all standard features, options, accessories, finishes and/or slight changes or modifications available. Shop or detail drawings shall be provided as requested.

G. Fabricated Equipment: Provide equipment that is not a standard catalog item and must be built to the size and shape as required for this project. All fabricated equipment shall be constructed by a single authorized fabricator who shall provide detailed shop drawings and as-built drawings.

H. Exposed: All visible surfaces or edges including those behind closed doors or access panels when opened, including when looking up from below.

1.03 REGULATORY REQUIREMENTS

A. All items, work and materials for this section shall comply with the latest US Public Health Services, the National Board of Fire Underwriters, all federal, state, local laws, and ordinances. This includes but not limited to building codes, regulations, rules, and interpretations of the authorities having jurisdiction (AHJ).
1. The equipment and installation must meet these minimum standards for this project.

[ADA]	Americans with Disabilities Act (Equipment & Installation)
[ANSI]	American National Standards Institute (Equipment & Installation)
[ASHRAE]	American Society of Heating, Refrigeration and Air Conditioning Engineers, Inc. (Equipment & Installation)
[ASME]	American Society of Mechanical Engineers (Boilers & Installation)
[ASTM]	American Society for Testing and Materials (Metals, Glass, Sprayers)
[AWS]	American Welding Society (Structural welding code)
[ICBO]	International Conference of Building Officials
[NEC]	National Electrical Code (Wiring & devices included with Food Equipment)

[NSF] National Sanitation Foundation (Equipment & Installation)

[NEMA] National Electrical Manufactures Association (Equipment & Installation)

[OSHA] Occupational Safety and Health Agency (Equipment & Installation)

[SMACNA] Sheet Metal & Air conditioning Contractor's National Association

[UL] Underwriters Laboratories (Electrical Products, Components Assemblies)

2. Safe Drinking Water Act: Lead-free plumbing fittings, faucets and fixtures or more stringent state/local codes where applicable.
3. Laws, Codes and Regulations: Contact State and local authorities that have jurisdiction to verify any special laws, codes, regulations or permits that may be required for this project. The FSEC shall submit to local health sanitarians, engineers, building inspectors that have jurisdiction, drawings and or specifications for clarification upon request.

[UBC] Uniform Building Code (Equipment & Installation)

[BOCA] Basic Building Code (Equipment & Installation)

[SBCC] Standard Building Code (Equipment & Installation)

[IBC] International Building Code (Equipment & Installation)

4. All equipment provided for this project shall have an NSF label.
5. All electrically operated, manufactured, or fabricated equipment shall meet the current National Electrical Code standards. The equipment shall be U.L. listed and tested to agency standards or be acceptable to authorities have jurisdiction.
6. Where the drawings and specifications require a larger size or higher standard than is required by regulations, the drawings or specifications shall govern.

1.04 ALTERNATES AND SUBSTITUTIONS

A. Procedure: Submit written requests at least ten (10) days prior to the bid date and time, to the project Architect. Manufacturer or fabricator changes are not acceptable after submittal review and acceptance without written authorization from FC Design and the Owner's Representative. Each request shall include the following information:
   1. Item number, description, and statement of how the proposed substitution is a betterment to the project.
   2. Manufacturer's product data (specification sheets) for the specified item and the proposed substitution with annotations highlighting the performance features not meeting and/or exceeding the specification for each item. Remove information that is not being supplied or required.
   3. Manufacturer's shop drawings for Fabricated Equipment that do not have standard product data (specification sheets) with annotations highlighting the performance features not meeting and/or exceeding the specification for each item.

B. Approval: The project Architect, Construction Manager, or General Contractor shall submit the request to FC Design for review. FC Design will review the proposed substitution with the Owner's Representative. The decision of FC Design and the Owner's Representative to approve or reject each request is final and binding. Determination may or may not state the reason for the decision. If approved, the project Architect will issue an addendum stating the approved alternate(s) to prime bidders of record. Verbal approval is not binding.

C. Responsibility: If a proposed alternate or substitution is accepted, the FSEC shall pay all costs required to modify the work of any trade affected to accommodate the substitution.

D. Substitutions for failure to order equipment in a timely manner are not acceptable.

E. Substitutions that to don't comply with the requirements of the bid documents are not acceptable.

1.05 SUBMITTALS

A. Procedure: Provide each of the following submittals in PDF format to the Architect and/or Owner's Representative for review and comment. The FSEC shall stamp and sign each submittal document indicating it has been reviewed by them and checked for conformance to the specifications, field dimensions, compatibility with other equipment and coordination with other trades and services prior to submittal.

1. Bid Summary: The FSEC shall provide a Bid Summary within 10 days of the contract award. The Bid Summary shall include foodservice equipment prices per item, freight, delivery to the job site, installation, and sales and use tax.
2. Schedule: The FSEC shall provide a schedule of key dates and tasks that must be completed by others to meet the equipment installation schedule within 30 days of contract award.
3. Procurement Progress: The FSEC shall provide a monthly letter to the Prime Contractor summarizing procurement progress, items stored, items delivered, items installed.
4. Product Data: The FSEC shall provide product data within 45 days of receiving a signed contract that include the following. Include a table of contents showing item number, description, and page number. Include product data (specification sheets) for every item of foodservice equipment included in this section including all new, existing, relocated, and future equipment. Annotate only relevant requirements and remove all information that is not applicable or relevant. Include a cover sheet for each item with item number and description, manufacturer, model number, quantity, optional features, special construction, installation, and utility requirements. Copies of the project specifications are not acceptable.
5. Notice of Field Verification: The FSEC shall provide a letter to the Architect and/or Owner's Representative stating that "the foodservice equipment rough-ins and special condition drawings have been field verified and fully comply with the equipment that is being provided within the contract."
6. Shop Drawings: The FSEC shall provide shop drawings at 3/4" = 1'-0" scale or larger for every Fabricated Equipment item including the following. Submit each of the following separately.
    a. Stainless Steel Fabrication: Show dimensions, materials, stainless steel grade and gauge, manufacturer, hardware, and other pertinent data as specified and as required for construction. Indicate partial plans and elevations to illustrate the junction condition where fabricated equipment adjoins other equipment. Show cutout locations, field welds and joints, reinforcement, edge profiles, and installation details and methods. Fabricated Equipment dimensions are subject to adjustments required by field verified dimensions and understructure components. Field measure and coordinate with finished building conditions. Field verification shall be completed by a company approved by the approved custom fabricator.
7. Coordination Drawings: The FSEC shall provide coordination drawings using the Architect's dimensioned plans and matching the sheet size of the bid documents within 45 days of receiving a signed contract. Show all foodservice equipment that is specified in Section 11 4000 including owner furnished, existing, and future equipment. Leave room for review stamps, FSEC title block, and information. It is not acceptable to copy the bid documents as this submittal. Include the following sheets:
    a. Foodservice equipment floor plan(s) at 1/4" = 1'-0" scale with equipment tags. Match the numbering of the bid documents and include equipment schedule(s) on the same sheet as corresponding the equipment plan(s).
    b. Foodservice equipment elevations at 1/2" = 1'-0" scale with equipment tags matching the numbering of the bid documents.
    c. Foodservice equipment plumbing rough-in plan(s) at 1/4" = 1'-0" scale showing exact rough-in locations with a utility symbol legend and a schedule of the utility requirements showing the equipment item number and heights. Make allowances for valves, fittings and other required components specified in Divisions 22 and 23. If utilities are already installed, field measure locations and indicate on plan, noting any objection to installed location. Dimension utility rough-ins installed in- floor from existing walls, exterior walls, or column line centers. Dimension other rough-ins from new walls.
    d. Foodservice equipment electrical rough-in plan(s) at 1/4" = 1'-0" scale showing exact rough-in locations with a utility symbol legend and a schedule of the utility requirements showing the equipment item number and heights. Make allowances for other required components specified in Division 26 and 27. If utilities are already installed, field measure locations and indicate on plan, noting any objection to installed location. Dimension utility rough-ins installed in- floor from existing walls, exterior walls, or column line centers. Dimension other rough-ins from new walls.

e. Foodservice equipment special conditions plan(s) at 1/4" = 1'-0" scale showing the foodservice equipment layout with the finished locations of wall backing, recessed floors, curbs, special wall heights, wall openings, and equipment bases. Include a symbol legend. Dimension from new or existing walls, exterior walls, or column line centers.

8. Approval: Submittals not complying with the above outline shall be rejected and must be resubmitted until correct.
9. Coordination: The FSEC is directly responsible for the accuracy of information on their Submittals. If a change on one submittal causes a change to another, the affected submittal(s) must be revised and resubmitted as well.

1.06 CLOSEOUT DOCUMENTS

A. Operation and Maintenance Manuals
   1. The FSEC shall provide: Two sets of manuals for foodservice equipment items, including (two sets of fabricated equipment as-built shop drawings. These manuals shall be ordered alphabetically by the manufacturer, separated by tabs, and include a cover sheet for each item. The cover sheet shall include the item number, description, manufacturer, model, serial number, and utility information.
      a. Provide current installation and operation manuals and parts manuals for all new foodservice equipment specified in this Section. Include the Manufacturer's name, address, and phone number. Include the local authorized service agent's (ASA) name, address, and phone number. List the FSEC if no local ASA is available. These manuals shall be delivered before the beneficial date of occupancy.
      b. Video record all training, operation, maintenance, instructions and provide digital and physical copies to the Architect and/or Owner's Representative.

B. As-Built Documents: The FSEC shall maintain one record set of as built drawings and product data with all related changes, corrections, revisions, additions, deletions as noted during the construction or installation phase. Provide these documents at the same time as the O&M data manuals.

C. Warranty Documents: [Ref: Section 11 4000, Part 3, Subpart 3.07]

1.07 SITE CONDITIONS

A. The FSEC shall field verify all on site surfaces, prepared openings, finished building dimensions and utility rough-ins to ensure that the site is ready for the equipment installation. This shall include but not limited to the verification and coordination of work by others including lighting fixtures, HVAC equipment, grease traps, building sprinkler systems, electrical services, and plumbing services.

B. The FSEC shall ensure Fabricated Equipment conforms to site dimensions and conditions and inform the Prime Contractor of any potential problems with the Fabricated Equipment, the work schedule, and delivery. Where field measurements cannot be made without delaying the work, the FSEC shall document and coordinate critical dimensions with the Prime Contractor to proceed with procurement.

C. The FSEC is responsible for changes to the equipment and/or cutting and patching of walls, partitions, ceilings, and floors necessary to receive and operate the equipment caused by failure to coordinate with the site conditions.

PART 2 PRODUCTS

2.01 FABRICATOR QUALIFICATIONS

A. Qualifications

1. Foodservice equipment fabricators must have a minimum of five years of experience in fabricating foodservice equipment like that indicated for this project and with a record of successful performance.
2. All custom fabricated equipment, excluding trim and corner guards, shall be provided by the same fabricator unless otherwise specified.
3. The custom fabricator shall field measure and verify as needed prior to fabrication.
4. The custom fabricator shall have factory-direct post-installation warranty support.
5. The fabricator shall employ a currently licensed master electrician if the items they are providing include pre-wired electrical components.

B. Approved custom stainless steel fabricators: The following companies have been approved for this project. Substitutions may be requested per the procedure specified in Part 1 of this Section.

LSV Metals Inc	Two Rivers Enterprises	BSI Inc.
Attn: Jason Johnson	Attn: Bob Struzyk	Attn: sales@bsidesigns.com
8424 Sunset Rd	490 River St. W, PO Box 70	601 E. 64th Ave, Bldg. A
Spring Lake Park, MN 55432	Holdingford, MN 56340	Denver, CO 80229
(612) 868-2252	(320) 746-3156	(303) 331-8777

C. Authorized custom millwork fabricators: The following companies have been approved for this project. Substitutions may be requested per the procedure specified in Part 1 of this Section.

ACS Fab, The Vollrath Company
Attn: Brandon Hansen
910 Hastings Ave Suite 150
Newport, MN 55055
(651) 285-0603

2.02 MATERIALS

A. Metals

1. Stainless Steel and Galvanized Steel Gauges Shall conform to the following thicknesses and tolerance. All gauges shall be within ±5% of the indicated thickness.

Gauge	Thickness
10	0.1406”
12	0.1094”
14	0.0781”

Gauge	Thickness
16	0.0625”
18	0.0500”
20	0.0375”

2. Standard Gauges of Fabricated Equipment elements:

10 Gauge Gusset plates.
12 Gauge Hat and "U" channel under bracing, hardware reinforcement.
14 Gauge Worktable tops, counter tops, dish table tops, drainboards, sinks, sink inserts, sink drainboards, and brackets.
16 Gauge Cabinet bases, mullions, elevated wall shelves, elevated wall cabinets, lower and intermediate shelves, legs, cross bracing, door fronts, drawer fronts, and panel skirts.
18 Gauge Door enclosures, drawer enclosures, access panels, removable covers, enclosure trim panels for walk-in cold storage rooms and kitchen ventilation systems, and trim strips, exhaust hoods, wall panels, and drawer pan inserts.

3. Stainless Steel

a. All stainless steel used in the fabrication of Fabricated Equipment shall be first-grade austenitic chromium-nickel alloys. Provide AISI Type 304 stainless steel unless otherwise specified. Ferritic and martensitic alloys are not acceptable unless otherwise specified or without approval from FC Design.

b. AISI Grade Specifications

AISI Grade	Cr	Ni	Mo	C	Remarks
Type 304	18.0-20.0%	8.0-10.5%	-	<0.07%	Standard
Type 304L	18.0-20.0%	8.0-12.0%	-	<0.03%	Low-C 304
Type 316	16.0-18.0%	10.0-14.0%	2.0-3.0%	<0.08%	Superior corrosion resistance
Type 316L	16.0-18.0%	10.0-14.0%	2.0-3.0%	<0.03%	Low-C 316
Type 317L	18.0-20.0%	11.0-15.0%	3.0-4.0%	<0.04%	Superior corrosion resistance
Type 321	17.0-19.0%	9.0-12.0%	-	<0.08%	Ti stabilized

c. Grind and polish surfaces producing a uniform, directional textured finish, free of cross scratches, tool, die marks and stretch lines. Polish exposed surfaces to a #4 (brushed) finish with the grain running parallel to the longer dimension for each piece. Remove any embedded foreign matter and leave surfaces chemically clean. Clean and deburr all edges and corners.

d. Exposed surfaces shall be protected from damage using a temporary strippable or peel-off covering.

e. ANSI Type 304, #4 mechanical finish, 180 grit, seamless or welded annealed, ground smooth, polished, heat treated and quenched to eliminate precipitation, drawn true, and polished with concentric grain.

4. Galvanized Steel: Provide Armco (or equivalent) hot-dipped, tight-coat galvanized iron. Use the largest sheets possible with as few joints as necessary. Smooth welded or damaged surface areas and cover with two coats of gray hammer-tone epoxy spray paint.
5. Gussets: Provide enclosed type with a minimum 3" top diameter. Continuously weld gussets to the underside of table top framework sink bottoms and drainboards.

B. Hardware
1. Fasteners: Bolts, screws, and nuts shall be stainless steel or the same material of the surface applied, spaced for best fastening. All exposed fastener threads shall be capped, including those located inside cabinets, with stainless steel lock washers and stainless steel cap nuts. Rivets are not an acceptable method of attachment.
2. Hinges shall be Component Hardware Model M75-5003 capable of 180°-270° opening unless otherwise approved. Use doweled cup and hinge screws for MDF installations. Provide Component Hardware Model M30-2400 magnetic and self-aligning catches when required for the hinge.
3. Drawer pulls shall be Component Hardware Model P46-1010 with brushed stainless finish unless otherwise specified.
4. Locks shall be Component Hardware P30 Series with stainless steel finish unless otherwise specified. Provide a master key that will open the locks of all foodservice equipment in each specified area.

C. Sound Deadening: All sound deadening on Fabricated Equipment shall be spray-on mastic unless otherwise specified.
1. The exposed underside of stainless steel work surfaces and sink bottoms shall have a smooth finish and coating shall be held 1" back from open edges. No coating may extend past the front sink cove corners.
2. Where sound deadening pads are specified, provide Schnee-Morehead or equal tape type sealant between all tops and under bracing and frame members.

D. Sealants: At minimum shall meet FDA's regulation #21 CFR 177.2600 and NSF C2 in foodservice area and/or ASTM C920 Type S, Grade NS in non-foodservice areas. Limit colors to aluminum, clear or white.

E. Glass: Provide a minimum 3/8" tempered, unless otherwise noted or specified.

F. Cutting Board: Shall be Richlite R50 or equal by Epicurean unless otherwise specified. All cutting boards shall be 1/2" thick unless otherwise specified and shall include 1" diameter finger hole when located below drawers.

G. Adhesives
1. Joint adhesives shall fully comply with the requirements and recommendations of the manufacturer of the adjacent materials. Use Akemi North America epoxy-type joint adhesive unless otherwise directed by the adjacent material manufacturer. The joint sealant shall be tinted to match quartz surfacing. Silicone joint seaming is not acceptable for adjoining solid surface and quartz composite materials.
2. Substructure Mounting Adhesive shall fully comply with the requirements and recommendations of the manufacturer(s) of the adjacent materials. Use flexible silicone, epoxy, or polyester adhesive unless otherwise directed by the adjacent material manufacturer(s).

H. Supports and backing shall be as detailed and fully comply with the Manufacturer's recommendations.

2.03 FABRICATED EQUIPMENT QUALITY STANDARDS

A. Remove burrs from sheared edges of metalwork, ease the corners, and smooth to eliminate a cutting hazard. Bend sheets of metal at not less than the minimum radius required to avoid grain separation in the metal. Maintain flat, smooth surfaces, without damage to the finish.

B. Reinforce metal at locations of hardware, anchorages, and accessory attachments wherever metal is less than 14 gauge or requires mortised application. Conceal reinforcements to the greatest extent possible. Neatly finish the reverse side. Depressions at these points are not acceptable.

C. Where components of Fabricated Equipment shall be galvanized and involve welding or Machining of metal heavier than 16 gauge, complete the fabrication and provide hot-dip galvanizing of each component to the greatest extent possible. Comply with ASTM A123 Standard Specification for zinc (hot-dip galvanized) coatings on iron and steel products.

PART 3 EXECUTION

3.01 STORAGE AND DELIVERY

A. All equipment shall be stored in a bonded or insured company warehouse. The storage space shall be dry, well-ventilated with the equipment placed on blocking at least 6” above the floor. All precautions shall be taken to prevent any corrosion or damage to the stored equipment. The storage location shall be open for inspection at any time prior to equipment installation.

B. The equipment shall be delivered to the project site in factory assembled units with protective crating and coverings free from manufactures defects or damage due to shipping, delivery, unloading or handling. Damaged items found prior to acceptance shall be rejected and must be immediately removed and replaced without additional costs or delays.

3.02 PRELIMINARY INSPECTION

A. The FSEC shall field verify the dimensions and conditions of all spaces where foodservice equipment installed in the scope of work is located. Conform to the finished building conditions and submit written notification to the Architect and Owner’s Representative if building conditions prevent equipment from functioning properly.

B. The FSEC shall coordinate the equipment dimensions with the building openings and construct equipment in sections sized to the limitations of the openings.

C. The FSEC shall field verify that the voltages, air volumes, water temperature, water pressure, gas pressure, and steam pressure meet the equipment requirements and coordinate changes to ensure proper operation.

D. The FSEC shall notify the Prime Contractor, Architect, and Owner’s Representative of any deficient conditions. It is not acceptable to cover deficient work. By commencing the installation of equipment, the FSEC excepts the site conditions. The FSEC is responsible of all expense(s) of changes to equipment and/or building element modifications necessary to receive and operate the equipment caused by the FSEC’s failure to coordinate with site conditions and or notify the Prime Contractor, Architect, and Owner’s Representative of deficient conditions.

3.03 INSTALLATION

A. Foodservice Equipment Installer Qualifications:
   1. The foodservice equipment Installer shall have at least five years of experience installing foodservice equipment on consultant specified projects of similar size and complexity.
   2. If field welds are required, the foodservice equipment Installer shall provide a currently certified NSF welder who is an employee of the Installer to perform all foodservice equipment field welding and polishing.
   3. Provide references for two projects of similar size and complexity completed within the past five years to the Owner’s satisfaction if requested.

B. The FSEC shall coordinate the installation schedule with the Prime Contractor and Owner’s Representative and shall comply with the requirements of the construction schedule including correcting deficient work. Submit written notification of any manufacturer or construction-related issues that are causing a delay in the equipment delivery and/or installation. The FSEC shall not delay the project completion.

C. The installation shall fully comply with the requirements of all applicable current national, state, and local codes.

D. Install trim to enclose the equipment to the adjacent building elements that cannot be sealed with silicone as specified and as required by code, whichever is greater. All trim material shall match the adjacent equipment surface. Exposed fasteners are not acceptable. unacceptable as a substitute for accuracy and neatness.

E. The FSEC shall use all reasonable means to protect the equipment, fixtures, and materials before, during and after the installation and prior to the final acceptance of the project. The foodservice equipment shall not be used for tool or material storage, work benches, scaffolding, stepladders, work platforms or stacking areas, by either the FSEC or other trades. The FSEC shall replace or repair items that are lost or damaged prior to Owner acceptance.

3.04 EXISTING EQUIPMENT

A. Existing equipment that is being removed or relocated shall be disconnected from connected utilities by licensed contractors as stated in Part 1 of this Section.
   1. The FSEC shall disassemble (if required), remove, and store until ready for installation all equipment that is to be relocated. Once the site conditions are ready for installation, the FSEC deliver and locate the equipment per plan and ready it for interconnections and final connections. It is expected that the equipment will be in the same working order as when it was removed from service.
   2. The FSEC shall submit an inventory identifying each piece of equipment removed, including all attachments and accessories, that states the working order of the equipment when removed from service to the Owner's Representative and FC Design for review.
   3. The Owner's Representative has the option to retain existing equipment. An authorized demolition contractor (not included in the FSEC scope of work) shall obtain written authorization from Owner's Representative to remove equipment from site. This contractor will remove and dispose of equipment that is not being relocated.

3.05 CLEANING

A. The FSEC shall remove masking and protective coverings from stainless steel and other finished surfaces.

B. Clean and polish equipment including glass, plastic, hardware, accessories, fixtures, and fittings prior to the inspection and acceptance of the Work.

C. Existing equipment shall be installed in the same state as when it was removed from service.

3.06 START-UP AND DEMONSTRATION

A. Start-up
   1. All electrical, plumbing, and gas connections to the equipment shall be completed prior to beginning start-up. This includes ensuring that the utility connections have been fully tested, purged, sanitized, and adjusted. The FSEC shall obtain written confirmation for each trade that this is complete.
   2. The FSEC shall provide factory-authorized representatives to perform the equipment start-up and test the full range of operation for all new foodservice equipment provided. The representatives shall make all necessary adjustments for the equipment installation and calibration.
      a. Start and run all refrigeration equipment for a minimum of 48-hours and verify that it operates as intended and holds the design temperatures within the Manufacture’s operating tolerance and without excess noise or vibration. New equipment not holding temperature shall be immediately repaired or replaced.
      b. Coordinate dishmachine testing with Detergent Vendor.
      c. Properly activate water filtration systems for the foodservice equipment per Manufacturer's recommendations.
      d. Calibrate controls, operating temperatures, pressure regulators, gas burners, motor rotations, and safety switches.
   3. The FSEC shall provide a letter of completion to the Architect and Owner’s Representative stating that all equipment provided and/or installed by the FSEC has been completely inspected, adjusted, calibrated by the FSEC or an authorized service agent after the FSEC has completed all final equipment testing and training demonstrations to the owner’s satisfaction.

B. Demonstration and Training
   1. The FSEC shall organize, schedule, and coordinate equipment operating and maintenance training demonstration(s) with the Owner’s Representative. After coordinating availability with the Owner’s Representative and Manufacturer’s Representatives, the FSEC shall submit a training schedule to the Owner’s Representative.
   2. Provide copies of all instructional, operational, maintenance manuals, charts and audio and video media at least two weeks prior to demonstration.
   3. Authorized Manufacturer’s Representatives and/or service technicians shall review data manuals and provide hands-on operational, cleaning, and maintenance instructions to the Owner’s Personnel and the appropriate inspectors for each piece of serialized equipment and Fabricated Equipment.
   4. The FSEC shall host the training demonstrations on site and provide a written record of the attendees and a list of unresolved questions raised from the training session to the Architect.

5. Submit a combined chart summarizing the demonstrations that includes the item number, equipment description/category, date of training, person and firm responsible for the training, and attending Owner's Representative's initials.

3.07 WARRANTY

A. General Foodservice Equipment Warranty: The following warranty shall not deprive the Owner of other rights they are entitled to under other provisions of the contract documents. The following warranty shall be in addition to and run concurrently with warranties under other provisions of the contract documents.
   1. The FSEC shall provide a one-year parts and labor warranty for all new foodservice equipment specified in this section beginning on the beneficial date of occupancy.
   2. The FSEC shall provide a minimum of a five-year replacement compressor warranty on all refrigeration equipment that covers the total cost of the compressor replacement. The FSEC shall provide a one-year service contract that covers repairs without charge for materials, labor, and travel on all new refrigeration systems specified in this Section. If a malfunction occurs outside of the one-year service contract period, the owner shall be responsible for labor costs unless the malfunction is caused by improper installation. The FSEC shall be responsible for all repair costs caused by improper installation.
   3. The FSEC shall respond to the Owner's request for service on refrigeration systems within 4 hours or less to reduce the loss of food product. The FSEC shall respond to the Owner's request for service on equipment without refrigeration systems within 24 hours of request.

B. The FSEC shall obtain a letter of substantial completion from the Prime Contractor stating the beneficial date of occupancy. All warranties shall start on the beneficial date of occupancy.

C. The FSEC shall provide completed copies of all warranty documents with the Closeout Documents.

3.08 ITEM SPECIFICATIONS

A. The following item specifications are based on the model numbers available at the time of preparing the construction documents. The FSEC shall notify FC Design if these models are not available at the time of bid in accordance with the requirements listed in Part 1 of this Section.

B. The FSEC shall provide the following specified foodservice equipment items or approved alternates in accordance with the requirements listed in Part 1 of this Section.

C. Consolidate equipment manufacturers to provide a single point of contact to the Owner.
   1. All walk-in cold storage room refrigeration systems shall be manufactured by a single company.
   2. All reach-in refrigeration equipment shall be manufactured by a single company.
   3. All stainless steel Fabricated Equipment shall be manufactured by a single company.
   4. All millwork Fabricated Equipment shall be manufactured by a single company.
   5. All plumbing fixtures shall be manufactured by a single company.
   6. All ice machines shall be manufactured by a single company.
   7. All ranges shall be manufactured by a single company.

ITEM 1 - 48" X 24" X 84"H 5-TIER PLASTIC SHELVING UNIT (6 REQ'D)
Cambro Model EXU184884VS5480

Stationary Starter Unit, 18"W x 48"L x 84"H, 5-tier, withstands temperature from -36°F (-38°C) to 190°F (88°C), includes: (4) vented and (1) solid reinforced polypropylene shelf plates with antimicrobial protection, (4) composite posts with leveling feet installed, pre-assembled post connectors & wedges, (10) Universal Traverses & (5) bags of 4 dovetails (10 left, 10 right), speckled gray, 800 lbs. capacity per shelf /2,400 lbs. max capacity, Made in USA, NSF

ITEM 2 - 3-SEC. HALF DOOR REACH-IN FREEZER (1 REQ'D)
Continental Refrigerator Model 3FNHD

Freezer, reach-in, three-section, self-contained refrigeration, stainless steel front, aluminum interior & ends, standard depth, half-height solid doors, electronic controller w/ digital display, electric condensate evaporator, 115v/208-230v/60/1-ph, NEMA L14-20P

1 ea. Standard warranty 7 year parts, labor, and compressor
1 ea. Left Door hinged on left, center & right doors hinged on right
1 ea. 5" Casters

ITEM 3 - 3-SEC. HALF DOOR REACH-IN REFRIGERATOR (1 REQ'D)
Continental Refrigerator Model 3RNHD

Refrigerator, reach-in, three-section, self-contained refrigeration, stainless steel front, aluminum interior & ends, standard depth, half-height solid doors, electronic controller w/ digital display, electric condensate evaporator, ENERGY STAR. 115v/60/1-ph, cord, NEMA 5-15P

1 ea. Standard warranty 7 year parts, labor, and compressor
1 ea. Left Door hinged on left, center & right doors hinged on right
1 ea. 5" Casters

ITEM 4 - 120" X 30" WORKTABLE WITH PREP SINKS AND OPEN-FRONT CABINET BASE (1 REQ'D)
Approved Fabricator Model Q-12030PWT

Worktable with prep sink(s) and open-front cabinet base, 120"W x 30" front-to-back x 42"H, 36" work height.
Top: 14ga., type-304 stainless steel top with type-C marine edge, 2"D x 10"H type-A backsplash with (1) set of 8" O.C. faucet holes, and type-B framework with sound deadening pads between all support channels and the top.
Base: 16ga. type-304 stainless steel open-front cabinet base with 2"W mullions and lower shelf with type-B framework with sound deadening pads between all support channels and the lower shelf on 6"H legs with adjustable bullet feet. The base shall be removable from the top. Refer to plans and elevations for specific sizing. Refer to fabrication details. Ref. QF222/View C

1 ea. Model Q-TUB-SKIRT - Tub skirt, full 16ga., type-304 stainless steel construction to enclose sink bowls. Refer to plans and elevations for specific sizing. Refer to fabrication details.
2 ea. Model Q-SINK-PREP 14ga., type-304 stainless steel Type-E Prep sink with integrated lip for custom fitting board. Weld-in undermount sink with rear overflow cutout, and 3-1/2" drain opening. Include cutout, welding, and polishing. Ref. QF601/FD-07 & FD-08
1 ea. Work drawers, stacked, (3) Type-B 15"W x 20" front-to-back x 5"H, 16ga., type-304 stainless steel frame and flush in fit type drawer faces with soft-close, self-closing roller bearing slides and removable inserts. Housing: 16ga., type-304 stainless steel fully-enclosed drawer housing. Refer to plans and elevations for specific sizing. Refer to fabrication details. Ref. QF601/FD-05
2 ea. 14ga., type-304 stainless steel Cutting board support bracket. 16” Front-to-back x 2”W.

ITEM 4.1 - PREP SINK FAUCET WITH ULTRARINSE (1 REQ'D)
T&S Brass Model B-0231-U12-CR

UltraRinse 8” wall mount mixing faucet with polished chrome plated brass body, 12” swing nozzle with stream regulator outlet, 10 3/8" 1.5 GPM multiple tip sprayer arm, ceramic cartridges with spring checks, lever handles, and 1/2” NPT female inlets. Certified to ASME A112.18.1/CSA B125.1, NSF 61-Section 9 and NSF 372. Meets ADA ANSI/ICC A117.1 requirements.

This item is an accessory to the item above and is not tagged or scheduled.

ITEM 4.2 - MODULAR WASTE DRAIN WITH OVERFLOW (2 REQ'D)
T&S Brass Model B-3992-01

Modular Waste Drain Valve, with pull handle, 3-1/2" sink opening, 2" NPT male / 1-1/2" female outlet & overflow tube with head assembly

This item is an accessory to the item above and is not tagged or scheduled.

ITEM 4.3 – COMPOSITE CUTTING BOARD / PREP SINK COVER (2 REQ'D)
AllPoints Model CUSTOM-RICHLITE-19.75X15.75X0.75

Cutting Board, 19-3/4"L x 15-3/4"W x 3/4" thick, 350°F maximum temperature rating, warp resistant, non-absorbent, Richlite

This item is an accessory to the item above and is not tagged or scheduled.

ITEM 5 - 106" X 18" PLASTIC PREP WALL GRID SHELVING UNIT (1 REQ'D)
Cambro Model WALL SHELF

1 ea. Model EWS36PREP110 - Wall Shelving Prep Station Starter Kit, 18" x 36" x 30-1/4", includes: (1) 40" aluminum wall track, (2) 30" wall uprights, (2) 18" deep universal shelf brackets, (1) 18" x 36" vented shelf with antimicrobial shelf plates, (1) 18" x 36" hanging pegboard, 304 stainless steel accessories: (2) large wire baskets, (1) small shelf/lid holder, (1) cylinder and holder & (8) peg hooks, black, NSF, Made in USA

2 ea. Model EWSA36PREP110 - Wall Shelving Prep Station Add-On Kit, 18" x 36", includes: (1) 40" aluminum wall track, (1) 30" wall upright, (1) 18" deep universal shelf bracket, (1) 18" x 36" vented shelf with antimicrobial shelf plates, (1) 18" x 36" hanging pegboard, black, NSF, Made in USA

ITEM 6 - SPARE NO.

ITEM 7 - 48" X 24" X 84"H 5-TIER PLASTIC SHELVING UNIT (1 REQ'D)
Cambro Model EXU244884VS5480

Stationary Starter Unit, 24"W x 48"L x 84"H, 5-tier, withstands temperature from -36°F (-38°C) to 190°F (88°C), includes: (4) vented and (1) solid reinforced polypropylene shelf plates with antimicrobial protection, (4) composite posts with leveling feet installed, pre-assembled post connectors & wedges, (10) Universal Traverses & (5) bags of 4 dovetails (10 left, 10 right), 800 lbs. capacity per shelf /2,400 lbs. max capacity, speckled gray, Made in USA, NSF

ITEM 8 - 36" X 24" X 84"H 5-TIER PLASTIC SHELVING UNIT (1 REQ'D)
Cambro Model EXU243684VS5480

Stationary Starter Unit, 24"W x 36"L x 84"H, 5-tier, withstands temperature from -36°F (-38°C) to 190°F (88°C), includes: (4) vented and (1) solid reinforced polypropylene shelf plates with antimicrobial protection, (4) composite posts with leveling feet installed, pre-assembled post connectors & wedges, (10) Universal Traverses & (5) bags of 4 dovetails (10 left, 10 right), 800 lbs. capacity per shelf /2,400 lbs. max capacity, speckled gray, Made in USA, NSF

ITEM 9 - 75" X 75" CORNER THREE-COMPARTMENT SINK (1 REQ'D)
Approved Fabricator Model Q-75753CS

Corner Three-compartment sink, 74 1/2"W x 74 1/2"D x 44"H, 33" work height.
Top: 14ga., type-304 stainless steel top with type-B raised rolled edge, 2"D x 10"H type-A backsplash with (2) set(s) of 8" O.C. faucet holes, and 30" left and right drainboards with type-C framework and sound deadening pads between all support channels and the top.
Base: 16ga. type-304 stainless steel 1-5/8" dia. legs with adjustable bullet feet and 1-5/8" dia. cross bracing with welded set-up. The base shall be removable from the top.
Refer to plans and elevations for specific sizing. Refer to fabrication details.

3 ea. 10”W x 20” Front-to-Back x 12”D sinks with overflow cutout

ITEM 9.1 - SPLASH MOUNT FAUCET (1 REQ'D)
T&S Brass Model B-0231-CR

Sink Mixing Faucet, wall mount, 8" centers, 12" swing nozzle, lever handles, ceramic cartridges, 1/2" NPT female inlets, low lead, ADA Compliant

This item is an accessory to the item above and is not tagged or scheduled.

ITEM 9.2 - MODULAR WASTE DRAIN WITH OVERFLOW AND EXTENDED HANDLE (3 REQ'D)
T&S Brass Model B-3992-01-3X

Modular Waste Drain Valve, with pull handle, 3-1/2" sink opening, 2" NPT male / 1-1/2" female outlet, overflow tube with head assembly, 3" handle extension

This item is an accessory to the item above and is not tagged or scheduled.

ITEM 10 – WAREWASHING PRE-RINSE WITH ADD-ON FAUCET (1 REQ'D)
T&S Brass Model B-0133-12CRBJST

Pre-Rinse Unit, 8" wall mount, add on faucet 12" swivel nozzle, Ceramic cartridges with check valves, lever handles, 18" riser, 44" flexible stainless steel hose, 1.07 GPM, accessory fitting, wall bracket, low lead, NSF

ITEM 11 - HIGH TEMP UNDERCOUNTER DISHMACHINE (1 REQ'D)
Hobart Model LXNR-5

LXe Advansys Dishwasher, undercounter with 17” door opening height, 208-240v/60/3ph, accommodates optional two-level racking accessory, high temperature sanitizing, Steam elimination and Energy Recovery, 30, 24, 13 Racks/Hour, Fresh Water Rinse, .62 gal/rack, Complete Delime with Delime Notification, Auto Dispensing, and Booster Guard, 3 selectable cycles - light, normal, heavy, touchscreen controls with SmartConnect app, Service Diagnostics, Detergent, Chemical Pumps with Auto Prime, cULus, NSF, ENERGY STAR. Factory Startup. Include all necessary travel

- 1 ea. Standard warranty - 1-Year parts, labor & travel time during normal working hours within the USA
- 1 ea. Hobart Care Unlimited: M-F, 8am - 5pm, weekday coverage for all calls, unlimited number of calls, (1) business day response for emergency calls, (3) business day response for non-emergency calls (FSEC Shall provide documentation of service agreement with closeout submittals.)
- 1 ea. Model DWT-ADV-LXN Drain water tempering kit
- 1 ea. Model WTRHAM-ARREST Water Hammer Arrestor Kit - Includes 3/4" brass pressure regulator valve
- 1 ea. Model DOORLOCK-LXN Automated door lock prevents opening of door before cycle is complete
- 1 ea. Model PUMPDRN-AIRGAP Pumped Drain Air Gap Kit

ITEM 11A – WATER SOFTENER CONDITIONER (1 REQ'D)
Hobart Model WS-40

Water Softening System, 2,527 grains/lb capacity, 5 gallons regeneration volume, & salt alarm, holds 1 40lbs bag of salt. Installed by Division 22.

ITEM 12 - 22" X 16" TUBULAR SORTING SHELF (1 REQ'D)
Approved Fabricator Model Q-SORTING-SHELF-TUBULAR

Shelf, sorting, wall-mounted, slanted, tubular, 22"W x 18"D x 12"H, full 16ga., type-304 stainless steel construction with 1-5/8" dia. tubing and welded set-up

ITEM 13 - 36" X 18" WAREWASHING PLASTIC WALL GRID SHELF UNIT (1 REQ'D)
Cambro Model EWS36SINK110

Wall Shelving Sink Station Starter Kit, 18" x 36" x 30-1/4", includes: (1) 40" aluminum wall track, (2) 30" wall upright, (2) 18" deep universal shelf brackets, (1) 18" x 36" vented shelf with antimicrobial shelf plates, (1) 18" x 36" hanging pegboard, 304 stainless steel accessories (1) large wire basket, (1) small shelf/lid holder, (1) cylinder and holder & (1) 6" peg hooks, black, NSF, Made in USA

ITEM 14 - SPARE NO.

ITEM 15 - HAND SINK WITH KNEE-VALVE APRON (1 REQ'D)
John Boos Model PBHS-W-1410-KV1APS

Hand Sink, wall mount, 14"W x 10"D front-to-back x 5" deep bowl, 3-1/2"H splash mount gooseneck faucet, knee activated with hinged front apron, 2" drain opening with basket drain, includes: mounting bracket, stainless steel construction, NSF

1 ea. Model PB-HSSS1410L Side Splash, 15-1/4"W x 9-3/4"H, for left side of hand sink with splash mount faucet, bolt on, ships loose for field installation, includes: installation hardware, 18/300 stainless steel (per each)
1 ea. Model PB-HSSS1410R Side Splash, 15-1/4"W x 9-3/4"H, for right side of hand sink with splash mount faucet, bolt on, ships loose for field installation, includes: installation hardware, 18/300 stainless steel (per each)
1 ea. Model PB-MV Tempering Valve, manual temperature mixing valve with built in check valves, rough chrome finish, 9/16 -24 UNEF threads to accept 3/8" compression female hose fitting

ITEM 16 - TRASH RECPECTICALES (11 NOT IN CONTRACT)
Trash Cans

ITEM 17 - SPARE NO.

ITEM 18 - 48" X 12" WALL SHELF (1 REQ'D)
Approved Fabricator Model Q-4812WS

Shelf, wall-mounted, 48"W x 12"front-to-back x 9-1/2"H
Top: 16 ga. type-304 stainless steel top with type-A safety edge and 1-1/2"H rear turn-up.
Wall Brackets: 14 ga. type-304 stainless steel wall brackets. Ref. QF601/FD-10
Refer to plans and elevations for specific sizing. Refer to fabrication details.

ITEM 19 - 48" X 16" WALL SHELF (1 REQ'D)
Approved Fabricator Model Q-4816WS

Shelf, wall-mounted, 48"W x 16"front-to-back x 12"H
Top: 16 ga., type-304 stainless steel top with type-A safety edge and 1-1/2"H rear turn-up.
Wall Brackets: 14 ga., type-304 stainless steel wall brackets. Ref. QF601/FD-10
Refer to plans and elevations for specific sizing. Refer to fabrication details.

ITEM 20 - VENTLESS RAPID COOK OVEN (2 REQ'D)
UNOX USA Model XASR-03HS-EDDS

Convection and Speed Baking Oven (3 PHASE), (3) 18" x 13" trays speed bake capacity, (1) 18" x 13" tray speed capacity, 3.5kW convection, 6.5kW microwave, 86°F to 500°F temperature range, safety thermostat, stackable, 9-baking steps, (24) quick programs, (896) memory programs, touch screen control panel, wi-fi integrated, USB port, rapid cook, LED interior light, solid pull down door, (3) TG305 trays & (1) TG360 Plate tray included, stainless steel interior & exterior, 208-240v/60/3-ph, IPX3 (includes 6.5 ft cable and plug).
1 ea. Model INSTALL FORM End User Data & Installation Confirmation Form
2 ea. 1 year parts and 1 year labor warranty

ITEM 21 - 48" WORKTOP FREEZER (1 REQ'D)
Continental Refrigerator Model SWF48N-FB-D

Work Top Freezer, Front Breathing, 48" wide, two-section, stainless steel flat top, (4) drawers, accommodates (1) 12 x 18 x 6 pan per drawer or (1) 1/2 x 6 pan & (1) 1/3 x 6 pans per drawer capacity (supplied by others), stainless steel front and end panels, aluminum interior, 3-3/4" casters, electronic controller w/ digital display, rear mounted self-contained refrigeration
1 ea. Standard warranty: 7 year parts, labor, and compressor
1 ea. 115v/60/1-ph, cord, NEMA 5-15P
1 ea. Stainless steel interior
1 ea. Stainless steel finished back

ITEM 22 - HEATED PIZZA HOLDING CABINET (2 REQ'D)
FWE / Food Warming Equipment Co., Inc. Model HLC-1717-11-UC

Handy Line Heated Cabinet, undercounter, (11) 17" pizza box capacity, (11) shelves, 2" fixed spacing, radiant heat system, adjustable thermostat, recessed controls, insulated, (1) solid door, recess mounted hand grips, stainless steel interior & exterior, 2" swivel casters, NSF, UL, cULus, UL EPH CLASSIFIED, IPX4. 120v/50/60/1-ph, 4.2 amps, 500 watts, NEMA 5-15P

1 ea. Two year limited parts & one year labor warranty
1 ea. For freight & shipping information, please contact factory
1 ea. Electronic Control
1 ea. Standard door(s)

ITEM 23 - 74" X 54" DUAL-SIDED WORKTABLE WITH CABINET BASE (1 REQ'D)
Approved Fabricator Model Q-7454EXPO

Work table with open-front & hinged-door cabinet base, 74"W x 54" front-to-back x 42"H, 36" work height.
Top: 14ga., type-304 stainless steel flat top with type-A saftey edge, and type-B framework with sound deadening pads between all support channels and the top.
Base: 16ga., type-304 stainless steel 1-section employee side open-front cabinet base and 1-section customer side hinged-door cabinet base with 2"W mullions, adjustable midshelf with type-B framework, and lower shelf with type-B framework with sound deadening pads between all support channels and the lower shelf on 6"H legs with adjustable bullet feet. Removeable stainless steel toe kick plate front. All doors and drawers to have soft-closing hinges and slides.
Refer to plans and elevations for specific sizing. Refer to fabrication details.

2 ea. Model Q-DRAWER-SINGLE Type-A Work drawer, single, 12"W x 20" front-to-back x 5"H, 16ga., type-304 stainless steel frame and flush in fit type drawer faces with soft-close, self-closing roller bearing slides and removable inserts. Ref. QF601/FD-05
Housing: 18ga., type-304 stainless steel fully-enclosed drawer housing.
Cutting board slides: 16ga., type-304 stainless steel cutting board slides. FSEC shall provide (1) appropriately sized 1/2" thick Richlite composite cutting board with routed finger pull in bottom.
Refer to plans and elevations for specific sizing. Refer to fabrication details.

ITEM 24 - 72" X 12" TABLE-MOUNTED OVERSHELF (1 REQ'D)
Approved Fabricator Model Q-OVERSHELF

Overshelf, table-mounted, single 72"W x 12" front-to-back, 16ga., type-304 stainless steel with type-A edge, welded set-up with type-B framework and sound deadening pads between all support channels and the shelf. Refer to fabrication details.

ITEM 25 - 60" 2-TIER HOT FOOD SHELF (1 REQ'D)
Hatco Model GR2SDH-60D

Horizontal Display Warmer, countertop, (2) shelves (24) rods, thermostat, pre-focused infrared top heat, incandescent light, hardcoat aluminum base, tempered glass end panels, designer panels & corner caps, 4" legs, 4420 watts, cULus, UL EPH Classified, Made in USA. 120/208v/60/1-ph, 4420 watts, 18.4 amps, NEMA L14-30P, standard

1 ea. One year on-site parts & labor warranty, plus one additional year parts only warranty on all Glo-Ray metal sheathed elements
1 ea. Model STANDARD Clear Anodized Aluminum housing, finish
1 ea. Model STANDARDBLACK Black, designer inset panel color
1 ea. Model BLACK Black, designer corner cap color

ITEM 26-27 - SPARE NO.

ITEM 28 - 57" 2-SEC. REACH-IN REFRIGERATOR (2 NOT IN CONTRACT)
Not in Contract – By Vendor

Electrical: 115/60/1 6.3 amps, NEMA 5-15P.
FSEC shall coordinate utilities of owner furnished equipment and include on coordination drawings.

ITEM 29 - 52 OZ. POPCORN POPPER (1 REQ'D)
Gold Medal Products Model 2911EB

Medallion 52 oz. Popcorn Machine with base, electric, floor model, 52 oz. stainless steel kettle, Big Eye Electronic Heat Control, 3-way filter system, forced air popcorn crisping system, reversible dome, LED backlit sign, LED cabinet lighting, oil dispense system, cETLus, CE. 120/208v/60/1-ph, 7177 watts, NEMA 14-50P

1 ea. 2 year parts & 6 months labor warranty

ITEM 30 - 130" X 30" WOKRTABLE WITH HINGED-DOOR CABINET BASE AND HANDSINK (1 REQ'D)
Approved Fabricator Model Q-9630WCWHS

Work table with open-front with (1) hinged-door cabinet base, 130"W x 30" front-to-back x 42"H, 36" work height.
Top: 14ga., type-304 stainless steel top with type-A safety edge, 1-1/2"D x 6"H type-A backsplash, and type-B framework with sound deadening pads between all support channels and the top.
Base: 16ga., type-304 stainless steel open-front with (1) hinged-door cabinet base with 2"W mullions and lower shelf with type-B framework with sound deadening pads between all support channels and the lower shelf on 6"H legs with adjustable bullet feet. All doors must have soft closing hinges.
Refer to plans and elevations for specific sizing. Refer to fabrication details.

1 ea. Model Q-STEPDOWN Step-down top for worktable to 24" work height, sized per plans and elevations.
1 ea. Model Q-HANDSINK Weld-in 10”W x 14” front-to-back x 8” D hand sink with stainless steel splash guard on left side 10”H. (1) 4” O.C. faucet holes in deck.
1 ea. Model Q-CUTOUT Provide a 23.375"W x 24"D cutout for item #43 in the base. Reference the plans and elevations.
1 ea. Model Q-CUTOUT Provide a 12” x 12” plumbing cutout in rear panel for plumbing connects. Reference the plans and elevations.
1 ea. Model Q-MIDSHELF 16ga., type-304 stainless steel Adjustable midshelf, 16”W x 24” Front-to-Back, with type-B framework with sound deadening pads between all support channels.
1 ea. Model Q-TOEKICK Stainless steel removable toe kick on exposed front.

ITEM 30.1 - DECK MOUNT FAUCET (1 REQ'D)
T&S Brass Model B-1141-04-CR

Faucet Workboard, swivel, deck mount, 11-3/8" long, gooseneck, 4" centers, lever handles, ceramic cartridges, check valves, includes: lock washer (014200-45), 2.2 GPM aerator, low-lead, polished chrome, 1/2" male NPT, ADA Compliant, ANSI, NSF

This item is an accessory to the item above and is not tagged or scheduled.

ITEM 31 - NACHO CHEESE DISPENSER (1 REQ'D)
Global Solutions by Nemco Model GS1555

Nacho Cheese Dispenser, (2) 140 oz. bag capacity, (3) button dispensing control with adjustable setting, 120v/60/1-ph., 1.9 amps, 225 watts, NEMA 5-15P, cULus, UL EPH

1 ea. One year warranty against mechanical defects, exclusive of blades

ITEM 32 - CHIP WARMER (1 REQ'D)
Hatco Model FST-1-MN

Chip Warmer, rear loading & dispensing door, with main deck shelf only, approximately 40 lbs. capacity, forced air heat with display light, anodized bronze finish frame with tempered glass sides, 1245 watts, cULus, UL EPH Classified, Made in USA. 120v/60/1-ph, 1245 watts, 10.4 amps, NEMA 5-15P

1 ea. One year on-site parts & labor warranty, plus one additional year parts only warranty on all Flav-R-Fresh metal sheathed air heating elements

ITEM 33 - HOT DOG ROLLER WITH HEATED BUN DRAWER (1 REQ'D)
Gold Medal Model 8123PE

Hot Dog Grill, roller style, (3) tier, (45) hot dog capacity, each tier has own temperature control & motor, recessed controls, stainless steel high temperature non stick rollers, UL, cUL, CE, NSF. 120v/60/1, 1740 watts, 14.5 amps, NEMA 5-15P

ITEM 33A - HOT DOG ROLLER WITH HEATED BUN DRAWER -FRONT COUNTER (1 REQ'D)
Gold Medal Model 8123PE

Hot Dog Grill, roller style, (3) tier, (45) hot dog capacity, each tier has own temperature control & motor, recessed controls, stainless steel high temperature non stick rollers, UL, cUL, CE, NSF. 120v/60/1, 1740 watts, 14.5 amps, NEMA 5-15P

ITEM 34 - COUNTERTOP FOOD WARMER (3 REQ'D)
Hatco Model HW-FUL

Food Warmer, electric, countertop, (1) 1/1 pan capacity, wet/dry operation, thermostatic controls, stainless steel construction, 1200 watts, 10.0 amps, CE, cULus, UL EPH Classified. 120v/60/1-ph, 1200 watts, 10.0 amps, NEMA 5-15P

- 3 ea. One year parts & labor warranty
- 3 ea. Model 4QT-PAN 4 Quart round pan, stainless steel
- 3 ea. Model 4QT-LID Lid, round hinged & notched, 4 quart

ITEM 35 - COFFEE BREWER (1 NOT IN CONTRACT)
By Vendor Model Coffee Machine

ITEM 36 - COFFEE BREWER WATER FILTRATION SYSTEM (1 REQ'D)
3M Purification Model BREW125-MS

Water Filtration Products Water Filter System, 15-1/2"H x 4-1/2"D, valve-in-head, high turbidity water, single vessel, SQC style, 1/4-turn shut off valve, max pressure of 125 psi at 100°F, for cyst, sediment, chlorine taste and odor, scale, 1 micron, 1.5 gpm flow rate, 10,000 gallons capacity, includes: (1) integral mounting bracket (1) o-ring seal cartridge filter, 3/8" FNPT connections, NSF certified.

ITEM 37-38 - SPARE NO.

ITEM 39 - 144" X 30" WORKTABLE HINGED DOOR CABINET BASE WITH HANDSINK (1 REQ'D)
Approved Fabricator Model Q-14430WTWHS

Work table with hinged-door cabinet base, 144"W x 30" front-to-back x 42"H, 36" work height.
Top: 14ga., type-304 stainless steel top with type-A safety edge, 1-1/2"D x 6"H type-A backsplash, and type-B framework with sound deadening pads between all support channels and the top.
Base: 16ga., type-304 stainless steel hinged-door cabinet base with 2"W mullions and lower shelf with type-B framework with sound deadening pads between all support channels and the lower shelf on 6"H legs with adjustable bullet feet. 12” x 12” plumbing cutout in rear panel for plumbing connects. Adjustable midshelf with type-B framework with sound deadening pads between all support channels. All doors must have soft closing hinges. Stainless steel removable toe kick.
Refer to plans and elevations for specific sizing. Refer to fabrication details.

- 1 ea. Model Q-HANDSINK Weld-in 10”W x 14” front-to-back x 8” D hand sink with stainless steel splash guard on left & right side 10”H. (1) 4” O.C. faucet holes in deck.
- 1 ea. Model Q-CUTOUT Provide a 12” x 12” plumbing cutout in rear panel for plumbing connects. Reference the plans and elevations.
- 2 ea. Model Q-CUTOUT Provide a 4” round cutout in front panel for cup dispenser. Reference the plans and elevations.
- 1 ea. Model Q-MIDSHELF 16ga., type-304 stainless steel Adjustable midshelf, 32”W x 24” Front-to-Back, with type-B framework with sound deadening pads between all support channels.
- 1 ea. Model Q-TOEKICK Stainless steel removable toe kick on exposed front and left side.

ITEM 39.1 - DECK MOUNT FAUCET (1 REQ'D)
T&S Brass Model B-1141-04-CR

Faucet Workboard, swivel, deck mount, 11-3/8" long, gooseneck, 4" centers, lever handles, ceramic cartridges, check valves, includes: lock washer (014200-45), 2.2 GPM aerator, low-lead, polished chrome, 1/2" male NPT, ADA Compliant, ANSI, NSF

This item is an accessory to the item above and is not tagged or scheduled.

ITEM 39.2 - DISPOSABLE CUP DISPENSER (2 REQ'D)
Dispense-Rite Model ADJ-2F

Cup Dispenser, in-counter, adjustable, one spring (F), accommodates cups 8 oz. to 44 oz. with rim diameter range 3" - 4-5/8", ring bezel 6-7/8", 22" long, stainless steel construction, foam cups any position mounting, paper or plastic cups in horizontal mounting only, NSF

2 ea. Model UCMB-2 Optional Undercounter Mounting Bracket, 9-1/8"H x 7-3/4"W x 4-3/4"D, for ADJ-2 or BFL-2 dispensers, mounts to any flat surface or wire shelf, 1-5/8" maximum counter lip, stainless steel
2 ea. 1 year limited warranty

This item is an accessory to the item above and is not tagged or scheduled.

ITEM 40 - POPCORN HOLDING CASE (1 REQ'D)
Gold Medal Products Model 2002

Astro Staging Cabinet, with swing-out doors, LED lighted sign, 2001 watts, 120v/60/1-ph, NEMA 5-20P, cULus, NSF

ITEM 41-42 - SPARE NO.

ITEM 43 – BUILT-IN WARMER DRAWER (2 REQ'D)
Hatco Model HDW-1B

Warming Drawer Unit, Built-in, one drawer, includes (1) standard 6" deep food pan, stainless steel construction, thermostatic controls, NSF, cULus, Made in USA. 120v/60/1-ph, 450 watts, 3.8 amps, hardwired

2 ea. 2-Yr Warranty on drawer warmer heating elements against burnout
2 ea. 2-Yr Warranty on drawer slides & rollers against breakage
2 ea. Stainless Steel Drawer Front
2 ea. Standard drawer pan

ITEM 44 - 276" X 33" FRONT COUNTER WORKTABLE WITH CABIENT BASE (1 REQ'D)
Approved Fabricator Model Q-27633FC

Worktable with open-front cabinet base, 276"W x 33" front-to-back x 42"H, 36" work height.
Top: 14ga., type-304 stainless steel top with type-A safety edge, 1"D x 4"H type-B backsplash, for coiling door provisions, Ref. QF602/CD-04 & CD-05, and type-B framework with sound deadening pads between all support channels and the top. (2) 2-1/2" grommeted hole cutout for appliance cord. (3) bolted hairline field joint provision.
Base: 16ga., type-304 stainless steel open-front cabinet base with 2"W mullions and lower shelf with type-B framework with sound deadening pads between all support channels and the lower shelf on 6"H legs with adjustable bullet feet. With cashier drawers. Wire chase for appliances in center on counter.
Load center for equipment in center, POS Systems, Coffee warmers, and Hot Dog Roller.
Refer to plans and elevations for specific sizing. Refer to fabrication details.

1 ea. Model Q-WALL CAP/LANDING 240" x 8" wall cap for coiling door opening. Ref. QF602/CD-04 & CD-05
1 ea. Model Q-STEPDOWN Step-down top for worktable to 24" work height, sized per plans and elevations.
1 ea. Model Q-NOTCH Notched for column.
2 ea. Model Q-FIELD JOINT Hairline Field Joint Provision, Bolted in field by FSEC.
1 ea. Model Q-FIELD JOINT Field Joint Provision, Welded in field by FSEC.
1 ea. Model Q-CUTOUT Provide a 23.375"W x 24"D cutout for item #43 in the base. Reference the plans and elevations.

ITEM 45 - POS SYSTEM (4 NOT IN CONTRACT)
By Vendor Model POS SYSTEM

Point-of-Sale System - By Vendor.

ITEM 46 - MOBILE DRAWER CABINET (2 REQ'D)
John Boos Model 4CD4-2724-C

Mobile Drawer Cabinet, 24"W x 26-1/2"D x 33-3/4"H, 14/300 stainless steel flat top, with Stallion Safety Edge front, 18/400 stainless steel wrap, (3) tier 15" x 20" drawers, 5" casters with brakes, NSF

ITEM 47 - REACH-IN UNDERCOUNTER FREEZER (2 REQ'D)
Continental Refrigerator Model SWF27N-U-D

Undercounter Freezer, 27" wide, one-section, accommodates (1) 12 x 20 x 6 pan per drawer (supplied by others), stainless steel front, top and end panels, aluminum interior, 1-3/8" diameter plate casters, front breathing, electronic controller w/ digital display,rear-mounted self-contained refrigeration. 115v/60/1-ph, cord, NEMA 5-15P

2 ea. Standard warranty 7 year parts, labor, and compressor
2 ea. Stainless steel interior
2 ea. Stainless steel finished back

ITEM 48-49 - SPARE NO.

ITEM 50 - 62" X 32" WORKTABLE WITH OPEN-FRONT CABINET BASE (1 REQ'D)
Approved Fabricator Model Q-6232WT

Work table with open-front cabinet base, 62"W x 33" front-to-back x 42"H, 36" work height.
Top: 14ga., type-304 stainless steel top with type-A safety edge, 1"D x 4"H type-B backsplash, and type-B framework with sound deadening pads between all support channels and the top.
Base: 16ga., type-304 stainless steel open-front cabinet base with 2"W mullions notched for column and lower shelf with type-B framework with sound deadening pads between all support channels and the lower shelf on 6"H legs with adjustable bullet feet.
Refer to plans and elevations for specific sizing. Refer to fabrication details.

ITEM 51 - MOP SINK (1 REQ'D)
John Boos Model PBMS2424-6

Mop Sink, floor mounted, 28-5/8"W x 27-3/8"D x 10"H overall size, 24"W x 24" front-to-back x 6" deep compartment, 3-1/2" diameter drain, marine edge on front & sides, tile edge on rear, 16/300 stainless steel construction, NSF

ITEM 51.1 - SERVICE FAUCET (1 REQ'D)
T&S Brass Model B-0665-BSTP

Service Sink Faucet, 8" centers, 2-3/8" clearance from wall to center of faucet, 8-7/8" from wall to center of outlet, polished chrome-plated finish, vacuum breaker nozzle with 3/4" garden hose thread & pail hook, built in screwdriver stops.

1 ea. Installation Kit, (2) 1/2" NPT nipples, lock nuts & washers, (2) short "Ell" 1/2" NPT female x male
This item is an accessory to the item above and is not tagged or scheduled.

ITEM 52 - 24" X 8" MOP UTILITY WALL SHELF (1 REQ'D)
Approved Fabricator Model Q-248MOPSHELF

Utility Shelf, wall-mounted, 24"W x 8"front-to-back x 9-1/2"H
Top: 16 ga. type-304 stainless steel top with type-A safety edge front and side and 1-1/2"H sides & rear turn-up. Hooks & (2) mop/broom holder with locking cam
Wall Brackets: 14 ga. type-304 stainless steel wall brackets.
Refer to plans and elevations for specific sizing. Refer to fabrication details.

ITEM 53 - 50" X 28" MOBILE CONDIMENT CART (2 REQ'D)
Lakeside Manufacturing Model 70270

Condiment Cart, 50-1/4"W x 27-1/2"D x 47"H, (12) manual pumps, dispenses (3) products, 39" counter height, stainless steel interior & exterior, (2) hinged doors with locks, uses 3-gallon condiment pouches, polyethylene bins for product pouches, (2) swivel & (2) swivel/brake 5" casters, Made in USA

24 ea. Color coded knobs screw onto pump mechanism (per pump)
2 ea. Group 2 solid laminate finish: Black

ITEM 53.1 - PAPER NAPKIN DISPENSER (2 REQ'D)
Dispense-Rite Model CT-FULL-BS

Napkin Dispenser, countertop, full fold napkin sizes 4-1/2" to 5" x 6-1/2", 1 sided, brushed satin steel faceplate, 5-5/8"H x 7-5/8"W x 11-3/4"D

2 ea. 1 year limited warranty

This item is an accessory to the item above and is not tagged or scheduled.

ITEM 54 - CORNER GUARD (8 REQ'D)
Approved Fabricator Model Q-CORNERGUARD

16 Ga. Stainless Steel 90 degree Corner Guard. 2" x 2" x 60"H

ITEM 55 - 64" MOBILE BAR UNIT (2 REQ'D)
Lakeside Model 887

Portable Bar, 63-1/2" long, waterproof top, laminate over stainless steel exterior, stainless steel work shelf & inner cabinet, (1) ice bin with drain: 40 lb. capacity, (2) 7 bottle speed rails, all-swivel 5" non-marking casters (2) with brakes, Made in USA

2 ea. Group 2 solid laminate finish: Red
2 ea. Magnetic Signage, 53"W x 36"H, adheres to bars with stainless steel front panels or stainless steel front panels wrapped in walnut or black vinyl finishes only (will not work with bars wrapped with other available finishes), contact factory for details and assistance to create custom graphic signage, Made in USA

ITEM 56- SPARE NO.

ITEM 57 – ICE MAKER WITH BIN (1 REQ'D)
Scotsman Model MC0722SAX-32

Ice Maker, cube style, air-cooled, self-contained condenser, production capacity up to 734 lb/24 hours at 70°/50° (537 lb AHRI certified at 90°/70°), small cube size, ICELINQ mobile app, Bluetooth connectivIty, preservation mode, external bin full indicator, AutoAlert indicating lights, WaterSense adjustable purge control, one-touch cleaning, harvest assist, front facing removable air filters, unit specific QR code, stainless steel finish, antimicrobial protection, R290 refrigernat, 208-230v/60/1-ph, cULus, NSF, engineered and assembled in USA

1 ea. 3 yr. parts & labor warranty, std.
1 ea. 5 year parts & labor warranties on evaporator
1 ea. 5 year parts on compressor & condenser
1 ea. Model KBILC Basic Ice Level Control, thermistor technology, ideal for dispenser applications
1 ea. Model XR-30 Sanitation System, for modular cube ice machines, field install only, external device mounted on top of ice machine, includes installation kit, power cord, NEMA 1-15P plug, cULus, NSF, CE
1 ea. Scotsman Model B530S - Ice Bin, top-hinged front-opening door, 536 lb application capacity, for top-mounted ice maker, 30" width, metallic finish exterior, toolless removable baffle, polyurethane insulation, polyethylene liner, includes 6" legs, NSF, engineered and assembled in USA
1 ea. 3 yr. parts & labor warranty
1 ea. Model KBT27 Bin Top, for use with all 22" cubers, flakers & nugget makers on B230, B330 & B530 bins
1 ea. Model KHOLDER Ice Scoop Holder, fits all modular ice storage bins, stainless steel
1 ea. Model BGS10 Ice Bagger, hooks over any ice bin opening, aluminum, includes easy bagger, wicket of bags (250), tape sealer & 1 roll of tape
1 ea. Model KBAG Ice Bags (case of 1000)
1 ea. Model KTAPE Tape, 180 ft., (1) roll, for ice bagger

ITEM 58 – ICE MACHINE WATER FILTERATION SYSTEM (1 REQ'D)
3M Purification Model ICE195-S

Water Filtration Products Water Filter System, with shut-off valve & gauge, 23-5/8"H x 5"D, high turbidity water, single vessel, max pressure of 125 psi at 100°F, 3 micron, 5 gpm flow rate, 54,000 gallons capacity, for sediment, chlorine taste & odor, scale, includes: (1) integral mounting bracket and (1) o-ring seal cartridge filter, 1/2" FNPT connections, NSF certified

ITEM 59 - SPARE NO.

ITEM 60 - 57" 2-SEC. REACH-IN REFRIGERATOR (1 NOT IN CONTRACT)
By Vendor

Electrical: 115/60/1 6.3 amps, NEMA 5-15P.
FSEC shall coordinate utilities of owner furnished equipment and include on coordination drawings.

END OF SECTION 11 4000

SECTION 11 6623
GYMNASIUM EQUIPMENT

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Gym divider curtains.

B. Indoor batting cages.

C. Protective spectator netting system.

D. Hockey shooting tarp.

E. Figure skating harness.

F. Synthetic ice flooring.

1.02 RELATED REQUIREMENTS

A. Section 05 1200 - Structural Steel Framing: Structural members supporting gymansium equipment.

B. Section 05 5000 - Metal Fabrications: Secondary structural members supporting gymnasium equipment.

C. Section 26 0583 - Wiring Connections.

1.03 REFERENCE STANDARDS

A. AWS D1.1/D1.1M - Structural Welding Code - Steel.

B. NFPA 101 - Life Safety Code.

1.04 ADMINISTRATIVE REQUIREMENTS

A. Large Components: Ensure that large components can be moved into final position without damage to other construction.

B. Electrically Operated Equipment: Coordinate location and electrical characteristics of service connection.

1.05 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide manufacturer's data showing configuration, sizes, materials, finishes, hardware, and accessories; include:
   1. Fire rating certifications.
   2. Structural steel welder certifications.
   3. Manufacturer's installation instructions.

C. Shop Drawings: For custom fabricated equipment indicate, in large scale detail, construction methods; method of attachment or installation; type and gauge of metal, hardware, and fittings; plan front elevation; elevations and dimensions; minimum one cross section; utility requirements as to types, sizes, and locations.

D. Erection Drawings: Detailed dimensional requirements for proper location of equipment.

E. Samples: Submit samples of wall pad coverings in manufacturer's available range of colors and textures.

F. Operating and maintenance data for each operating equipment item.

G. Warranty: Submit manufacturer warranty and ensure that forms have been completed in Owner's name and registered with manufacturer.

1.06 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section, with not less than three years of documented experience.

B. Installer Qualifications: Company specializing in performing work of the type specified with minimum three years of experience.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Deliver products to project site in manufacturer's original packaging with factory original labels attached.

B. Store products indoors and elevated above floor; prevent warping, twisting, or sagging.

C. Store products in accordance with manufacturer's instructions; protect from extremes of weather, temperature, moisture, and other damage.

PART 2 PRODUCTS

2.01 GENERAL REQUIREMENTS

A. See drawings for sizes and locations, unless noted otherwise.

B. Where mounting dimensions or sizes are not indicated, comply with applicable requirements of the following:
   1. National Federation of State High School Associations (NFHS) sports rules.

C. Provide mounting plates, brackets, and anchors of sufficient size and strength to securely attach equipment to building structure; comply with requirements of Contract Documents.

D. Hardware: Heavy duty steel hardware, as recommended by manufacturer.

E. Structural Steel Fabrications: Welded in accordance with AWS D1.1/D1.1M, using certified welders.

2.02 GYMNASIUM DIVIDER CURTAINS

A. Gymnasium Divider Curtains:
   1. Curtain Material: Class A rated, self-extinguishing vinyl coated polyester complying with NFPA 101.
   2. Upper Section: 9 oz/sq yd vinyl mesh fabric.
      a. Color: As selected by Architect from manufacturers full range.
   3. Lower Section: 18 oz/sq yd solid vinyl coated polyester.
      a. Color: As selected by Architect from manufacturers full range.
   4. Operation: Vertical lift roll-up, curtain coils on top rail.
   5. Controls: Group control touch pad.
   6. Options to include: Bottom Pad and Line Shaft Safety Lock
   7. Manufacturers:
      a. **BASIS OF DESIGN:** Draper, Inc: www.draperinc.com/#sle.
      b. Substitutions: See Section 01 6000 - Product Requirements.

2.03 INDOOR CONTAINMENT

A. Indoor Batting Cages:
   1. Enclosure Material: Netting on top and sides with sewn rope border allowing for additional material on sides to rest on floor to retain balls within batting cage.
   2. Netting: Black, No.36 nylon, 1-3/4 inches square.
   3. Operation: Drive shaft driven by instantly reversing 115 volt, 3/4 HP motor with overload protection, and carrying support cables guided by flanges on shaft.
   4. Controls: Keyed, 3-position switch with wall plate.
   5. Size/Layout: as indicated on Drawings.
   6. Upper Support Frame: At least 1-1/2 inches diameter aluminum pipe and necessary fittings to provide symmetrical layout with uniform spacing.
   7. Support Cables: Steel cables at least 1/8 inch in diameter with minimum of 1800 pounds tensile strength spaced to align with support frame horizontal members providing uniform load distribution and stability.
   8. Manufacturers:
      a. Grand Slam Safety, LLC: www.grandslamsafety.com/#sle.
      b. **BASIS OF DESIGN:** Draper, Inc: www.draperinc.com/#sle.
      c. Substitutions: See Section 01 6000 - Product Requirements.

B. Protective Spectator Netting System

1. Size and Location: Netting shall be identified where shown on the drawings. The netting shall extend from 6" below the top of the shielding supports to the height specified on the drawings. The net shall be custom made to fit the exact length.
2. Material:
   a. Nylon. #420 knotless High Tenacity Polypropylene (HTPP) Pylon, 1-1/2" square mesh x 1/8 mm twine, 125 lb. minimum break strength, UV and weather resistant and treated with fire retardant coating. Perimeter edging shall be reinforced vinyl, double sewn with #2 brass grommets. Grommets location shall be maximum of 24" on center. Color will be black as selected by Owner.
3. Support System:
   a. The top of the netting shall be supported with a continuous rigid conduit or rigid bar system (10-foot minimum length sections) formed to the radius dimensions of the rink. Rigid supports shall be installed at the bottom of the netting at all equipment and access gates. Conduit supports shall be galvanized steel.
   b. Support Cables: 3/16" galvanized steel cable to roof structure.
   c. Fasteners: Netting shall be attached on each sheet of shielding, cable shall be attached to shielding with suction cups if supportless shielding, fasteners shall be attached to poly clips at top of shielding. Nylon ties shall be 1/8" wide, UL recognized and a minimum tensile strength of 100 lbs.
   d. Provide all other cables, clamps, turnbuckles, eyebolts, suction cups, plastic ties, etc. as required for a complete, clean and neat installation.

2.04 HOCKEY SHOOTING TARP

A. Hockey Shooting Tarp System: Heavy-duty, UV coated vinyl hung to protect walls from hockey target practice.
   1. Provide top and bottom tubing along chain attachment (no bungee cords) to ceiling structure as required. Provide goalie images as shown on drawings along with (5) puck pockets per goalie. See drawings for Tarp sizes.

B. Products:
   1. **BASIS OF DESIGN:** Snipers Edge Hockey.
   2. Substitutions: See Section 01 6000 - Product Requirements.

2.05 FIGURE SKATING HARNESS

A. ___

2.06 SYNTHETIC ICE FLOORING

A. Location: Shooting room.

B. Floor Panels: Interlinking panels
   1. Size: 48 x 96 inches
   2. Thickness: 1/2 inch
   3. Color: As selected from manufacturer's full range.

C. Product:
   1. **BASIS OF DESIGN:** Becker Arena Products: Floor Panel System
   2. Substitutions: See Section01 6000-Product Requirements.

PART 3 EXECUTION

3.01 EXAMINATION

A. Take field measurements to ensure proper fitting of work. If taking field measurements before fabrication will delay work, allow for adjustments within recommended tolerances.

B. Inspect areas and conditions before installation, and notify Architect in writing of unsatisfactory or detrimental conditions.

C. Do not proceed with this work until conditions have been corrected; commencing installation constitutes acceptance of work site conditions.

3.02 INSTALLATION

A. Install in accordance with Contract Documents and manufacturer's instructions.

B. Install equipment rigid, straight, plumb, and level.

C. Secure equipment with manufacturer's recommended anchoring devices.

D. Separate dissimilar metals to prevent electrolytic corrosion.

3.03 ADJUSTING

A. Verify proper placement of equipment.

B. Verify proper placement of equipment anchors and sleeves, and use actual movable equipment to be anchored if available.

C. Adjust operating equipment for proper operation; remove and replace equipment causing noise or vibration; lubricate equipment as recommended by manufacturer.

3.04 CLEANING

A. Remove masking or protective covering from finished surfaces.

B. Clean equipment in accordance with manufacturer's recommendations.

3.05 PROTECTION

A. Protect installed products until Date of Substantial Completion.

B. Replace damaged products before Date of Substantial Completion.

END OF SECTION

SECTION 11 6643
ELECTRONIC SCOREBOARDS

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Interior, electronic, multi-purpose scoreboards including control center, and other accessories for complete functional installation.
   1. Centerhung - 4 Sided Display, Scoreboard A
   2. Single-Sided LED hockey Scoreboard B
   3. Single-Sided LED hockey Scoreboard C
   4. Locker Room Clock, Scoreboard D
   5. Timing Display, Scoreboard E

1.02 RELATED SECTIONS

A. Division 26 - Electrical: Low voltage electrical distribution

B. Division 27 - Communications: Integrated audio-video systems

1.03 REFERENCE STANDARDS

A. ASTM B221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes.

B. Federal Communications Commission, Part 15 Rules & Regulations.

C. National Electrical Code, Article 600.

D. Underwriters Laboratories Inc: (UL) 48 Standard for Electric Signs

1.04 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Product Data: Manufacturer's catalog cuts and descriptive information on each product to be used, including:
   1. Wiring diagrams for motor operators and actuators, and controls and switches.

C. Shop Drawings: Indicate dimensions, verified field measurements, mounting details, utility requirements and connections, and interface with adjacent construction.

D. Samples: For case and frame finishes, submit two samples 6 by 6 inch in size, illustrating color and texture of finish.

E. Operation and Maintenance Data: Provide manufacturer's operation and maintenance instructions.

F. Warranty: Submit manufacturer warranty and ensure that forms have been completed in Owner's name and registered with manufacturer.

1.05 QUALITY ASSURANCE

A. Source limitation: All components including scoreboard, control center, control cable, and other accessories and installation hardware shall be products of a single manufacturer.

B. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section, with not less than ten years of documented experience.

C. Installer Qualifications: Company specializing in performing work of the type specified and with at least three years of documented experience and approved by manufacturer.

D. Scoreboards and other electrical components shall be certified for use in United States and Canada by Underwriter Laboratories, (UL), Inc. and shall bear either UL or C-UL label only.

E. Scoreboards and other electrical components shall be electrically grounded in accordance with National Electrical Code (NEC), Article 600.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Deliver scoreboards to project site in manufacturer's original unopened packaging, and inspect for damage and proper size before accepting delivery.

B. Store in a protected, clean, dry area with temperature maintained above 50 degrees Fahrenheit, and stack in accordance with manufacturer's recommendations.

1.07 FIELD CONDITIONS

A. Environmental Limitations: Do not install scoring equipment until spaces are enclosed and weatherproof, wet work in spaces is complete and dry, and ambient temperature and humidity conditions are maintained at the levels indicated for project when occupied for its intended use.

B. Field Measurements: Provide size, weight and mounting location for coordination. If shot clock is to be mounted to a backstop, mounting hardware shall be supplied by the backstop provider.

C. Supply weight and mounting method for owner to verify that building structure is capable of supporting the scoreboard’s weight in addition to the auxiliary equipment.

1.08 WARRANTY

A. See Section 01 78 00 - Closeout Submittals, for additional warranty requirements.

B. Provide 5 year manufacturer warranty against defects in workmanship or materials.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Electronic Scoreboards and Shot Clocks
   1. Fair-Play; www.fair-play.com
   2. **BASIS OF DESIGN:** Daktronics; www.daktronics.com/en-us
      a. Centerhung - 4 Sided Display, Scoreboard A: LPN-5511.
      b. Single-sided LED Hockey, Scoreboard B: H-2104.
      c. Single-Sided LED hockey, Scoreboard C: H-2111.
      d. Locker Room Clock, Scoreboard D: TI-2031.
      e. Timing Display, Scoreboard E: TI-2101.
   3. Nevco Inc,; www.nevco.com.
   4. Substitutions: See Section 01 60 00 - Product Requirements.

2.02 CENTERHUNG - 4 SIDED DISPLAY, SCOREBOARD A

A. Product: LPN-5511 displays show live and recorded video clips, real-time scores/stats, animations, graphics, and text messages. SMD (3-in-1) LED packages feature 3.7mm row and column spacing to provide wider viewing angles and extremely close viewing distances.

B. General information:
   1. Cabinet Dimensions: 6.64' (2.03 m) high, 11.81' (3.6 m) wide, 6.51" (165 mm) deep
   2. Matrix size: 540 x 960
   3. Weight: 435 lb (195 kg) Power requirements: 1949 W]

C. Cabinet Paint Color:
   1. Black

D. Construction
   1. Die-Cast Magnesium and Aluminum
   2. Service Access: Front
   3. Floor Frame and Shrouding for LPN Centerhung for 11.81' Width
   4. Corner Shrouding for 4-sided display
   5. 11.75’ Upper Sling – 60lbs
   6. 11.75’ Lower Sling – 23lbs
   7. 11.75’ Floor decoration

E. Display Capabilities
   1. Color Capacity: 16 bit (281 trillion colors)

2. LED Refresh Rate: 7680 Hz as defined by the number of times per second the LED image is repainted in intensity
3. Display has signal redundancy allowing for signal path both forward and backwards through panels allowing for loss of only 1 panel vs. rows or blocks of multiple panels in case of failure.

F. Viewing Characteristics
1. Calibrated Intensity: 1200 nits
2. Brightness Control: 256 levels (manual, scheduled or automatic)
3. Suggested Viewing Angle: 160° horizontal and +80°/-80° vertical

G. Pixel Characteristics
1. Each pixel consists of one RGB 3-in-1 surface-mount device LED.
2. Pixel spacing measurement must be measured from the center points of neighboring physical pixels, rather than neighboring physical and virtual pixels.

H. LED Tile Characteristics
1. Tiles shall be for indoor use.
2. Tiles shall have anti-reflective paint or coating applied to display face. Black state across all tiles shall exhibit a Delta E color variation of no more than .4.
3. Tiles shall have horizontal louvers running between LEDs or pixels.
4. Tiles shall be able to be removed and installed from the front of the display.
5. It is not necessary to remove or insert screws in order to remove or install tiles.

I. Video Processing
1. Video Frame Rate: 50/60 frames per second
2. Graphic Frame Rate: 30 frames per second
3. Processing Architecture: 22 bit (distributed)
4. System Architecture: 100% digital
5. Video Enhancement: Color space conversion, adjustable gamma correction, proprietary sharpening technology and enhancement algorithms for optimal picture quality

J. LED Quality
1. Quality Control: Sorted by intensity and color wavelength
2. LED Lifetime: 100,000 hours of operation as defined by time at which display intensity has decreased to 50 percent of the original intensity

K. Calibration
1. Pixel-to-pixel and tile-to-tile optical color calibration must be performed at the factory. The manufacturer must also provide easy-to-use calibration software that allows individual tiles and pixels to be independently adjusted while in the display.
2. If tiles should need replacement during the life of the display, the calibration software must match newer tiles' brightness levels to older tiles' levels to preserve picture quality and maintain a uniform display appearance.

L. Display Interface
1. The full-color video display must be able to interface and display real-time data from the control system without the need for a duplicate or redundant input.

M. 1 VIDEO INPUT CONTROL SYSTEM
1. Equipment Rack
   a. Dimensions: 25.75" H x 19.25" W x 26" D (654 mm x 489 mm x 660 mm); 14RU
   b. A larger rack may be required based on additional optional equipment.
2. Media Player
   a. Provide a Digital Media Player (DMP).
   b. Matrix Resolution: Up to 2160x3840
   c. Video Input: SDI or HDMI up to 1080p 59.94
   d. Video Output: DisplayPort to Daktronics Display Interface
   e. Audio Output: balanced 3-pin XLR
   f. Memory: 32 GB DDR5 SODIMM

g. Storage: 1 TB
h. Networking: 10/100/1000 Ethernet (RJ-45 LAN) @1
i. Dimensions: Half-width 2RU; 3.4" H x 8.7" W x 12.5" D (86 mm x 221 mm x 318 mm)

3. Display Interface
   a. Provide a Display Interface (DI).
   b. Video Input: HDMI from Daktronics DMP
   c. Video Output: Daktronics ProLink® 6 (fiber optic) @1
   d. Networking: 10/100/1000 Ethernet (RJ-45 LAN) @1
   e. Dimensions: Half-width 1RU; 1.75" H x 8.75" W x 12" D (44.5 mm x 222 mm x 305 mm)
4. Uninterruptable Power Supply (UPS)
   a. Battery operation after a power outage ensures enough time for proper shutdown of control equipment.
5. Network Router – 1 Gigabit
6. Primary/Backup System
   a. Allows switching to live/hot backup system via control software if primary system goes down. No physical swapping of cables or devices is required.
   b. Includes one (1) Primary and one (1) Backup Digital Media Player along with one (1) Primary and one (1) Backup Display Interface.
   c. Content and files are automatically backed up to Backup System when files are loaded on Primary System, as both systems are always live.

N. CONTROL COMPUTER
1. Laptop
   a. Operating System: Windows® 11 Pro
   b. Processor: Intel® Core™ i5
   c. Memory: 16 GB RAM
   d. Hard Drive: 500 GB
   e. Form Factor: Dell Latitude 5510
   f. Laptop may be removed from the control location so content can be created and modified elsewhere. When the laptop is reconnected to the rack, updated content is synced in a matter of minutes.

O. CONTROL SOFTWARE
1. Manufacturer must provide a Windows® 11 based computer with the control software loaded, configured, and ready to control display at startup.
2. Must be developed by the manufacturer of the Display, Media Player, and Display Interface.
3. The display's control software must provide simple, user-friendly features for creating, editing, scheduling, running and deleting messages.
4. Display Software features:
   a. Direct control of an infinite number of displays located on a network
   b. Simultaneous display and edit capability
   c. Content playlists with loop, shuffle, random and next play functionality
   d. Thumbnail preview of content clips
   e. Onscreen display monitor
   f. Unlimited, color-coded buttons with adjustable sizes
   g. Multiple operator workspaces
   h. Support input devices such as a mouse, keyboard, touch screen, and dual monitor
   i. Icon and pull-down menu programming features
   j. Help screens
5. Content Editor Software features:
   a. Display of TrueType fonts and other Windows® compatible character fonts
   b. Inline text editing
   c. Outlined, Drop shadowed, Bold, Italic, and Underlined text modes
   d. Ability to copy and paste text from most Windows applications

e. Import common image and animation formats, including BMP, JPEG and AVI
f. Content preview
g. Content layering
h. Real-time data (RTD) integration allows operators to create messages with information that automatically updates without user intervention. Such data may include scores, game time, player/team statistics, time-of-day, date or temperature.
i. Profanity protection and Spell Check
j. Multiple transition effects for entry, hold and exit

P. SCORING CONTROL SOFTWARE
1. Modern interface allows control via provided laptop and/or touchscreen tablet.
2. Score the following sports:
a. Baseball
b. Basketball
c. Football
d. Hockey
e. Lacrosse
f. Practice Mode
g. Soccer
h. Softball
i. Volleyball
j. Wrestling
1) Create team profiles, rosters, and matchups ahead of game time.
3. Assign common or custom rule profiles to fit the level of play.
4. Seamlessly switch between scoring the game and changing display content with Display Software Hot Buttons:
a. Manually play content directly from the Scoring Control Software.
b. Automatically play content via game triggers, such as when a team scores.
5. Multiple data outputs send Real-Time Data (RTD) to video displays and control fixed-digit numeric scoreboards.
6. Create custom color schemes for different teams/operators.
7. Support for tactile start/stop switches ensures precise timing during critical moments.
8. Battery backup activates when power is lost.
9. Tablet for All Sport® Pro

2.03 SINGLE-SIDED LED HOCKEY, SCOREBOARD B

A. Product: Daktronics H-2104 single-sided hockey scoreboard displays period time to 99:59, HOME and GUEST scores to 99, PERIOD to nine and SHOTS ON GOAL to 99 along with PLYR (player number) to 99 and PENALTY time to 9:59 for up to two players on each team. During the last minute of the period, scoreboard displays time to 1/10 of a second. Scoreboard can also score any sport requiring a clock, score and period function.

B. General information
1. Dimensions: 5'-0" (1.52 m) high, 10'-0" (3.05 m) wide, 0'-6" (152 mm) deep
2. Base weight: 185 lb (84 kg) – options may increase weight
3. Base power requirement: 200 W – options may increase wattage
4. Color: choose from manufacturer’s standard paint selections

C. Construction
1. All-aluminum construction
2. Scoreboard back, face, and perimeter: 0.063" (1.60 mm) thick
3. Cabinet withstands high-velocity impact from air-filled sports balls without the need for protective screens

D. Digits
1. LED color:

2. All White digits and indicators
3. Clock and score digits: 10" (254 mm) high
4. PERIOD, PLYR, PENALTY and SHOTS ON GOAL digits: 7" (178 mm) high
5. Seven bar segments per digit
6. PanaView® (PV) digit technology – discrete LEDs protrude through the scoreboard face

E. Captions
1. Vinyl applied directly to scoreboard face
2. HOME and GUEST captions: 6" (152 mm) high
3. PERIOD, PLYR, PENALTY and SHOTS ON GOAL captions: 4" (102 mm) high
4. Color: standard white or choose from manufacturer's vinyl color selections

F. Border Striping
1. Vinyl striping applied around the clock and scoreboard face
2. Color: standard white or choose from manufacturer's vinyl color selections

G. Horn
1. Vibrating horn mounted inside the scoreboard cabinet behind the face
2. Sounds automatically when period clock counts down to zero
3. Sounds manually as directed by operator

H. Power Cord
1. Cord is 11' (3.35 m) long
2. Cord plugs into a standard grounded outlet

I. Accessory Equipment
1. Two 6" (152 mm) high Programmable Team Name Message Centers (TNMCs) in place of vinyl HOME and GUEST captions – add 15 lb (7 kg) and 60 W
2. Hardware to control the scoring information – All Sport® Pro Interface

2.04 SINGLE-SIDED LED HOCKEY SCOREBOARD, SCOREBOARD C

A. Product: Daktronics H-2111 single-sided hockey scoreboard displays period time to 99:59, HOME and GUEST scores to 99 and PERIOD to nine. During the last minute of the period, scoreboard displays time to 1/10 of a second. Scoreboard can also score any sport requiring a clock, score and period function.

B. [endif]General information
1. Dimensions: 4'-0" (1.22 m) high, 8'-0" (2.44 m) wide, 0'-6" (152 mm) deep
2. Base weight: 120 lb (54 kg) – options may increase weight
3. Base power requirement: 120 W – options may increase wattage
4. Color: choose from manufacturer's standard paint selections

C. Construction
1. All-aluminum construction
2. Scoreboard back, face, and perimeter: 0.063" (1.60 mm) thick
3. Cabinet withstands high-velocity impact from air-filled sports balls without the need for protective screens

D. Digits
1. LED color: All White digits
2. Clock and score digits: 13" (330 mm) high
3. PERIOD digit: 10" (254 mm) high
4. Seven bar segments per digit
5. PanaView® (PV) digit technology – discrete LEDs protrude through the scoreboard face

E. Captions
1. Vinyl applied directly to scoreboard face
2. HOME and GUEST captions: 6" (152 mm) high
3. PERIOD caption: 4" (102 mm) high
4. Color: standard white or choose from manufacturer's vinyl color selections

F. Border Striping
   1. Vinyl striping applied around the clock and scoreboard face
   2. Color: standard white or choose from manufacturer's vinyl color selections

G. Horn
   1. Vibrating horn mounted inside the scoreboard cabinet behind the face
   2. Sounds automatically when period clock counts down to zero
   3. Sounds manually as directed by operator

H. Power Cord
   1. Cord is 11' (3.35 m) long
   2. Cord plugs into a standard grounded outlet

I. Accessory Equipment
   1. Two 6" (152 mm) high Programmable Team Name Message Centers (TNMCs) in place of vinyl HOME and GUEST captions – add 15 lb (7 kg) and 60 W]
   2. Hardware to control the scoring information – All Sport® Pro Interface

2.05 LOCKER ROOM CLOCK, SCOREBOARD D

A. Product: Daktronics TI-2031 wall mounted locker room clock displays game time or time of day. Displays time in synchronization with scoreboard clocks.

B. General information
   1. Dimensions: 8" (203 mm) high, 1'-3" (381 mm) wide, 3.25" deep (83 mm) for Surface Mount.
   2. Weight: 4 lb (1.8 kg)
   3. Power requirement: 40 W
   4. Color: provide over 150 colors to choose from

C. Construction
   1. Durable, high impact polystyrene

D. Digits
   1. LED digit technology: diffusant lenses over the LEDs blend the light for a uniform bar look and 140° viewing angle
   2. LED digit color: White
   3. Clock digits: 4" (102 mm) high
   4. Seven bar segments per digit

E. Power Cord
   1. Cord is 6' (1.83 m) long
   2. Cord plugs into a standard grounded outlet

2.06 TIMING DISPLAY, SCOREBOARD E

A. Product: Daktronics TI-2101 is ideal for displaying time of day (TOD) but can also be configured to count up or down from any preset number from 0 to 99:59.

B. Display
   1. General information
      a. Dimensions: 2'-0" high, 4'-0" wide, 0'-6" deep
      b. Weight: 35 lb
      c. Power requirement: 200 W
      d. Color: choose from manufacturer's standard paint selections
   2. Construction
      a. All-aluminum construction
      b. Display back, face, and perimeter: 0.063" (1.60 mm) thick
      c. Cabinet withstands high-velocity impact from air-filled sports balls without the need for protective screens
   3. Digits
      a. LED digit color: Red.

b. Clock digits: 13" high
c. Seven bar segments per digit
d. PanaView® (PV) digit technology – discrete LEDs protrude through the scoreboard face

4. Border Striping
   a. Vinyl striping applied around the display face
   b. Color: standard white or choose from manufacturer's vinyl color selections
5. Horn
   a. Vibrating horn mounted inside the display cabinet behind the face
   b. Sounds automatically when period clock counts down to zero
   c. Sounds manually as directed by operator
6. Power Cord
   a. Cord is 11' long
   b. Cord plugs into a standard grounded outlet

C. SCORING CONSOLE
1. Console is an All Sport® 1600 controller
2. Scores multiple sports using changeable keyboard inserts
3. Controls multiple displays, including other All Sport 1600 controlled displays currently owned by customer
4. Recalls clock, score, and period information if power is lost
5. Runs Time of Day and Segment Timer modes
6. Console includes:
   a. Rugged aluminum enclosure to house electronics
   b. Sealed membrane water-resistant keyboard
   c. 32-character LCD to verify entries and recall information currently displayed
   d. Power cord that plugs into a standard grounded outlet; 3 watts max
   e. Control cable to connect to the control receptacle junction box (wired system only)
   f. Soft-sided carrying case

D. Accessory Equipment: manufacturer's standard.

PART 3 - EXECUTION

3.01 PREPARATION

A. Verify exact scoreboard and control center quantities and junction box locations with Architect.

B. Coordinate requirements for electrical power, wall blocking, auxiliary framing and supports, suspension cables, and other components to be provided under other specification sections to ensure adequate provisions are made for complete, functional installation of scoreboards.

C. Coordinate scoreboard electrical requirements to ensure proper power source, conduit, wiring, and boxes are provided. Prior to installation, verify type and location of power supply.

3.02 INSTALLATION

A. Install in accordance with manufacturer's instructions and approved installation drawings, using manufacturer's recommended hardware for relevant substrates.

B. Before installation, field test scoreboards and accessories for operating functions. Ensure that scoreboards accurately perform all operations. Correct deficiencies.

C. Rigidly mount scoreboards and accessories level and plumb with brackets and fasteners.

D. Install plumb and level.

E. Install scoreboards ready for connection to power and control systems by others.

F. Test scoreboards for proper working condition.

3.03 INSTALLATION—CONTROL CENTER

A. Provide boxes, cover plates and jacks as required to meet control specification requirements. Control cables to control panels must be concealed.

B. Test the operation of the display, controller and all control jacks; leave control unit and other loose items with owner's designated representative.

C. Conduct operator training on the display/controller operation.

D. Manufacturer must supply all required signal conversion hardware to allow for direct wire control of electronic display.

3.04 CLEANING AND PROTECTION

A. Clean exposed surfaces.

B. Protect installed products until completion of project.

C. Repair or replace damaged products before Date of Substantial Completion.

3.05 DEMONSTRATING AND TRAINING

A. In accordance with Section 01 78 00 - Closeout Submittals, provide demonstration and training session for Owner's representative covering operation and maintenance of electronic scoreboard.

END OF SECTION

SECTION 12 2400
WINDOW SHADES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Interior manual roller shades (RWS-1).

B. Interior motorized roller shades (RWS-2).

1.02 RELATED REQUIREMENTS

A. Section 06 1000 - Rough Carpentry: Concealed wood blocking for attachment of headrail brackets.

B. Electrical: Lighting control system for control of motorized window shades & finish requirements for wall controls specified in this section.

1.03 REFERENCE STANDARDS

A. ASTM G21 - Standard Practice for Determining Resistance of Synthetic Polymeric Materials to Fungi.

B. NFPA 701 - Standard Methods of Fire Tests for Flame Propagation of Textiles and Films.

1.04 ADMINISTRATIVE REQUIREMENTS

A. Coordination:
   1. Where motorized shades are to be controlled by control systems provided under other sections, coordinate the work with other trades to provide compatible products.
   2. Coordinate the work with other trades to provide rough-in of electrical wiring as required for installation of hardwired motorized shades.

B. Preinstallation Meeting: Convene one week prior to commencing work related to products of this section; require attendance of affected installers.

C. Sequencing:
   1. Do not fabricate shades until field dimensions for each opening have been taken with field conditions in place.
   2. Do not install shades until final surface finishes and painting are complete.

1.05 SUBMITTALS

A. Product Data: Provide manufacturer's standard catalog pages and data sheets, including materials, finishes, fabrication details, dimensions, profiles, mounting requirements, and accessories.
   1. Motorized Shades: Include power requirements and standard wiring diagrams for specified products.

B. Shop Drawings: Include shade schedule indicating size, location and keys to details, head, jamb and sill details, mounting dimension requirements for each product and condition, and operation direction.
   1. Motorized Shades: Provide schematic system riser diagram indicating component interconnections. Include requirements for interface with other systems.

C. Selection Samples: Include fabric samples in full range of available colors and patterns.
   1. Motorized Shades: Include finish selections for controls.

D. Verification Samples: Minimum size 6 inches square, representing actual materials, color and pattern.

E. Project Record Documents: Record actual locations of control systems and show interconnecting wiring.

F. Operation and Maintenance Data: List of all components with part numbers, sources of supply, and operation and maintenance instructions; include copy of shop drawings.

G. Warranty: Submit sample of manufacturer's warranty and documentation of final executed warranty completed in Owner's name and registered with manufacturer.

H. Maintenance contracts.

1.06 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section, with not less than five years of documented experience.

B. Installer Qualifications: Company specializing in performing work of this type with minimum five years of documented experience with shading systems of similar size and type.
   1. Manufacturer's authorized representative.
   2. Factory training and demonstrated experience.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Deliver shades in manufacturer's unopened packaging, labeled to identify each shade for each opening.

B. Handle and store shades in accordance with manufacturer's recommendations.

1.08 FIELD CONDITIONS

A. Do not install products under environmental conditions outside manufacturer's absolute limits.

1.09 WARRANTY

A. See Section 01 7800 - Closeout Submittals, for additional warranty requirements.

B. Provide manufacturer's warranty from Date of Substantial Completion, covering the following:
   1. Shade Hardware: Twenty-five years.
   2. Electric Motors: One year.
   3. Electronic Control Equipment: One year.
   4. Fabric: Twenty-five years.
   5. Aluminum and Steel Coatings: Five years.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Interior Manually Operated Roller Shades:
   1. Draper, Inc: www.draperinc.com/#sle.
   2. Hunter Douglas Architectural: www.hunterdouglasarchitectural.com/#sle.
   3. Lutron Electronics Co., Inc: www.lutron.com/#sle.
   4. **BASIS OF DESIGN:** MechoShade Systems LLC; UrbanShade: www.mechoshade.com/#sle.
   5. SWFcontract, a division of Springs Window Fashions, LLC.: www.swfcontract.com/#sle.
   6. WT Shade: www.inprocorp.com.
   7. Substitutions: See Section 01 6000 - Product Requirements.

B. Interior Motorized Roller Shades, Motors and Motor Controls:
   1. Draper, Inc: www.draperinc.com/#sle.
   2. Hunter Douglas Architectural: www.hunterdouglasarchitectural.com/#sle.
   3. Lutron Electronics Co., Inc: www.lutron.com/#sle.
   4. **BASIS OF DESIGN:** MechoShade Systems LLC; Electroshade: www.mechoshade.com/#sle.
   5. SWFcontract, a division of Springs Window Fashions, LLC: www.swfcontract.com/#sle.
   6. WT Shade: www.inprocorp.com.
   7. Substitutions: See Section 01 6000 - Product Requirements.

2.02 ROLLER SHADES

A. General:
   1. Provide shade system components that are easy to remove or adjust without removal of mounted shade brackets.
   2. Provide shade system that operates smoothly when shades are raised or lowered.
   3. Motorized Shades: Motor system housed inside roller tube, controlling shade movement via motor controls indicated; listed or recognized to UL 325.

B. Roller Shades:
   1. Description - Interior Roller Shades: Single roller, manual and motor operated fabric window shade system complete with mounting brackets, roller tubes, hembars, hardware, and accessories.
      a. Drop Position: Regular roll.
      b. Roll Direction: Roll down, closed position is at window sill.

c. Mounting: Window jamb mounted - inside, between jambs and outside on face of jambs. Field verify prior to ordering.
d. Size: As indicated on drawings.
e. Fabric: As indicated under Shade Fabric article.

2. Brackets and Mounting Hardware: As recommended by manufacturer for mounting indicated and to accommodate shade fabric roll-up size and weight.
a. Material: Stamped steel.

3. Roller Tubes: As required for type of shade operation.
a. Material: Extruded aluminum, clear anodized finish.
b. Size: As recommended by manufacturer; selected for suitability for installation conditions, span, and weight of shades.
c. Fabric Attachment: Utilize extruded channel in tube to accept vinyl spline welded to fabric edge.
d. Take-Up Roller: Manufacturer's standard roller tube pretensioned for winding lift cable in bottom-up type shades.

4. Hembars: Designed to maintain bottom of shade straight and flat.
a. Style: Full wrap fabric covered bottom bar, flat profile with heat sealed closed ends.

2.03 SHADE FABRIC

A. Fabric: Nonflammable, color-fast, impervious to heat and moisture, and able to retain its shape under normal operation.
1. Manufacturers: See Finish Schedule for Basis of Design.
a. Lutron Electronics Co., Inc: www.lutron.com.
b. MechoShade Systems LLC: www.mechoshade.com/#sle.
c. Mermet Corporation: www.mermetusa.com/#sle.
d. Phifer, Inc: www.phifer.com/#sle.
e. Substitutions: See Section 01 6000 - Product Requirements.

2. Performance Requirements:
a. Flammability: Pass NFPA 701 large and small tests.
b. Fungal Resistance: No growth when tested in accordance with ASTM G21.

3. Openness Factor: See Finish Schedule.
4. Color: See Finish Schedule.
5. Fabrication:
a. Fabric Orientation: Railroaded, fabric is turned 90 degrees off the roll.
b. If height of opening requires multiple panels of railroaded fabric, use manufacturer's standard sewn seams.

2.04 MOTOR CONTROLS

A. Unless specifically indicated to be excluded, provide all required equipment, conduit, boxes, wiring, connectors, hardware, supports, accessories, software, system programming, etc. as necessary for a complete operating system that provides the control intent indicated.

B. Provide all components and connections necessary to interface with other systems as indicated.

C. Digital Network Controls:
1. Provide suitable interface modules as indicated or as required for connection to standard (nonintelligent) motors and devices.

D. Manual Controls:
1. Control Functions:
a. Open: Automatically open controlled shade(s) to fully open position when button is pressed.
b. Close: Automatically close controlled shade(s) to fully closed position when button is pressed.
c. Raise: Raise controlled shade(s) only while button is pressed.
d. Lower: Lower controlled shade(s) only while button is pressed.
e. Presets: For selection of predetermined shade positions.

f. Multiple Shade Groups: Provide individual controls for each shade group as indicated.

2. Wall Controls: Provided by shade manufacturer.
   a. Finish: To be selected by Architect.
   b. Provide locking box to cover controls.

2.05 ROLLER SHADE FABRICATION

A. Field measure finished openings prior to ordering or fabrication.

B. Dimensional Tolerances: Fabricate shades to fit openings within specified tolerances.
   1. Vertical Dimensions: Fill openings from head to sill with 1/2 inch space between bottom bar and window stool.
   2. Horizontal Dimensions - Inside Mounting: Provide symmetrical light gaps on both sides of shade not to exceed 1/2 inch total.

C. At openings requiring continuous multiple shade units with separate rollers, locate roller joints at window mullion centers; butt rollers end-to-end.

PART 3 EXECUTION

3.01 EXAMINATION

A. Examine finished openings for deficiencies that may preclude satisfactory installation.

B. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

C. Start of installation shall be considered acceptance of substrates.

3.02 PREPARATION

A. Prepare surfaces using methods recommended by manufacturer for achieving best result for substrate under the project conditions.

B. Coordinate with window installation and placement of concealed blocking to support shades.

3.03 INSTALLATION

A. Install in accordance with manufacturer's instructions and approved shop drawings, using mounting devices as indicated.

B. Replace shades that exceed specified dimensional tolerances at no extra cost to Owner.

C. Adjust level, projection, and shade centering from mounting bracket. Verify there is no telescoping of shade fabric. Ensure smooth shade operation.

3.04 SYSTEM STARTUP

A. Motorized Shade System: Provide services of a manufacturer's authorized representative to perform system startup.

3.05 CLEANING

A. Clean soiled shades and exposed components as recommended by manufacturer.

B. Replace shades that cannot be cleaned to "like new" condition.

3.06 CLOSEOUT ACTIVITIES

A. See Section 01 7800 - Closeout Submittals, for closeout submittals.

B. Demonstration: Demonstrate operation and maintenance of window shade system to Owner's personnel.

C. Training: Train Owner's personnel on 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 training by manufacturer's authorized personnel at location designated by the Owner.

3.07 PROTECTION

A. Protect installed products from subsequent construction operations.

B. Touch-up, repair, or replace damaged products before Substantial Completion.

3.08 MAINTENANCE

A. See Section 01 7000 - Execution and Closeout Requirements, for additional requirements relating to maintenance service.

B. Provide to Owner, a proposal as an alternate to the base bid, a separate renewable maintenance contract for the service and maintenance of a motorized shade system for one year from date of Substantial Completion. Include a complete description of preventive maintenance, systematic examination, adjustment, parts and labor, cleaning, and testing, with a detailed schedule.

END OF SECTION

SECTION 12 3600
COUNTERTOPS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Countertops for architectural cabinet work:
   1. Solid Surface (SSF-#)
   2. Quartz (QTZ-#)

B. Wall-hung counters and vanity tops.

C. Solid surface window sills (SSF#).

1.02 RELATED REQUIREMENTS

A. Section 06 4100 - Architectural Wood Casework: architectural cabinet work.

B. Division 22: Plumbing fixtures including undermount and drop in sinks, trim and connections.

1.03 REFERENCE STANDARDS

A. ANSI A208.2 - Medium Density Fiberboard (MDF) for Interior Applications.

B. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials.

C. AWI/AWMAC/WI (AWS) - Architectural Woodwork Standards, 2nd Edition.

D. ISFA 2-01 - Classification and Standards for Solid Surfacing Material.

E. ISFA 3-01 - Classification and Standards for Quartz Surfacing Material.

F. NEMA LD 3 - High-Pressure Decorative Laminates.

G. NSI (DSDM) - Dimensional Stone Design Manual, Version VIII.

1.04 SUBMITTALS

A. See Section 01 3000 - 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. Specimen warranty.

C. Shop Drawings: Complete details of materials and installation ; combine with shop drawings of cabinets and casework specified in other sections.

D. Selection Samples: For each finish product specified, color chips representing manufacturer's full range of available colors and patterns.

E. Verification Samples: For each finish product specified, minimum size 6 inches square, representing actual product, color, and patterns.

F. Test Reports: Chemical resistance testing, showing compliance with specified requirements.

G. Maintenance Data: Manufacturer's instructions and recommendations for maintenance and repair of countertop surfaces.

1.05 QUALITY ASSURANCE

A. Perform work in accordance with AWI Standards (latest edition) unless other quality is indicated for specific items.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Do not deliver countertops until painting and similar operations that could damage countertops have been completed in installation areas.

B. Store products in manufacturer's unopened packaging until ready for installation.

C. Store and dispose of solvent-based materials, and materials used with solvent-based materials, in accordance with requirements of local authorities having jurisdiction.

1.07 FIELD CONDITIONS

A. Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's absolute limits.

B. Field Measurements: Where countertops are indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication, and indicate measurements on Shop Drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work.

PART 2 PRODUCTS

2.01 COUNTERTOPS

A. Solid Surfacing Countertops: Solid surfacing sheet or plastic resin casting over continuous substrate.
   1. Flat Sheet Thickness: 1/2 inch, minimum.
   2. Solid Surfacing Sheet and Plastic Resin Castings: Complying with ISFA 2-01 and NEMA LD 3; acrylic or polyester resin, mineral filler, and pigments; homogenous, non-porous and capable of being worked and repaired using standard woodworking tools; no surface coating; color and pattern consistent throughout thickness.
      a. Manufacturers:
         1) Avonite Surfaces: www.avonitesurfaces.com/#sle.
         2) Dupont; Corian: www.corian.com/#sle.
         3) Formica Corporation: www.formica.com/#sle.
         4) **BASIS OF DESIGN:** LG Hausys America, Inc; HI-MACS: www.lghausysusa.com/#sle.
         5) Wilsonart: www.wilsonart.com/#sle.
         6) Substitutions: See Section 01 6000 - Product Requirements.
      b. Surface Burning Characteristics: Flame spread index of 25, maximum; smoke developed index of 450, maximum; when tested in accordance with ASTM E84.
      c. Finish on Exposed Surfaces: Matte, gloss rating of 5 to 20.
      d. Color and Pattern: As indicated on drawings.
   3. Other Components Thickness: 1/2 inch, minimum.
   4. Exposed Edge Treatment: Built up to minimum 1-1/4 inch thick; square edge.
   5. Back and End Splashes: Same sheet material, square top; minimum 4 inches high, unless otherwise indicated.
   6. Skirts: As indicated on drawings.
   7. Fabricate in accordance with AWI/AWMAC/WI (AWS), Section 11 - Countertops, Premium Grade.
   8. Solid Surfacing Window Sills: thickness as detailed, 1/4" overhang on interior, square with eased edges.

B. Natural Quartz and Resin Composite Countertops: Sheet or slab of natural quartz and plastic resin over continuous substrate.
   1. Natural Quartz and Resin Composite Sheets, Slabs and Castings: Complying with ISFA 3-01 and NEMA LD 3; orthophthalic polyester resin, mineral filler, and pigments; homogenous, non-porous and capable of being worked and repaired using standard stone fabrication tools; no surface coating; color and pattern consistent throughout thickness.
      a. Manufacturers:
         1) Cambria Company LLC: www.cambriausa.com/#sle.
         2) **BASIS OF DESIGN:** Corian Quartz.
         3) Dal-Tile Corporation: www.daltile.com/#sle.
         4) LG Hausys America, Inc: www.lghausysusa.com/#sle.
         5) Wilsonart: www.wilsonart.com/#sle.
         6) Substitutions: See Section 01 6000 - Product Requirements.
      b. Factory fabricate components to the greatest extent practical in sizes and shapes indicated; comply with NSI (DSDM).

c. Surface Burning Characteristics: Flame spread index of 25, maximum; smoke developed index of 450, maximum; when tested in accordance with ASTM E84.
d. Finish on Exposed Surfaces: Polished.
e. Color and Pattern: As indicated on drawings As indicated in Finish Schedule.

2. Other Components Thickness: 3/4 inch, minimum.
3. Back and End Splashes: Same sheet material, square top; minimum 4 inches high, unless indicated otherwise.
4. Skirts: As indicated on drawings.
5. Fabricate in accordance with AWI/AWMAC/WI (AWS), Section 11 - Countertops, Premium Grade.

2.02 MATERIALS

A. Wood-Based Components:
1. Wood fabricated from old growth timber is not permitted.

B. Medium Density Fiberboard for Supporting Substrate: ANSI A208.2.

C. Adhesives: Chemical resistant waterproof adhesive as recommended by manufacturer of materials being joined.

D. Joint Sealant: Mildew-resistant silicone sealant, clear.

2.03 ACCESSORIES

A. Low-Profile Countertop Support Brackets: Fixed, L-shaped, face-of-wall mounting.
1. Materials: Steel; T-shape cross-section.
a. Finish: Manufacturer's standard, factory-applied, field-painted to match adjacent wall finish unless noted otherwise.
b. Color: Black.
c. Height: As recommended by manufacturer.
d. Support Length: As recommended by manufacturer.
e. Width: 1 inch.
2. Products:
a. A&M Hardware, Inc; Hybrid Brackets: www.aandmhardware.com/#sle.
b. Rakks/Rangine Corporation; EH Series Brackets: www.rakks.com/#sle.
c. Substitutions: See Section 01 6000 - Product Requirements.

B. Countertop Brackets: Fixed, concealed vertical leg, side-of-stud mounting.
1. Materials: Steel L- and T-shapes.
a. Finish: Manufacturer's standard, factory-applied, powder coat.
b. Color: as selected by Architect.
2. Products:
a. A&M Hardware, Inc; Concealed Brackets: www.aandmhardware.com/#sle.
b. Rakks/Rangine Corporation; Inside Wall Flush Mount Brackets: www.rakks.com/#sle.
c. Substitutions: See Section 01 6000 - Product Requirements.

2.04 FABRICATION

A. Fabricate tops and splashes in the largest sections practicable, with top surface of joints flush.
1. Join lengths of tops using best method recommended by manufacturer.
2. Fabricate to overhang fronts and ends of cabinets 1 inch except where top butts against cabinet or wall.
a. Rout a 1/8 inch drip groove at underside of exposed overlapping edges, set back 1/2 inch from face of edge.
3. Prepare all cutouts accurately to size; replace tops having improperly dimensioned or unnecessary cutouts or fixture holes.

B. Provide back/end splash wherever counter edge abuts vertical surface unless otherwise indicated.
1. Secure to countertop with concealed fasteners and with contact surfaces set in waterproof glue.
2. Height: 4 inches, unless otherwise indicated.

C. Solid Surfacing: Fabricate tops up to 144 inches long in one piece; join pieces with adhesive sealant in accordance with manufacturer's recommendations and instructions.

D. Wall-Mounted Counters: Provide skirts, aprons, brackets, and braces as indicated on drawings, finished to match.

PART 3 EXECUTION

3.01 EXAMINATION

A. Do not begin installation until substrates have been properly prepared.

B. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

C. Verify that wall surfaces have been finished and mechanical and electrical services and outlets are installed in proper locations.

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. Securely attach countertops to cabinets using concealed fasteners. Make flat surfaces level; shim where required.

B. Seal joint between back/end splashes and vertical surfaces.

3.04 TOLERANCES

A. Variation From Horizontal: 1/8 inch in 10 feet, maximum.

B. Offset From Wall, Countertops: 1/8 inch maximum; 1/16 inch minimum.

C. Field Joints: 1/8 inch wide, maximum.

3.05 CLEANING

A. Clean countertops surfaces thoroughly.

3.06 PROTECTION

A. Protect installed products until completion of project.

B. Touch-up, repair or replace damaged products before Date of Substantial Completion.

END OF SECTION

SECTION 12 6100
FIXED AUDIENCE SEATING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Fixed, non-upholstered audience seating (SEAT-1).

B. Companion chairs.

C. Chair accessories.

1.02 RELATED REQUIREMENTS

A. Section 12 6613 - Telescoping Bleachers.

1.03 PRICE AND PAYMENT PROCEDURES

A. Alternates:
   1. See Section 01 2300 - Alternates for product alternates affecting this section.
   2. This section includes base bid and alternate items.

1.04 REFERENCE STANDARDS

A. ADA Standards - 2010 ADA Standards for Accessible Design.

B. ASTM A48/A48M - Standard Specification for Gray Iron Castings.

C. ASTM E1352 - Standard Test Method for Cigarette Ignition Resistance of Mock-Up Upholstered Furniture Assemblies.

D. ASTM E1537 - Standard Test Method for Fire Testing of Upholstered Furniture.

E. BIFMA X5.4 - Public and Lounge Seating.

F. NFPA 261 - Standard Method of Test for Determining Resistance of Mock-Up Upholstered Furniture Material Assemblies to Ignition by Smoldering Cigarettes.

1.05 ADMINISTRATIVE REQUIREMENTS

A. Coordination with Electrical Work: Coordinate installation of wiring to ensure that floor-mounted junction boxes are completely beneath seats and free of aisle spaces.

1.06 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Product Data: Manufacturer's printed data sheets for products specified.

C. Shop Drawings: Fabrication and installation details, chair layouts and dimensions and seat numbering scheme.
   1. Field Measurements: Verify seating layout by field measurements and record field dimensions on shop drawings.

D. Selection Samples: Manufacturer's color charts and swatches for fabric upholstery, plastic laminate, baked enamel finish, hardwood and finishes, plywood and finishes, and molded plastic, indicating full range of materials, colors, and patterns available.

E. Verification Samples: Full-size two-seat fabricated sample of each type of chair specified, including all accessories and one end panel, illustrating all finishes and workmanship to be expected in the finished Work; approved sample may be incorporated into the Work.

F. Installer's qualification statement.

1.07 QUALITY ASSURANCE

A. Installer Qualifications: An experienced installer certified in writing by the seating manufacturer to be qualified for installation of specified seating.

B. Fire Retardance of Upholstered Seating: Self-extinguishing when mock-up is exposed to smoldering cigarettes in accordance with ASTM E1352 or NFPA 261.

C. Fire Retardance of Fixed Audience Seating: Maximum instantaneous net peak rate of heat release of 250 kW or less, and total energy released during first 5 minutes of 40 mJ or less, when tested in accordance with ASTM E1537.

D. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum five years of documented experience.

1.08 DELIVERY, STORAGE, AND HANDLING

A. Deliver seats to project site in unopened containers clearly labeled with manufacturer's name and identification of contents.

B. Store seating units in dry and clean location until needed for installation. During installation, handle in a manner that will prevent marring and soiling of finished surfaces.

1.09 WARRANTY

A. See Section 01 7800 - Closeout Submittals for additional warranty requirements.

B. Manufacturer Warranty: Provide manufacturer warranty for interior fixed audience seating covering the material and workmanship for the specified warranty period:
   1. Structural Components: 5 years.
   2. Operating Mechanisms: 5 years.
   3. Plastic, Wood and Painted Components: 5 years.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Fixed Audience Seating:
   1. **BASIS OF DESIGN:** Irwin Seating Company: www.irwinseating.com/#sle.
      a. Audience Seats: Patriot
      b. Companion Seats: Gathr Essential
   2. Southern Bleachers; Interkal Aura Stadium.
   3. Substitutions: See Section 01 6000 - Product Requirements.

2.02 NON-UPHOLSTERED SEATING

A. Fixed seating system designed to permit radial installation using common middle support standards in each row and aisle standards aligned as indicated on drawings. Width of seats not less than 21 inches, except exit seat locations may be reduced to 20 inches to complete specific row dimensions.
   1. Finish/Color: See Interior Finish Shedule.
   2. Sizing/ Dimensions: See Interior Finish Shedule.

B. Performance Criteria:
   1. Strength and Durability: Comply with BIFMA X5.4 standards for seats, backs, armrests, and standards.

C. Support Standards: One-piece cast iron, with integral mounting points for backs, seats, and arm rests, and integral riser anchoring points.

D. Two-Piece Chairs:
   1. Construction: Contoured seat and back construction with rolled edges, fabricated from impact-resistant, blow-molded, (HDPE) high density polyethylene plastic.
   2. Seats: Equip seat with noiseless, self-lubricating hinges and spring-operated mechanism that will raise seat to vertical or near-vertical position when seat is unoccupied.

E. Arm Rests: Locate at aisles and between chairs; mount to support standard with concealed fasteners; exposed surfaces of molded high-impact plastic.

F. End Panels: One piece panels fastened securely to aisle standards with concealed fasteners, configured as follows:
   1. Shape: Rectangular.
   2. Finish: to match chair.

2.03 MATERIALS

A. Cast Iron: ASTM A48/A48M, Class 25A minimum, free of air holes and casting imperfections, all edges ground smooth.

2.04 COMPANION SEATS

A. Companion Seats: Folding seating with molded polycarbonate seat and back with upholstered cushions.
   1. Colors: As selected from manufacturer's full range.
   2. Options: Include Quick-Secure Slide-and-Glide ganging device.

2.05 ACCESSORIES

A. Seat and Aisle Numbers: Manufacturer's standard seat numbers securely fastened to front edge of folding seats and row numbers securely fastened to aisle arm rests; brass finish, with letters and numbers countersunk and filled with black paint; surface mounting.

B. Designated Aisle Seats: provide complete end panel on swing-out mechanism with latch to hold closed, provide standard blue ADA marker on end arm rest to aid identification. Lift-up armrests shall not be accepted

PART 3 EXECUTION

3.01 EXAMINATION

A. Examine substrates for conditions detrimental to installation of fixed audience seating. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 INSTALLATION

A. Comply with manufacturer's installation instructions and approved shop drawings.

B. Anchor support standards securely to substrate with at least two anchoring devices recommended by manufacturer.
   1. Place standards in each row laterally so the standards at the aisle will be in alignment.
   2. Vary width of seats and backs as required to optimize sightlines, and comply with the ADA Standards for row and aisle widths.
   3. In curved rows, install standards to form smooth radius, without breaks or angled chords
   4. Attach components to standards with sufficient flexibility to compensate for convergence of seats toward the center.

3.03 ADJUSTING

A. Adjust seat mechanisms to ensure that seats in each row are aligned when unoccupied.

B. Replace upholstery fabric damaged or soiled during installation.

END OF SECTION

SECTION 12 6723
BENCHES

<<<< UPDATE NOTES

PART 1 GENERAL

2.01 SECTION INCLUDES

A. Benches (BENCH-1).

2.02 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide manufacturer's specifications and descriptive literature, installation instructions, and maintenance information.

C. Shop Drawings: Indicate plans for each unit or group of units, elevations with model number, overall dimensions, construction, and anchorage details.

2.03 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section, with at least three years of documented experience.

PART 2 PRODUCTS

3.01 FURNISHINGS

A. Benches: Metal frame and wood seat section without back.
   1. Frame: Steel.
   2. Seat: Wood slat.
   3. Finish/Color: See Interior Finish Shedule.
   4. Sizing/ Dimensions: See Interior Finish Shedule.
   5. Products:
      a. **BASIS OF DESIGN:** Botton + Gardiner; B+G Terrain Bench.
      b. Substitutions: See Section 01 6000 - Product Requirements.

PART 3 EXECUTION

4.01 EXAMINATION

A. Verify proper installation of mounting surfaces, preinstalled anchor bolts, and other mounting devices; and ready to receive site furnishing items.

B. Do not begin installation until unacceptable conditions are corrected.

4.02 INSTALLATION

A. Install furnishings in accordance with approved shop drawings, and manufacturer's installation instructions.

END OF SECTION

SECTION 13 18 11
ICE RINK GENERAL REQUIREMENTS

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Quality assurance - prequalification criteria.

B. General description of ice system requirements including ice rink floor, refrigeration system, and waste heat recovery systems.

C. Reinspection.

D. Submittal and project closeout requirements.

E. Electrical requirements.

F. General concrete requirements.

G. Floor drain containment systems.

H. Start-up and shutdown procedures.

I. Building first ice sheet.

J. Emergency Preparedness Planning/Process Hazard Assessment Assistance (ammonia systems).

1.02 QUALITY ASSURANCE

A. To demonstrate the qualifications to perform the Work, the Ice Rink Contractor shall submit the information requested below with their Bid. Ice Rink Contractor is defined as the contractor responsible for completing all Division 13 work and all work shown on the "R" drawings. Subcontractors performing the work identified below shall also meet the qualifications. Qualification document submitted by the low bidder will be evaluated after the bid opening to determine if the Ice Rink Contractor meets these qualifications.

1. As evidence and assurance of the contractor's ability to construct the project and support the Owner's system with service the contractor installing and constructing the primary and secondary refrigeration systems, along with the project superintendent for the contractor that will be on-site during construction, must have successfully installed and constructed ammonia refrigeration systems and ice rink floors for **five (5) ice rink construction projects that are similar to this project and completed within the past five (5) years.** Submit information on each project. Submittal shall be on company letterhead, signed by an authorized representative of the company and include project description, portion of project completed by the company, location, construction cost, completion date, owner's name, owner's representative, phone number and completion date of work.
2. As evidence and assurance of the contractor's concrete subcontractor's ability to construct the project, the contractor placing and finishing the concrete must have successfully completed the placement and finishing of concrete on **eight (8) concrete ice rink floor construction projects within the past five (5) years.** Submit information on each project. Submittal shall be on company letterhead, signed by an authorized representative of the company and include project description, portion of project completed by the company, location, construction cost, completion date, owner's name, owner's representative, phone number and completion date of work.
3. As evidence and assurance of the contractor's controls subcontractor's ability to construct the project the control subcontractor must have successfully completed the programming and installation of two (2) ice rink construction projects that are similar to this project that were completed within the past five (5) years. Submit information on each project. Submittal shall be on company letterhead, signed by an authorized representative of the company and include project description, portion of project completed by the company, location, construction cost, completion date, owner's name, owner's representative, phone number and completion date of work.
4. As evidence and assurance of the contractor's expansion joint subcontractor's ability to construct the project, the ice rink floor expansion joint subcontractor must have successfully completed twenty (20) construction projects that use the same type of joint. Submit information on each

 © 2026 B32 Engineering Group, Inc. All Rights Reserved

project. Submittal shall be on company letterhead, signed by an authorized representative of the company and include project description, portion of project completed by the company, location, construction cost, completion date, owner's name, owner's representative, phone number and completion date of work.

5. Submit the names of all persons that will be performing the fusion welding process on this project along with their certifications, training and qualifications for performing the fusion welding process for high density polyethylene pipe (HDPE).

1.03 GENERAL PROJECT DESCRIPTION

A. The following is a general description of the project and may not include all materials and labor required or covered elsewhere in the contract documents.
   1. Furnish and install a complete ice system including central refrigeration system, three (3) ice rink floors, and waste heat recovery systems for sub-floor heating and snow melting.
   2. Furnish and install an indirect refrigeration system including equipment, piping, insulation, valves, refrigerant, brine, gas monitoring system, controls, motor control center, electrical, accessories and all other necessary materials and labor required for a complete operating system.
   3. Furnish and install three (3) concrete ice rink floor including floor insulation, vapor barrier, pipe supports, piping, reinforcement, concrete, expansion joint, accessories and all other necessary materials and labors required for a complete operating system.
   4. Furnish and install waste heat recovery systems for three (3) sub-floor heating and two (2) snow melting including sand, piping, coil for pit, heat exchanger, pumps, valves, glycol, controls, electrical, accessories and all other necessary materials and labor required for complete operating systems.
   5. Schedule and pay for all testing and start up services required by the contract documents pertaining to the ice system.

1.04 REINSPECTION

A. In addition to the Engineer’s standard site visits throughout the project, the Engineer will be on-site at the end of the project to generate a list of uncompleted, or unsatisfactorily completed items, (i.e., punch list) after the project is reported complete by the Contractor and prior to the project’s required completion date. If the items are not satisfactorily completed and should additional site visits be required to follow up on uncompleted items, the Engineer shall be compensated at the typical hourly rate for each person involved in the re-inspection. The Contractor will be back charged the amount of the additional inspections.

1.05 RELATED SECTIONS

A. Division 0, Division 1, General and Supplementary Conditions.

B. Section 131812 - Ice Rink Refrigeration System.

C. Section 131813 - Ice Rink Floor System.

D. Section 131814 - Ice Rink Piping, Valves and Accessories.

E. Section 131815 - Ice Rink Waste Heat Recovery Systems.

F. Section 131817 – Ice Rink Central Control System.

1.06 REFERENCES

A. ACI 301 - Specifications for Structural Concrete for Buildings.

B. ACI 305 - Hot Weather Concreting.

C. ACI 306 - Cold Weather Concreting.

D. ACI 309 - Recommended Practices for Consolidation of Concrete.

E. ASHRAE/ANSI - 15 Safety Code for Mechanical Refrigeration.

F. ASME B31.5 - Refrigeration Pressure Piping Code.

G. IEEE Standard 112 - Standard Test Procedure for Polyphase Induction Motors and Generators (Method B).

 © 2026 B32 Engineering Group, Inc. All Rights Reserved

H. NECA - Standard of Installation.

I. NEMA ICS2 - Industrial Control Devices, Controllers and Assemblies.

J. NEMA -MG - Motor and Generators.

K. NEMA TC2 - Electrical Plastic Tubing (EPT) and Conduit (EPC-40 and EPC-80).

L. NEMA-WC5 - Thermoplastic Insulated Wire and Cable.

M. NEMA -WC7 - Cross Linked Thermosetting Poly Insulated Wire and Cable.

N. NEMA 250 - Enclosures for Electrical Equipment.

O. NFPA 70 - National Electrical Code.

P. UL-83 - Thermoplastic - Insulated Wires and Cables.

Q. UL 360 - Liquid-Tight Flexible Steel Conduit.

R. UL 508 - Industrial Control Equipment.

S. UL 651 - Schedule 40 and 80 PVC Conduit.

T. UL 797 - Electrical Metallic Tubing.

U. UL 810 – Capacitors.

V. UL 845 - Control Panels.

W. International Fire Code.

X. International Building Code.

Y. International Mechanical Code.

1.07 CODES AND STANDARDS

A. All parts of the project shall be performed in accordance with the most recent version of the following codes and standards and all amendments:
   1. State Building Codes.
   2. State Electrical Codes.
   3. State Mechanical Codes.
   4. National Fire Protection Association Codes.
   5. ANSI/ASHRAE 15 -Safety Code for Mechanical Refrigeration.
   6. ASHRAE 34-Number Designations and Safety Classification of Refrigerants.
   7. OSHA.
   8. American Standard Code for Pressure Piping ASA B31.1.
   9. American Standard Code for Refrigeration Piping ASA B31.
   10. American Standard Code for Pressure Vessels.
   11. ANSI/IIAR Standard.

1.08 SUBMITTALS

A. See General Conditions, Division 0 and additional requirements below..

B. Shopdrawings and Submittals:
   1. The Contractor’s approval stamp is required on all submittals and indicates that the Contractor has reviewed all materials and has a completed understanding of the specifications and requirements. Contractor shall clearly mark all deviations from the contract documents on all submittals.
   2. Shop Drawings. All submittals shall conform to the requirements of the General Conditions and these specifications.
   3. Submit each item/material/equipment in a separate submittal and clearly labeled as follows using specification section, article and title.
      a. For example: Rink Piping, Title: Polyethylene Rink Pipe, Submittal No. 131813.2.05.001

C. Progress Schedule. Submit progress schedule before project begins.

D. Test Reports. Submit one (1) electronic copy of test reports to the Engineer when specified.

 © 2026 B32 Engineering Group, Inc. All Rights Reserved

E. Certifications. Submit one (1) electronic copy of certifications to the Engineer when specified.

F. Operation and Maintenance Manuals
   1. Submit one (1) electronic copy for initial review. After reviewed by the Engineer and all changes are made, submit one (1) final electronic copy and two (2) final printed copies for the Owners' use.
   2. Prepare manuals, instructions and data by personnel experienced in maintenance and operation of described products.
   3. Prepare data in form of an instructional manual.
   4. Binders: Commercial quality, 8 ½ x 11-inch text pages, three D size, 3 ring binders with durable plastic covers, 2-inch maximum ring size. When multiple binders are used, correlate data into related consistent groupings.
   5. Provide tabbed dividers for each separate product and system, with typed description of product and major component parts of equipment.
   6. Sheets: Printed sheets in Part 1 shall have page protectors for each sheet. Printed sheets at the start and end of each additional section of the manual shall have page protectors.
   7. Drawings: Provide with reinforced edges.
   8. Manual covers to have printed title "OPERATION AND MAINTENANCE INSTRUCTIONS", title of project, and subject matter of manual when multiple manuals are required.
   9. Contents of Manuals:
      a. Table of Contents: Provide for each volume with each product or system identified, typed on white paper.
      b. **Part 1**: Directory, listing names, addresses, and telephone numbers of Engineer, Contractor, subcontractors, and major equipment suppliers for each product or system.
      c. **Part 2:** Operation and maintenance instructions arranged by system and subdivided by specification section. For each category, identify names, addresses, and telephone numbers of subcontractors and suppliers. Identify the following:
         1) Provide logical sequence of instructions for each procedure, incorporating manufacturer's instructions.
         2) Description of each unit, equipment or system.
         3) Significant design criteria, normal operating characteristics and limiting conditions for each equipment and system. Include performance curves, engineering data and tests.
         4) Operating Procedures: Include start-up, break-in, routine normal operating instructions, sequences, and shutdown of the system including, but not limited to, system checks, controls, stopping, valve number references, typical fluid levels in all vessels, emergency instructions, etc. Include winter, summer, and any other special operating instructions.
         5) Start-up and shut-down procedure description including a step-by-step written description of how to start up and shutdown the system including, but not limited to, system checks, safety device checks, valves number references, typical levels in vessels, etc.
         6) Instructions of care and maintenance instructions for equipment and systems including, but not limited to, manufacturer's recommendations for cleaning agents and methods, precautions against detrimental cleaning agents and methods, and recommended schedule for cleaning and maintenance.
         7) Maintenance Requirements: Include routine maintenance procedures and guide for preventative maintenance and troubleshooting; disassembly, repair, and reassembly instructions; and alignment, adjusting, balancing, and checking instructions.
         8) Detailed description of control system including a step-by-step written description of how to operate the control system. See Section 131817 - Ice Rink Control System for additional requirements.
         9) List of equipment.
         10) Parts list for each component.
         11) Valve list that includes valve number, description, manufacturer, operation (normal closed or open, etc.). Provide schematic drawing of refrigeration system that shows locations of each valve.

 © 2026 B32 Engineering Group, Inc. All Rights Reserved

12) Servicing and lubrication schedule, list of lubricants required.
13) Troubleshooting information.

d. **Part 3:** Project documents and certificates, including the following:
1) Approved shop drawings and product data.
2) Manufacturer's printed operation and maintenance instructions.
3) Detailed wiring diagrams of all electrical and control systems and all other electrical and control information.
4) Product Data: Mark each sheet to clearly identify specific products and component parts, and data applicable to installation. Delete inapplicable information.
5) Air and water balance reports.
6) Test records
a) Material and fluid tests for concrete, sand, glycol, CaCl2, etc.
b) Pipe pressure tests for refrigeration system piping, rink floor piping, and transmission mains.
7) Certifications of inspections by regulatory agencies.
8) Warranties. Including project warranty and all equipment and material warranties.
9) Maintenance Drawings – Supplement product data to illustrate relations of component parts of equipment and systems, to show control and flow diagrams. Do not use Project Record Documents as maintenance drawings.
10) Record Drawings including pipe routing, joint locations on all underground transmission mains, wiring diagrams, equipment layout, valve locations, etc. Reduce to half size and insert into back of manual.
11) Training and reporting forms.
a) Provide daily checklist form for recording operation of refrigeration system.

1.09 WARRANTY/GUARANTY

A. In addition to the standard manufacturer's warranty on all equipment and materials, the contractor shall provide a standard one-year materials and labor warranty on all work performed for this project.

1.10 PRODUCT DELIVERY, STORAGE AND HANDLING REQUIREMENTS

A. Transport, handle, store and protect products in accordance with manufacturer's recommendations. Secure products at all times.

B. Store products with seals and labels intact and legible.

C. Store products in a secure environment at all times.

D. Provide adequate labor to handle products and prevent damage.

E. All damaged materials and equipment will be rejected.

PART 2 - PRODUCTS

2.01 ELECTRICAL

A. See requirements in Section 131812 - Ice Rink Refrigeration Systems.

2.02 GENERAL CONCRETE REQUIREMENTS

A. This section refers to all concrete work outside the ice rink floor unless otherwise noted. For concrete ice rink floor see Section 131813 - Ice Rink Floor.

B. Concrete Mix:
1. Submit mix design fourteen (14) business days prior to placement.
2. Concrete shall be produced by a Ready-Mix Plant approved by the Engineer. Concrete shall meet the requirement of ASTM C94 - Standard Specifications for Ready Mix Concrete.
3. Mix Design Requirements

Minimum 28-day compressive strength	4000 psi
Coarse aggregate size	3/4 inch to #44 (ASTM C33 No. 67)

Maximum water to cement ratio	0.45
Maximum pozzolan content	25% of cement content
Minimum cement plus pozzolan content	564 lbs/cy
Slump	3 inches +/- 1 inch
Entrained air content	6% +/- 1.5%

C. Material Requirements
   1. Cement: Shall meet ASTM C150, Type 1
   2. Aggregates: Shall meet ASTM C33
   3. Water: Shall be clean, potable water.
   4. Admixtures:
      a. Air Entrainment: Shall meet ASTM C260
      b. Water Reducing Agent: Shall meet ASTM C494, Type A
      c. Fly Ash: Shall meet ASTM C618 class C or F.

D. Reinforcement and Formwork
   1. Formwork shall meet ACI 347 - Recommended Practice for Concrete Formwork.
   2. Reinforcement shall be tagged and conform to ASTM A615 Grade 60. Installation shall meet ACI 315.
   3. Tire wire: Shall be 16-gauge black annealed wire or heavier.

E. Related General Materials
   1. Polyethylene Sheeting: Shall conform to ASTM C171.
   2. Finishing Compound: Thoroseal by Thoro System Products or equal.
   3. Expansion Joint: Bituminous fiber type meeting ASTM D1751.
   4. Joint Sealant: Two part - self leveling, polyurethane sealant. MasterSeal SL2 by BASF or equal.
   5. Anchor Adhesive: For anchoring dowels. Hilti HIT Doweling Adhesive C-100 by Hilti Fastening Systems, Powers Pure 110+, or equal.

2.03 BREATHING APPARATUS

A. Owner to provide form fitted equipment.

2.04 FLOOR DRAIN CONTAINMENT SYSTEMS

A. Floor Drain Covers
   1. Approved manufacturers: CPLabSafety (California Small Business #58199) or equal.
   2. Provide one Drain Seal product for each of the floor drains in the ammonia refrigeration room.
   3. Size: shall be 6” larger than the outside of the drain grate or as required by the manufacturer.
   4. Material: The Drain Seal system shall be water-tight, Ultra-Tech flexible, 2-hour rated, non-absorbing urethane material, shall resist oil and ammonia, and maid with reinforced and tear resistant mesh. System shall seal using either side of material the material.
   5. Color: orange

PART 3 - EXECUTION

3.01 CONSTRUCTION UTILITIES AND FACILITIES

A. Unless specified elsewhere, all temporary utilities and facilities required to complete the project shall be the responsibility of the contractor and costs for these utilities and facilities shall be incidental to the project costs.

3.02 NOTIFICATIONS OF WORK

A. The Contractor shall notify the Engineer, a minimum of seven (7) business days, prior to the following phases of the work (per rink):
   1. Completion of subgrade preparation.
   2. Start of sub-floor heating system piping.
   3. Completion of transmission main installation
   4. Start of floor insulation.

5. Completion of floor insulation.
6. Start of rink piping and header piping.
7. Completion of rink piping and header piping.
8. Final flushing of all piping systems.
9. Start of concrete placement.
10. Start of refrigeration piping insulation installation.
11. Start and completion of all pressure tests.
12. Start up and Training.

3.03 INSPECTIONS

A. See Section 1.04 of this specification for requirements regarding re-inspection of uncompleted or unsatisfactory work.

3.04 CLEANING, PAINTING AND RESTORATION

A. Contractor shall be responsible for cleaning the immediate construction area including the rink floor, perimeter concrete where work or demolition is conducted and the mechanical rooms where work is being performed.

B. Patch and paint all holes caused or left by construction and demolition work. Match adjacent textures and colors.

C. Clean all equipment and piping to original condition after project has been completed.

D. Touch up all equipment paint, using paint provided by the manufacturer, after the installation is complete.

E. All piping, valves, and other items related to the ice system resulting from required demolition shall be removed and disposed of off-site by the contractor unless specifically designated to be salvaged.

F. Clean out snow melt pit.

3.05 CONCRETE WORK

A. Reinforcement shall be installed with a minimum of 2" of cover. Adequately support reinforcement with concrete blocks or wire/plastic chairs. Splices shall be installed with minimum lapping distances shown on the plans and bars wired tightly together.

B. Concrete Placement: shall conform to ACI 309 - Consolidation, ACI 306 - Cold Weather Placement, ACI 307 - Hot Weather Placement.

C. All new concrete adjacent to the ice rink floor shall be placed at the same tolerance as specified for the ice rink floor and shall use the same benchmark, unless otherwise noted.

D. Finishing: Apply float finish and uniform textured surface to all interior slabs. Apply broom finish to exterior slabs. Edge or chamfered the edge of all concrete that is adjacent an expansion or construction joint.

E. Joints: Install control and construction joints as follows unless otherwise stated elsewhere:
   1. Install control joints every 10 feet o.c. in each direction.
   2. Install construction joints with expansion material and caulk at any new cold joints.

F. Curing: Cover with burlap-polyethylene and damp cure for a minimum of 7 days.

G. Testing: Contractor shall hire a testing agency to perform the following tests and shall pay for all testing and laboratory costs. Tests shall include air content (ASTM C 231), slump (ASTM C143) and compressive strength (ASTM C31, C39) for all concrete placed. Three (3) copies of the results shall be submitted to the Engineer.

3.06 START-UP AND FOLLOW UP SERVICES

A. **The refrigeration system shall not be started until all local and state governing authorities have inspected and provided written approval for all systems related to, and including the refrigeration, piping, controls, ventilation, ice equipment room and building and all other related systems; and all alarms and controls have been thoroughly tested for all conditions and modes of operations.**

B. Provide documentation of all piping pressures tests and vacuum tests on systems. All tests shall be witnessed by Owner or Owner's representatives.

C. After all piping systems have been tested according to the specifications and current codes and have been thoroughly cleaned, fill all piping systems with a complete charge of the specified primary and secondary refrigerants. Remove all free air from the systems. The contractor shall be responsible for removing air from the system throughout the warranty period of the project. The contractor shall take every precaution to fill the piping system in such a manner that results in maximum air removal and avoids trapping air in the system (for example, the ice rink floor). If air becomes trapped in the piping system, the contractor shall remove the fluid and refill the system as many times as required until the air is removed. Provide field report for each site visit where air is removed, or systems checked clearly detailing processes and observations.

D. Provide all additional primary and secondary refrigerants necessary to maintain fully charged systems throughout the warranty period of the project. Test all refrigerants at frequency specified in Section 131812 – Ice Rink Refrigeration System and provide final test reports of each refrigerant (including moisture content, inhibitor concentration, solids, refrigerant content, etc.).

E. Start-Up and Commissioning: Provide a factory-trained technician for a minimum of 30 hours to completely check the operation of the refrigeration system and equipment and all associated systems and equipment during start up. Startup shall follow all requirements *of ANSI/IIAR-5 Startup of Closed-Circuit Ammonia Refrigeration Systems*. Provide documentation and certification from trained technician with completed, detailed check list for each piece of equipment.

F. Inspection, Testing, and Maintenance Service: The Contractor shall provide the following follow-up services, at minimum. The cost of these services shall be incidental.
   1. 6 Month (Semi-Annual) System ITM: Perform all recommended system tests, inspections and maintenance per *ANSI/IIAR-6 Standard for Testing, Inspection and Maintenance of Closed-Circuit Ammonia Refrigeration System* including but not limited to:
      a. Testing of Secondary Refrigerants
      b. Calibration of Ammonia Leak Detectors.
   2. 12 Month (Annual) System ITM: Perform all recommended system tests, inspections and maintenance per *ANSI/IIAR-6 Standard for Testing, Inspection and Maintenance of Closed-Circuit Ammonia Refrigeration System* including but not limited to:
      a. Testing of Secondary Refrigerants
      b. Calibration of Ammonia Leak Detectors.
   3. Site visits during the warranty period as required to make adjustments to control settings, equipment functions, and any other parts of the system.

G. Concrete ice rink floors shall cure a minimum of 28 days prior to lowering the temperature of the ice rink floor. After the 28-day cure, lower the temperature of the ice rink floor at a maximum rate of 1-degree F per hour until a slab temperature of 34 degrees F and then 1-degree F every 2 hours until a slab temperature of 16-18 degrees F or as desired by the Owner. Apply water only after the desired operating temperature is reached. Provide documentation that procedure was witnessed by Owner or Owner representative.

H. Provide the Owner's operating staff with twenty (20) hours of hands-on instructions on the safe operation of the entire ice system. This shall be provided in a minimum of three (3) separate days. Include detailed instructions on how to build the first ice sheet. Operation and Maintenance Manuals must be completed and approved by this time so they can be reviewed during the training sessions. Provide a minimum of fourteen (14) days' notice for all training sessions. Training sessions shall be coordinated with Owner's schedule.

I. Demonstrate that all control and alarm systems are working as required by code and specified in the contract documents. All necessary adjustments, additions, and electrical modifications shall be made to provide these systems. Provide documentation that procedure was witnessed by Owner or Owner representative.

J. The Contractor shall provide the following follow-up services, at minimum. The cost of these services shall be incidental.

1. Forty-Eight (48) hours after the system has been operating, shut down the system and clean strainers and screens on the compressor and rink pump that has been operating throughout this period. Clean strainers and screens on all other valves and equipment. Start operation of second compressor and rink pump.
2. Forty-Eight (48) hours after the second compressor and rink pump start up, shutdown the system and clean the screens on the compressor and rink pump that has been operating throughout this period. Repeat this step for additional equipment. Provide field report and documentation of all work performed and observations.
3. Thirty (30) days after start-up change filter dryer cores. Provide field report and documentation of all work performed and observations.
4. Site visits during the warranty period as required to make adjustments to control settings, equipment functions, and any other parts of the system as required to optimize the operation of the ice system.

K. Variable Frequency Drives: Provide start up services by a certified manufacturer's representative to provide an additional 1-year warranty. Provide field report and documentation of all work performed and observations.

L. Build the first ice sheet on each ice rink floor. The ice sheet shall be built in thin layers of water and in accordance with industry standard practices. This includes:
1. Build the black ice layer of ice (ice layer prior to painting).
2. Furnish and install white paint on entire ice rink floors and ice markings as shown on the drawings and/or specified herein. Paint shall be applied at rates recommended by the paint manufacturer and supplier (3 coats minimum for the white paint) and to achieve full uniform coverage of the ice surface, marking areas, etc. Logos shall be furnished and installed by the Owner.
2. Build the ice over the ice markings to the ice thickness desired by the Owner.
3. Train the Owners staff in building the first ice sheet.

M. Assist the Owner in preparing an Emergency Action Plan, Process Hazard Analysis, Preventative Maintenance Plan, Emergency Planning Community Right to Know Act forms or other required documents, required by the EPA, IIAR, etc. by providing the Owner's planning consultant and/or engineer with the information on the ice system as requested and shall take part in two (2) planning sessions with the Owner, Owner's planning consultant and/or engineer, via teleconference.

N. Provide laminated drawings of all the flow diagrams and P&IDs, valve list and reference for the project. Mount drawings to refrigeration room wall. Minimize size of drawings shall be 22" x 34".

3.07 SHUTDOWN SERVICES

A. Provide the Owner's operating staff with ten (10) hours of hands-on instructions on the shutdown procedures of the system after the first ice season has finished. Provide a minimum of fourteen (14) days' notice for all training sessions. Training sessions shall be coordinated with Owner's schedule.

3.08 COORDINATION OF WORK

A. The contractor shall be responsible for coordinating all work in Division 13 – Ice Rink. The contractor shall also work closely with the other subcontractors on the project and help coordinate all associated structural, electrical and mechanical systems.

3.09 PERMITS

A. The contractor shall apply for and obtain all permits required to construct the project at no additional cost to the Owner unless specified otherwise.

END OF SECTION

 © 2026 B32 Engineering Group, Inc. All Rights Reserved

SECTION 13 18 12
ICE RINK REFRIGERATION SYSTEM

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. General system description, design criteria and control criteria.
B. Ice System Electronic Delegated Design.
C. Motor Control Center
D. Motor Starters and Variable Frequency Drives.
E. Motors.
F. Power Monitoring Panel.
G. Automatic Alarm Dialer.
H. Power Factor Correction Capacitors.
I. Phase Loss Protection.
J. Other Electrical Components.
K. Ice System Controls
L. Compressors.
M. Chiller and Surge Drum.
N. Rink Pumps.
O. Condenser System (incl. water pump, sump & chemical treatment system).
P. Gas Monitoring System.
Q. Primary Refrigerant.
R. Secondary Refrigerant.
S. Storage Receiver System.
T. Thermosyphon Receiver.
U. Windsock for ammonia systems.

1.02 RELATED SECTIONS

A. Division 0, Division 1, General and Supplementary Conditions.
B. Section 131811 - Ice Rink General Requirements.
C. Section 131813 - Ice Rink Floor System.
D. Section 131814 - Ice Rink Piping, Valves and Accessories.
E. Section 131815 - Ice Rink Waste Heat Recovery Systems.
F. Section 131817 – Ice Rink Central Control System.

1.03 GENERAL REQUIREMENTS

A. General Refrigeration System Description:
   1. Furnish and install a complete ice rink refrigeration system including but not limited to chiller, compressors, pumps, condenser system, piping, valves, controls, motor control center, and all related electrical components and connections necessary for a completely automatic refrigeration system with alarms, operating at the conditions described in, and meeting the requirements of, the contract documents.

B. Refrigeration System Design Criteria:
   1. Design Parameters: See Ice Equipment Schedule on drawings.

 © 2026 B32 Engineering Group, Inc. All Rights Reserved

2. All primary refrigeration piping shall be sized by the Contractor unless otherwise specified or indicated on the drawings. The piping shall be sized for the full capacity of the system except where manufacturer recommends a different size to optimize operation of the system.
3. Furnish and install isolation valves, unions, purge valves, etc. required for isolating and servicing each piece of equipment and system components whether or not they are shown on the drawings.
4. The cost of all piping, electrical, equipment, controls, or other changes required for the proper installation of all equipment shall be included in the Contractors bid. If equipment substitutions require revisions in the design of the systems or facility, the Contractor shall reimburse the Owner for the cost of the redesign services.
5. The Contractor shall provide all electrical work, design, materials and equipment necessary for a complete, operational ice system. All work, materials and equipment shall meet the required electrical codes for the Project's location. A licensed electrician shall perform all electrical work. The main electrical feed for each piece of equipment shall be routed beneath the floor slab, not overhead. Provide all low voltage wiring required for alarms, controls and other related systems for a complete operating system.

1.04 SUBMITTALS

A. Shop Drawings. All submittals shall conform to the requirements of the General Conditions and these specifications.

1.05 WARRANTY/GUARANTY

A. As required in Section 131811 - Ice Rink General Requirements and as follows:
1. Manufacturer’s standard warranties that exceed the specified warranty.
2. Evaporative Condenser: In addition to the standard 1-year warranty, provide 5-year warranty on corrosion protection system, welded 304 stainless steel, and all major mechanical components, including fans, fan shafts, bearings, sleeves, supports and fan motor.
3. Motors and Variable Frequency Drives: In addition to the standard 1-year warranty, provide start-up services from a certified manufacturer’s representative to provide an additional 1-year warranty.
4. Test and maintain chemical balance of all refrigerants in all systems including inhibitors in all solutions during warranty period.
5. Coupon Test Rack. Provide 2-year warranty.
6. Diffusion tank. 3-year warranty for defects in materials and workmanship and 1-year for fittings and accessories.

1.06 PRODUCT DELIVERY, STORAGE AND HANDLING REQUIREMENTS

A. As required in Section 131811 - Ice Rink General Requirements.

PART 2 - PRODUCTS

2.01 ICE SYSTEM ELECTRICAL

A. Ice System Electrical Design Criteria:
1. The Ice System Contractor shall provide all electrical design, work, materials and equipment necessary for a complete, operational ice system. All work, materials and equipment shall meet the required electrical codes for the Project's location. A licensed electrician shall perform all electrical work.
2. All electrical work shall conform to the National Electrical Code. All provisions of the Division 26 Electrical Specifications concerning wiring, protection, etc., apply to wiring provided by the Ice Systems Contractor unless noted otherwise.
3. Control low (24V) and control line (120V) voltage wiring, conduit, and related switches and relays required for the automatic control &/or interlock of motors and equipment, including final connection, are to be furnished and installed under Divisions 13.
4. All components shall be UL approve and listed where applicable.
5. Wire and Cable: All wire shall be Copper, stranded conductor, 600-volt thermoplastic or thermoset insulation. Aluminum conductors are not to be used. Conductor sizing shall be per NEC requirements.

 © 2026 B32 Engineering Group, Inc. All Rights Reserved

6. Conduit and Raceways: All conductors shall be routed in an appropriate raceway for the specific location and conditions. Raceway sizes shall be appropriate for the number and size of conductors being routed through it. In locations where the floor of the refrigeration room is new (such as new construction) or being replaced, feeders to each piece of equipment shall be routed below slab wherever possible.
7. Disconnects: Contractor shall install disconnects adjacent to all equipment not within line of sight of the MCC or associated distribution panel. Approved Manufacturers for disconnects: Cutler Hammer, General Electric, Square D, Westinghouse or equal. Enclosure shall be NEMA rated for environment where it will be located. Disconnects for motors with VFD drives shall have auxiliary contacts to shut down VFD per manufacturers' recommendations.

2.02 MOTOR CONTROL CENTER (MCC)

A. Approved Manufacturers: Eaton/Cutler Hammer Westinghouse, Allen Bradley, General Electric, Siemens, Square D, Rockwell Automation or equal.

B. Panels designed and manufactured by custom panel shops will not be approved.

C. Provide a Motor Control Center (MCC) to house and including all starters, breakers, controls, running lights, contacts, relays, switches, fuses, safety switches, alarms, overload relays, resets, VFDs and all other electrical devices required for a fully operational ice system. The MCC shall include but not limited to, the following:
   1. Circuit breakers for each load with appropriate trip rating.
   2. Starters for compressors, pumps and condenser fans.
   3. Variable frequency drives for condenser fan, oil cooling pump and rink floor pumps.
   4. Running lights and HOA switches for all motors.
   5. 120/240V, 1PH panel board for refrigeration equipment requiring 120V power for control circuits, etc.
   6. 480V / 120-240V, 1PH transformer.
   7. Transient voltage surge suppressor.
   8. Feeder breakers as necessary (basin heaters, basin sweepers, etc.).
   9. Ice System Controls. Provide all necessary components and accessories for the integration of ice rink central control style.
   10. Power monitoring device

D. Ice System Controls. See description in this Section.

E. Shall be installed on a 4" high concrete pad and away from the refrigeration equipment to avoid vibration concerns.

F. The MCC shall be a dead-front, free-standing unit, Type 1 enclosure in accordance with UL 508, UL845 and shall be NEMA rated. Shall include individual buckets for each piece of equipment, each bucket containing a combination starter (motor starter, breaker device, and power disconnect), disconnects with means of padlocking in lock out position, copper ground bus, fault current rating of 65,000 amps, non-insulated equipment ground bus, and rated for 480 volts, 3 phase, 3 wire, 60 hertz electrical service. Provide plastic laminated identification nameplates on the front of the MCC panel. Finish shall be gray primer over a phosphatized surface.

G. The Motor Control Center and Ice System Control System shall fit in the spaces shown on the drawings. The contractor is responsible for all changes and modifications to these systems as required.

H. An electrical feeder (with phase loss protection) will be brought into the ice mechanical room by the Division 26 electrical subcontractor and connection made to the MCC panel. Verify the size of the electrical feeder with electrical subcontractor prior to ordering equipment. Verify that size of electrical feeder is adequate for ice system equipment. All electrical requirements inside the MCC, including the design of the electrical system, and the ice system equipment are the responsibility of the Ice Rink Contractor.

2.03 MOTOR STARTERS AND VARIABLE FREQUENCY DRIVES

A. Approved Manufacturers: Cutler Hammer Westinghouse, Allen Bradley, General Electric, Siemens, Square D, Danfoss or equal.

 © 2026 B32 Engineering Group, Inc. All Rights Reserved

B. Each motor shall have its own dedicated starter device for the associated load. See ice equipment schedule for motor loads.

C. Full Voltage Non-Reversing Starters (FVNR/ Across-the-Line): For motors smaller than 75-HP.
   1. NEMA ICS 2, Class A, magnetic, full voltage, non-reversing.
   2. Overload and phase failure protection.
   3. Integral control transformer for required control power voltage.
   4. Hand-Off-Auto selector switch and red indicator light on cover.

D. Solid State Starters (SSRV/Soft Starts): Required for motors 75-HP and greater. Shall be UL listed and include isolation contacts, current limiting fuses, capacitors for noise protection, microprocessors and all other circuitry required to function properly, overload protection, LED indicators, auxiliary contacts, heat sink, integral cooling fan, phase loss and stall protection, soft stop, adjustable starting and stopping times, and adjustable initial voltage level to adjust torque for motor starts. Shall have standard handle with four positions; ON, OFF, TRIPPED, and RESET. Part winding or wye-delta starters will not be accepted.

E. Variable Frequency Drive (VFD):
   1. Approved Manufacturers: ABB, Bell & Gossett, Danfoss, Eaton, Rockwell Automation, Yaskawa, or equal.
   2. Materials and Construction: NEMA 1 Enclosure, pad lockable input disconnect switch, electronic overload protection, input fuses, HOA switch, selectable operating modes, protection circuits, UL/CSA Approved.
   3. Display: Output frequency and voltage, motor current, kwh meter, fault indication with text, % torque, % power (kW), and speed (RPM).
   4. Voltage Tolerance: +/- 10%.
   5. Manual bypass (2 contactors), auxiliary contact for disconnect. Required on condenser fan(s) only unless otherwise noted.
   6. All motors for use with Variable Frequency Drives shall be listed suitable for use with VFD equipment to prevent premature bearing failure. This includes, but is not limited to, providing NDE and DE bearing and shaft grounding rings or system, etc. Shall be installed prior to start-up.
   7. All motors for use with Variable Frequency Drives shall be listed suitable for use with VFD equipment to prevent premature bearing failure. This includes, but is not limited to, providing NDE and DE bearings and shaft grounding rings or system, etc. Shall be installed prior to start-up.

2.04 MOTORS

A. Motors shall be 460 volts, 3 phase, 60 Hz, squirrel cage induction motors with a service factor of 1.15. Shall have adequate torque to accelerate the load at operating conditions without exceeding the nameplate rating, not including the service factor. Motors shall be designed, constructed and tested in accordance with ANSI/NEMA Publication No.MG-1 and meet NEMA specifications. Shall be premium efficiency design as determined by IEEE Standard 112, Method B. Minimum motor efficiencies shall meet the following.

Table for Premium Efficiency Motors (ODP type)

Motor HP	1200 RPM	1800 RPM	3600 RPM
1	82.5	85.5	77.0
1.5	86.5	86.5	84.0
2	87.5	86.5	85.5
3	88.5	89.5	85.5
5	89.5	89.5	86.5
7.5	90.2	91.0	88.5
10	91.7	91.7	89.5
15	91.7	93.0	90.2
20	92.4	93.0	91.0
25	93.0	93.6	91.7

 © 2026 B32 Engineering Group, Inc. All Rights Reserved

30	93.6	94.1	91.7
40	94.1	94.1	92.4
50	94.1	94.5	93.0
60	94.5	95.0	93.6
75	94.5	95.0	93.6
100	95.0	95.4	93.6
125	95.0	95.4	94.1
150	95.4	95.8	95.0
200	95.4	95.8	95.0

B. Motor enclosures shall be open drip proof (ODP). Bearings shall be shielded and regreasable steel ball bearings. Stator windings shall be copper. Insulation shall be Class F non-hygroscopic materials.

C. Motor shall be factory aligned and if necessary, shall be realigned by the Contractor after installation and prior to start-up.

D. Motors for exterior located equipment shall be Totally Enclosed, Fan Cooled type (TEFC).

E. Motors shall be inverter duty where VFDs are being used.

2.05 CUSTOMER MONITORING PANEL

A. Furnish and install a microprocessor-based monitor panel to provide the following readings: voltage, amperage, power, power factor, and energy consumption. The panel shall conform to the following:
1. Approved Manufacturers: Rockwell Automation (Allen Bradley) PowerMonitor 5000 or equal.
2. Current transformers, 5A secondary.
3. Four (4) protection functions shall be provided which shall include the following: overvoltage and undervoltage. Protective functions shall be field settable for alarm and/or trip outputs.
4. One alarm relay shall be programmable for KWH pulse output.
5. A serial port for data transmission to remote location shall be provided.
6. Provide monitoring software for multiple computers as required by Engineer/Owner. Connect unit to Ice Rink Center Control System for data collection and manipulation.

2.06 AUTOMATIC ALARM DIALER

A. Furnish and install a complete automatic alarm dialer system, compatible with the Owner's telephone system, that will monitor the following alarm conditions and points. This system is required by IIAR 6.14.7.4 "A monitored location shall be notified upon loss of power to or failure of the emergency mechanical ventilation system".

B. Before ordering the dialer system, the contractor shall verify with the Owner the type of phone system that is being used (standard dial type telephone system, Voice over Internet Protocol (VoIP) system, etc.). The contractor shall select the correct dialer system for their application. If VoIP is available, that system shall be selected.

C. Monitor the following alarm conditions and points:
1. Power loss to refrigerant leak detection dedicated circuit branch (per IIAR).
2. Power loss to emergency mechanical ventilation system's dedicated circuit branch (per IIAR).
3. Start/Fail for the emergency ventilation system's fan (per IIAR).
4. High brine temperatures from compressor microprocessor.
5. Alarm conditions from compressor microprocessor to be named later by Owner.
6. Power failure to refrigeration system.

D. Manufacturer: Sensaphone 800 system, Sensaphone Sentinel Monitoring System with Cellular Modem or equal.

E. Unit to provide up to 12 different status conditions.

F. Dial a minimum of eight (8) different phone numbers.

G. Uninterrupted Power Supply (UPS) for 20 minutes.

 © 2026 B32 Engineering Group, Inc. All Rights Reserved

H. Additional requirements for standard telephone system:
1. Operate with standard dial telephone line.
2. Respond to status interrogation from any touch-tone telephone.

I. Additional requirements for VoIP system:
1. Include 12-month subscription to cellular dialer system for time of startup. Coordinate with City on selection of service provider.
2. Shall instantly send alerts via phone, text or email over cellular connection.
3. Shall deliver event reports, and audit logs.
4. Shall store all data in the cloud, with unlimited information storage and allows multiple devices to be managed from one account. No software shall be required.
5. Shall be accessible by any web-enabled device.

2.07 POWER FACTOR CORRECTION CAPACITORS

A. Approved Manufacturers: Square D, Cutler Hammer or equal.

B. Furnish and install power factor correction capacitors to increase the power factor to a minimum of 0.90 or minimum recommended by the local power company, whichever is higher. A capacitor shall be provided on each motor, for the following equipment:
1. All other motors of 3 horsepower or greater.

C. Materials and Construction:
1. Type: self-healing, internally protected capacitor elements, dry design.
2. Dielectric: metalized polypropylene film, no liquid dielectrics
3. Internal connection: 3 phase, delta.
4. Tolerance on capacitors: -5%/+10%
5. Discharge mechanism: polycarbonate resistor, 1 per phase.
6. Losses: <0.5W/kVAR, including discharge resistors.
7. Rated voltage/frequency: 480V/60 Hz
8. Dielectrics withstand: 4kV/60 Hz for 1 minute.
9. Interrupting rating: unfused-10kA I.C. symmetrical; fused-200kA.
10. Continuous overvoltage: 1.1 x Vn (8 hours over 24 hours)
11. Continuous overcurrent: 1.30 In
12. Maximum harmonic current: 1.05 x ln
13. Maximum harmonic voltage: 1.05 x V
14. Temperature range: 14 F to +104 F
15. Approvals: CSA and CSA-US certified
16. Painted finish: NEMA Type 1 and Type 3R.
17. Enclosure: 14-gauge steel.
18. Other: wall mount brackets

2.08 PHASE LOSS PROTECTION

A. Approved Manufactures: Zelio by Telemecanique (Schneider Electric), Macromatic, or equal.

B. Furnish and install phase loss protection at each motor. Devices shall monitor 3-Phase supplies and sequence of phases L1, L2, and L3 and total loss of one or more phases.

C. Function:
1. Phase sequence
2. Phase failure
3. Asymmetry
4. Undervoltage
5. Overvoltage

D. Materials and Construction:
1. Product certifications: UL, CSA
2. Conforming standards: NF EN 60255-6 and IEC 60255-6
3. Vibration resistance: 0.035 mm from 10-150 Hz.

 © 2026 B32 Engineering Group, Inc. All Rights Reserved

4. Degree of protection: Casing IP 30, Terminals IP 20.
5. Overvoltage category: III
6. Insulation resistance: >500 mega ohms, 500 Vdc.
7. Rated insulation voltage: 400 V.
8. Insulation test voltage: Dielectric = 2kV, 50 Hz, 1 min. on VAC
9. Wire: Solid cable range one 14-20 AWG.
10. Housing material: Self-extinguishing plastic.
11. Rated supply voltage: 208-480 Vac.
12. Operating range: 183-528 Vac.
13. Voltage limits (of power supply circuit): -12%, +10%
14. Frequency: 50/60 Hz +/- 10%
15. Maximum power consumption: 1.8 VA on VAC
16. Output type: 1 or 2 C/O contacts.
17. Contact type: Cadmium-free.
18. maximum switching voltage: 250 Vac/Vdc
19. Rated breaking capacity: 1250 VA.
20. Minimum breaking current: 10/5 Vdc mA.
21. Maximum operating rate: 360 operations/hour under full load
22. Maximum response time (fault event): 100 ms
23. Delay on pick-up: 500 ms
24. Relay status and fault signaling shall be indicated by LEDs.

2.09 OTHER ELECTRICAL COMPONENTS

A. Emergency Devices
   1. Furnish and install an emergency remote control push/pull button (off-only control) and all associated electrical for a complete system to stop the operation of all electrically energized equipment related to the refrigeration system as required by the current state and local mechanical codes.
   2. For interior devices and locations, furnish and install a clear Plexiglass protective, lockable, wall mounted case for devices.
   3. For exterior devices and locations, furnish and install NEMA Type 3R, continuous hinge, lockable enclosure (Weigmann RHC121206 or equal). Emergency ventilation remote switch provided by others will also be installed by others in this enclosure. Verify enclosure space needs with ventilation contractor.

2.10 ICE SYSTEM CONTROLS

A. Ice Rink Control System and Components:
   1. Furnish and install Ice Rink Control System as specified in Section 131817 – Ice Rink Central Control System.
   2. Furnish and install all necessary controls, electrical, wiring, lights, housings, relays and other electrical devices and systems required for a complete automatically controlled ice system. Provide all low voltage wiring and connections required for alarms, controls and all other related devices for complete operating systems.
   3. The refrigeration system shall have sufficient manual controls to allow the system to operate without the computer control system if the computer control system fails.

2.11 SCREW COMPRESSOR PACKAGE

A. Approved manufacturers: Mycom Compressor Package, Bitzer ACP or equal.

B. Design Parameters: See Ice Equipment Schedule on drawings for design conditions. System basis of design is based on Mycom I-Series screw compressors package. If alternative compressor manufacture is used, contractor shall submit revised design documents including but not limited to: design data, flow diagram, package layout, etc. Package shall be designed and constructed to meet all applicable codes including but not limited to: ANSI IIAR, ASHRAE 15, ASME B31.3, etc. All compressors, vessels,

 © 2026 B32 Engineering Group, Inc. All Rights Reserved

piping, and accessories shall be mounted to a single industrial strength steel frame and be fully piped, wired and tested prior to delivery.

C. Compressors: Open drive ammonia screw compressor. Compressors shall have stepped capacity control (50%-75%-100%) via solenoid valves. Mycom i-Series, Bitzer OS 74/85 Series, or equal.

D. Motors: NEMA Premium Efficiency Motors, 1.15SF Motor (s) C-Flange, 3,300 ft elevation, 40C ambient, 460v/3p/60Hz, ODP, suitable for Solid State Soft Starter.

E. Accessories: Suction check valve, Suction shut-off valve, Suction Strainer, Discharge shut-off valve, Discharge check valve with cold start pressure control.

F. Oil Cooling / Separation System
   1. Provide a complete thermosyphon oil cooling and separation system.
   2. Combination Oil Separator: Horizontal type multi-stage oil separator with sump oil heaters, dual relief valve assembly, sight glasses, and access cover for replacement of internal coalescing elements. The separator shall be designed and constructed in accordance with ASME Section VIII, Div.1 for a minimum design working pressure of 300 PSIG. The separator shall be sized for full capacity of associated compressors.
   3. Oil Cooling Heat Exchanger: Shall be plate and shell or shell and tube type heat exchanger. The heat exchanger shall be sized for full capacity of associated compressors. The oil side of heat exchanger shall include a 3-way thermostatic mixing valve to maintain required oil temperature. See ice equipment schedule on drawings for design conditions.
   4. Oil Filter: Package shall include dual oil filters (20 Micron) or a single oil filter with bypass. Provide one complete set of spare oil filters and O-rings/gaskets for owners use after warranty period.
   5. Oil: Package shall come with complete charge of manufacturer approved oil. Provide (10) gallons of spare oil for owners' use after warranty period.

G. Wiring/Controls: All sensors, transducers, and controls necessary for a fully functioning system shall be wired to a central terminal box. See ice rink control system specification for additional requirements.

H. Startup: Package shall be started up by a factory trained technician. Startup service shall include (2) eight-hour days of onsite service. The technician shall provide a complete start-up report and pre-start checklist.

I. Post Start-Up Maintenance/Service: Following initial startup, at minimum the contractor shall perform the following manufacture recommended inspection/maintenance/service items and all other inspection/maintenance/service items recommended by the manufacture to maintain warranty:
   1. At 100 hours or per manufacturer's recommendations (whatever comes first), replace compressor oil filters.
   2. At 500 hours or per manufacturer's recommendations (whatever comes first), clean suction strainer.
   3. At 500 hours or per manufacturer's recommendations (whatever comes first), analyze oil. Oil shall be analyzed every 5,000 hours or annually (whatever comes first) thereafter throughout the warranty period.
   4. At 500 hours or per manufacturer's recommendations (whatever comes first), replace primary oil filter(s).

J. Warranty: 24-month factory warranty on compressor package from compressor startup or 30 months from ship date of equipment. Warranty shall include all parts and labor.

2.12 THERMOSYPHON RECEIVER

A. Approved Manufacturers: HT Industrial, Bitzer, H.A. Phillips, Docal, or equal.

B. Capacity: See Ice Equipment Schedule on drawings.

C. Construction: Designed for minimum design parameters outlined in table below. Vessel shall be constructed and stamped per ASME Boiler and Pressure Vessel Code, Section VIII, Division 1 98E/99A. Shall be pass through design.

Refrigerant	Minimum Design Pressure	Temperature Range
R-717	250 PSIG	-20 F to 250 F

 © 2026 B32 Engineering Group, Inc. All Rights Reserved

D. Accessories: Provide a dual relief valve assembly as specified and per code requirements. Provide all valves, piping and other related materials and accessories as necessary for a fully operational system. Name plate shall clearly display code compliance and capacity of vessel.

E. Vessels shall be mounted on a factory constructed steel legs or frame system.

F. Finish: Prepare exterior surface in accordance with SSPC-SP3 clean. Paint with one coat of primer and one coat of alkyd egg-shell enamel for exterior use.

G. Rust inhibitor shall be used when hydro-testing system. Thoroughly dry vessel interior after hydro-testing and prior to filling system with refrigerant.

2.13 CHILLER AND SURGE DRUM

A. Approved Manufacturers: HT Industrial, Delta Tee, Docal, Isotherm, or equal.

B. Design Parameters: See Ice Equipment Schedule on drawings.

C. Shell and Head Construction: Steel pipe construction conforming to ASME Specifications AS-53 Grade B, seamless or resistance welded; or rolled steel plate conforming to ASME SA-516 Grade 70 with electric fusion welds conforming to ASME Boiler and Pressure Vessel Code, Section VIII, Division 1.

Minimum design ratings on flooded vessels shall be as follows:

Refrig.	Shell Side Pressure	Tube Side Pressure	Temperature Range
R-717	250 PSIG	150 PSIG	-20 F to 200 F

D. Tube Construction:

Item	Flooded System	DX System
Design Pressure & Temp	See table above	See table above
Tube Material	Plain Steel	Copper
Outside Diameter	0.750 inches	0.625 inches
Minimum Wall Thickness	0.065 inches	0.025 inches
Fouling Resistance	0.0005 hr x sf x F/BTU	0.0005 hr x sf x F/BTU

E. Surge Drum: Design conditions and material construction equal to the chiller. Surge drum shall be sized to provide adequate separation of the refrigerant vapors from the refrigerant liquid and shall provide adequate surge space. Risers shall be sized to allow adequate separation of the refrigerant vapors from the refrigerant liquid and shall be close coupled to the chiller vessel. Number of risers shall be as recommended by the manufacturer.

F. Accessories:
1. Dual relief valve assembly as specified and per code requirements.
2. Name plate shall clearly display code compliance and capacity of vessel.
3. Site glasses on chiller vessel for monitoring refrigerant level with frost shields.
4. System shall include all floats, valves, gauges, piping and other related materials and accessories as necessary for a fully operational system.
5. Adjustable level controller, column and float system: Provide an external column with a float switch for liquid make-up and a float switch for high level compressor shutdown. See specifications in Section 131814 – Ice Rink Piping Valves and Accessories.
6. Automatic level control: Provide automatic expansion valve system as specified in Section 131814 – Ice Rink Piping Valves and Accessories.

G. Oil Pot System:
1. Provide an oil storage system including, but not limited to, oil receiver vessel, relief valves, stop valves, piping, designed for 300 psig working pressure and site glass. Oil pot shall have a design working pressure of 400 PSIG @ -20F to 400 F constructed in accordance with A.S.M.E. Section VIII Division 1, current edition and addenda, UW-12(e) & CSA B-51 codes.
2. Provide Owner with operation and maintenance procedure of oil return system and heater in the Operation and Maintenance manual.

H. Vessels shall be mounted on a factory constructed steel frame system. The steel frame and vessels shall be shop painted with one coat of primer and one coat of alkyd egg-shell enamel.

I. All vessels must meet state requirements for national board registration.

 © 2026 B32 Engineering Group, Inc. All Rights Reserved

J. Finish: Prepare exterior surface of all vessels in accordance with SSPC-SP3 Power Tool Cleaning or SSPC-SP10/NACE 2 Near-White Blast Cleaning. Paint with one coat of primer and one coat of alkyd egg-shell enamel for exterior use.

K. Drip Pan: Provide a stainless-steel drip pan under oil pot with integral drain.

2.14 RINK PUMPS

A. Approved Manufacturers: Pentair Aurora Series 3800 Series, Xylem Inc. Bell and Gossett Series e1510, Armstrong or equal.

B. Design Parameters: See Ice Equipment Schedule on drawings. Motor size is based on the pump manufacturer listed in the schedule on the drawings. If the motor size increases due to the use of pump another manufacturer, the contractor is responsible for all changes associated with the motor size change at no additional cost to the Owner.

C. Pump Construction and Materials

1. Centrifugal, end suction design, base mounted, single stage. Shall be serviceable without disconnecting from the piping system. Pumps shall be capable of continuous operation without fault. Pump shall be rated at 175 psi.
2. Volute: Heavy-duty cast-iron conforming to ASTM A48, Class 30, integrally cast pedestal support. Provide drain and vent plugs. When calcium chloride (CaCl2) is specified as the secondary refrigerant or brine all surfaces in contact with the liquid shall have an epoxy coating.
3. Impellers: Enclosed type, cast bronze conforming to ASTM B584 (for glycol use only), vacuum cast, keyed to shaft with non-corrosive fasteners, statically and dynamically balanced. When calcium chloride (CaCl2) is specified as the secondary refrigerant or brine the impeller material shall be cast iron conforming to ASTM A48, Class 30 or stainless-steel conforming to AISI 316.
4. Shafts: Carbon steel conforming to AISI C1045 machined and polished. Replaceable bronze sleeve conforming to ASTM B62. Maximum deflection of 0.002 inches at the seal face under a maximum load condition. Provide ANSI/OSHA-compliant coupling guard with slotted viewing window. When calcium chloride (CaCl2) is specified as the secondary refrigerant or brine the sleeve shall be stainless steel conforming to AISI 316 when using calcium chloride.
5. Bearings: Heavy duty, grease lubricated, regreasable, ball bearings with B10 minimum bearing life of 50,000 hours per AFBMA test procedures. Shall be replaceable without disconnecting pump from pipe system.
6. Seal Assembly:

Material	Glycol Systems	Water Systems
Elastomer	EPR (Ethylene Propylene Rubber)	Buna
Rotating Face	Silicon Carbide	Carbon
Stationary Face	Silicon Carbide	Silicon Carbide
Hardware	Stainless Steel	Stainless Steel
Spring	18-8-Stainless Steel	18-8-Stainless Steel
Other	Internal flushing capabilities	Internal flushing capabilities
Other	Easily Inspected	Easily Inspected
Other	Replaceable	Replaceable

7. Wearing Ring:

Material	Glycol Systems
Material	Bronze
ASTM Specification	B62
Type	Replaceable

8. Motor: Shall conform to the requirements of this Section.
9. Energy Rating. After January 27, 2020, all pump and motor assemblies shall be in compliance with the pump energy efficiency regulations by the U.S. Department of Energy. Provide all documents with the shop drawing submittal and as required for the Owner to apply for a rebate through the electrical utility.
10. Accessories: See Section on Ice Rink Piping, Valves, Accessories and other requirements herein.

 © 2026 B32 Engineering Group, Inc. All Rights Reserved

2.15 CONDENSER (EVAPORATIVE TYPE)

A. Approved Manufacturers: Evapco, Baltimore Aircoil Company, Imeco, or equal.

B. Provide one (1) condenser system, factory assembled and tested, induced draft counter flow evaporative condenser complete with fan, coil, louvers, accessories and rigging supports meeting the design parameters listed on the Ice Equipment Schedule on drawings. See warranty in Section 1.5 of this specification.

C. Materials of Construction
   1. All cold water basin components (including vertical supports, air inlet louver frames, and panels up to rigging seam) and upper casing, channels and angle supports shall be constructed of Type 304 welded stainless steel. All other parts shall be G 235 galvanized steel.
   2. Fan(s) shall be high efficiency axial propeller type with aluminum wide chord blade construction. Each fan shall be dynamically balanced and installed in a closely fitted cowl with venturi air inlet for maximum fan efficiency.

D. Drift Eliminators
   1. Drift eliminators shall be constructed entirely of Polyvinyl Chloride (PVC) in easily handled sections. Design shall incorporate three changes in air direction and limit the water carryover to a maximum of 0.001% of the recirculating water rate.

E. Water Distribution System
   1. Spray nozzles shall be zero-maintenance precision molded ABS with large 1-1/4" diameter orifice threaded into branch piping with internal sludge ring to eliminate clogging. Spray header, branches, and riser shall be Schedule 40 Polyvinyl Chloride (PVC) for corrosion resistance.

F. Heat Transfer Media
   1. Heat transfer coil shall be elliptical tubes of prime surface steel, encased in steel framework with entire assembly hot-dip galvanized after fabrication. The coil assembly shall be designed with sloping tubes for liquid drainage and air pressure tested to 390 psig air under water. Coil shall be in compliance with ASME/ANSI B31.5.

G. Bleed-off
   1. Unit shall have a waste water bleed line with a manual adjustable valve provided.

H. Air Inlet Louvers
   1. The air inlet louver screens shall be constructed from UV inhibited polyvinyl chloride (PVC) and incorporate a framed interlocking design that allows for easy removal of louver screens for access to the entire basin area for maintenance. The louver screens shall have a minimum of two changes in air direction and shall be of a non-planar design to prevent splash-out and block direct sunlight & debris from entering the basin.

I. Make up Float Valve Assembly
   1. Make up float assembly shall be a mechanical brass valve with an adjustable plastic float.

J. Pan Strainer
   1. Pan Strainer(s) shall be all Type 304 Stainless Steel construction with large area removable perforated screens.

K. Motors and Drives
   1. Motor: Shall be oversized for dry operation and shall conform to the requirements of this Section. Motor shall be inverter duty type for operation with VFD.
   2. Fan and motor shall be located in the dry entering stream.
   3. Variable Frequency Drive (VFD): Furnish and install VFD as specified in this section, for the fan motor.
   4. Shall meet all requirements of the Rink Pumps in this Section with the following exceptions:
      a. Design Parameters: See Ice Equipment Schedule on drawings.
      b. Shall be horizontal, base mounted or close coupled.

L. Fan Motor

 © 2026 B32 Engineering Group, Inc. All Rights Reserved

1. Fan motor(s) shall be totally enclosed, ball bearing type electric motor(s) suitable for moist air service. Motor(s) are Premium Efficient, Class F insulated, 1.15 service factor design. Inverter rated per NEMA MG1 Part 31.4.4.2 and suitable for variable torque applications and constant torque speed range with properly sized and adjusted variable frequency drives.
2. Fan motor(s) shall include strip-type space heaters with separate leads brought to the motor conduit box. C. Fan Drive
3. The fan drive shall be multigroove, solid back V-belt type with QD tapered bushings designed for 150% of the motor nameplate power. The belt material shall be neoprene reinforced with polyester cord and specifically designed for evaporative equipment service. Fan sheave shall be aluminum alloy construction. Belt adjustment shall be accomplished from the exterior of the unit. D. Fan Shaft
4. Fan shaft shall be solid, ground and polished steel. Exposed surface shall be coated with rust preventative.

M. Fan Shaft Bearings
1. Fan Shaft Bearings shall be heavy-duty, self-aligning ball type bearings with extended lubrication lines to grease fittings located on access door frame. Bearings shall be designed for a minimum L-10 life of 100,000 hours.

N. Maintenance Access
1. Fan Section
   a. Access door shall be hinged and located in the fan section for fan drive and water distribution system access. B. Basin Section
   b. Framed removable louver panels shall be on all four (4) sides of the unit for pan and sump access.
2. Internal Working Platform
   a. Internal working platform shall provide easy access to the fans, belts, motors, sheaves, bearings, all mechanical equipment and complete water distribution system. The coil surface shall be an acceptable means of accessing these components.

O. Remote Sump
1. Approved Manufacturers: Steel tanks shall match manufacturer of condensers. Polyethylene tanks shall be manufactured by Indelco Plastics Corporation (612.925.5075), Industrial Plastics (800.877.4472) or equal.
2. Dimensions and volume shall be as shown on the drawings.
3. Steel sump tanks shall be heavy gauge galvanized steel with flanged, gasketed panel design and coated with corrosion protection system as specified in this Section.
4. Construction: Poly sump tanks shall be constructed of naturally polypropylene with minimum wall thickness of ¾ inches or thicker if recommended by the manufacturer for the application. Single internal bead/extrusions welded for outer seams. Flange design shall be "Flat-flange" type and steel girths covered with polypropylene girth covers welded to side walls, inlet/outlet triple bead welded. Provide additional structure support as recommended by the manufacturer. Provide all necessary fitting, pipe connections and flanges. Tank shall be open on top.
5. Accessories: Strainer shall be hot dipped galvanized with large, perforated opening and an integral anti-vortexing hood to prevent air entrainment. Make up valve shall be large diameter of brass construction. Float shall be plastic, unsinkable and installed for easy adjustment. Provide a full removable ½ inch thick tank cover of like material, overflow and water piping, valves, and 2” drain connection with ball valve.

P. Walkways, Ladders and Platforms
1. Furnish and install a complete, elevated, walkway/platform system for easy and safe access to equipment. The system shall include:
   a. External Louver Face platform: Aluminum, galvanized steel, or stainless steel complete with knee rail and toe board. Comply with 29 CFR 1910.23.
   b. External Ladders: Provide a ladder for each access panel and platform. Aluminum galvanized or stainless steel, fixed ladders with ladder extensions to access external platforms and top of cooling tower from adjacent grade without the need for portable ladders. Comply with 29

 © 2026 B32 Engineering Group, Inc. All Rights Reserved

CFR1910.27. Provide extensions as needed to meet roof or slab elevation. Provide cage around ladder if required by OSHA, and other code requirements.

c. External Access Door Platforms with Handrails: Aluminum, FRP, or galvanized steel bar grating at tower access doors when cooling towers are elevated and not accessible from grade.

d. Ladder Guard. Guard to restrict access to ladder. Aluminum, powder coated safety yellow. 63" in length. Manufacturer: Belt Conveyor Guarding, Canada or equal.

2.16 CHEMICAL TREATMENT SYSTEM

A. Qualifications: Company specializing in manufacturing the products specified in this section with a minimum of five (5) years documented experience. Company shall have local representatives with water analysis laboratories and full-time service personnel.

B. Regulatory Requirements: Conform to all applicable codes and regulations for addition of non-potable chemicals to building mechanical systems, and for discharge to public sewage systems. Provide only chemicals approved for use and disposal by local authorities. Contact Engineer if any specified chemicals are prohibited.

C. Furnish and install a complete chemical water treatment system for the condenser system to control scale, corrosion and biological growth. Provide all piping, valves, controls, wiring, meters, strainers, equipment and chemicals required for a complete operating system. Interlock with water pump as necessary for automatic operation.

D. Approved water treatment company: ASTRO-CHEM LAB, INC.

E. Water softener: Provide a water softener sized for the water requirements of the tower. Provide a bypass line on this system so unsoftened water can be used during the passivation of the condenser/tower and softened water can be used after the passivation system has been completed.

F. Provide chemicals for one year for the prevention of scale, corrosion and biological growth. All chemicals must be compatible with the equipment materials used in the system and must meet or exceed all environmental requirements. Annual chemical cost information and name of suppliers must be submitted with the proposed chemical treatment system shop drawings.

G. Provide quarterly water testing for the duration of the warranty period.

H. Accessories: Furnish a pH cube kit as manufactured by HACH Cat. No. 12519 Phenol red.

I. Passivation: Chemical treatment supplier to provide a passivation plan for the unit per manufacturers recommendations.

J. Maintenance Service: Provide the following services during the one-year warranty period.

1. Provide site visits, a minimum of once per month, to monitor the chemical treatment system and conduct verification testing as needed. Monthly testing shall include dipslide culture counts. Quarterly water samples shall be sent to a CDC Elite lab for culturing to establish baseline total organism & Legionella counts. etc. Provide a follow-up report to the Owner and Ice Rink Contractor with recommendations for changes, practices, etc.
2. Provide laboratory and technical assistance services during warranty period.
3. Include three (3) hours of training for operating personnel that includes installation, care, maintenance, testing, and operation of water treatment systems. Training shall take place during start-up of system.
4. Provide on-site inspections of equipment during system shutdown to properly evaluate the performance of the water treatment program. Make recommendations in writing based on findings.
5. Provide sufficient chemicals for treatment and testing during the warranty period.
6. Chemical Treatment Subcontractor is responsible for coordinating all chemical treatment and testing with the Ice Rink Contractor.

K. Containment Tray: Furnish and install a containment tray for the chemical drums. Approved manufactures: PIG www.newpig.com or equal. System shall be durable plastic, one-piece utility tray with 5" minimum side walls.

 © 2026 B32 Engineering Group, Inc. All Rights Reserved

2.17 REFRIGERANT GAS MONITORING SYSTEM

A. Approved Manufacturer: Bacharach (Pat McClernon, Control House Ltd. 952-746-3485), Calibration Technologies, Inc., Cool Air Mechanical, or equal

B. Provide one (1) complete refrigerant gas monitoring system for the specified refrigerant. System shall continuously monitor for refrigerant leaks and meet ASHRAE 15 Standard current edition.

C. System shall include:
1. One (1) Main Controller Panel mounted inside ice equipment room.
2. One (1) Remote Display Panel mounted outside main door to ice equipment room.
3. Sensors, strobes and audible devices as defined herein.
4. One (1) Uninterruptable Power Supply (UPS) to provide power for 20 minutes.

D. Features:
1. Multi-zone detection with expandable capabilities.
2. Main Controllers and remote displays shall have a front panel display with backlit graphic LCD, system and alarm status indicators, and keypad.
3. Displays shall show zone specific refrigerant concentration for all sensors.
4. Four (4) SPDT relays contacts (minimum).
5. 4-20 mA analog output.
6. Sampling: Automatic and continuous or manual.
7. Automatic reboot and system alarm reset after power failure.
8. Trend / Data Logging: Graphic display of trend data, alarm log and fault log.
9. NEMA 4X, UL-listed, CSA, IEC, IP66 enclosure.
10. Provide a silence and reset switch at the gas monitoring panel inside the refrigeration room as required by code.

E. Sensors and transmitters
1. Approved type of sensors:
   a. Infrared transmitters and sensors with a sensing range of 25ppm to 10,000ppm.
   b. Electrochemical transmitters and sensors
   c. Solid state
2. Accuracy of +/- 5% of value.
3. Zero Drift: Less than 0.1% full-scale.
4. Response time: less than 20 seconds
5. Linearity: +/- 1% of full-scale
6. Ranges:
   a. Provide ranges most suitable for the ranges specified in the table below except that one sensor in the ice equipment room must have a high range of 10,000 ppm.
7. Certification: ETL listed to UL standard.
8. Sensors shall be installed in the locations shown on the plans (if indicated) and in accordance with the table below. The exact locations shall be verified during construction.

Location	Sensor Type	Quantity
Ice Equipment Room	Infrared/Electrochemical/SS	3

F. Alarm Settings
1. Alarm concentration levels shall be adjustable. Initial settings and sequences shall be in accordance with the table below.
2.

Ammonia Concentration	Description or Action
25 ppm	1. Notify Ice Rink Control System a. Notification sent to facility personnel. 2. Controller to initiate the following alarm sequences per IIAR: a. Strobes and audible alarm in ice equipment room, vestibule and exterior door only activated.

 © 2026 B32 Engineering Group, Inc. All Rights Reserved

50 ppm	1. Notify Ice Rink Control System a. Notification sent to facility personnel. 2. Controller to initiate the following alarm sequences: a. **All** strobes and audible alarms activated. This may be the same as 25 ppm.
150 ppm	1. Notify Ice Rink Control System a. Notification sent to facility personnel. 2. Controller to initiate the following alarm sequences per IIAR: a. All strobes and audible alarms activated. b. Emergency purge ventilation system is activated. c. Send signal to fire alarm system.
250 ppm	1. Notify Ice Rink Control System a. Notification sent to facility personnel. 2. Controller to initiate the following alarm sequences per IIAR: a. All strobes and audible alarms activated. b. De-energize pumps, compressors, and normally closed automatic refrigerant valves that are not part of an emergency control system.

G. Alarm Devices
1. Alarm devices shall be combination strobe lights and audible alarms.
2. Strobe light single color shall be selected by Owner.
3. Furnish and install as required by current state and local mechanical codes.
4. Device locations shall be as shown on the plans and in accordance with the table below. The exact locations shall be verified during construction.

Location	Alarm Device	Quantity
Inside Refrigeration Room	Strobe & Audible	2
Outside Refrigeration Room Doors	Strobe & Audible	2

H. Provide all necessary auxiliary equipment relays as required to operate strobes / audible devices, start emergency ventilation, shut down refrigeration system, fire alarm system notification, etc.

I. Leak detector shall turn on exhaust fan even when control panel is powered off or not functioning.

J. Connection from the emergency ventilation to the auxiliary relay will be by building electrical or mechanical contractor.

K. Connection from the fire alarm system to the auxiliary relay will be by fire alarm contractor.

L. Provide connection to ice rink control system for monitoring concentrations and alarms.

2.18 PRIMARY REFRIGERANT

A. Furnish and install a complete operating charge of anhydrous ammonia (R-717) refrigerant to fill entire refrigeration system. The refrigerant charge shall meet the following chemical properties:
1. Ammonia: 99.999% minimum
2. Moisture (as H20): 10 ppm maximum
3. Oil: 1 ppm maximum

 © 2026 B32 Engineering Group, Inc. All Rights Reserved

2.19 SECONDARY REFRIGERANT

A. Ethylene Glycol Solution
   1. Furnish and install a complete operating charge of 35% by volume of inhibited ethylene glycol and deionized water. The fluid shall be an industrial heat transfer fluid specifically designed for HVAC systems.
   2. Approved Manufacturers: Dow Chemical Company Dowtherm SR-1, Texaco Texcool E100, Dynalene, Interstate Chemical Company Intercool, or equal.
   3. The solution shall have a factory mixed corrosion inhibitor or neutralizing agent, an anti-foaming agent to minimize air entrainment, and dyed a noticeable color such as pink or green.
   4. The solution mixture shall meet the following parameters:

Parameter	35% EG	40% EG	45% EG
Specific Gravity @ 15F	1.064	1.077	1.077
Viscosity @15F	7.500	9.3017	
Freezing Point	-1.5 F	-9.8 F	-17.5 F
pH	8.0 to 9.2	8.0 to 9.2	8.0 to 9.2
Density @ 15F	66.37 lbs./cf	68 lbs./cf	
Specific Heat @15F	0.828 BTU/lb. F	0.700 BTU/lb. F	0.797 BTU/lb. F
Thermal Conductivity @15F	0.23 BTU/hr-SF	0.21 BTU/hr-SF	0.21 BTU/hr-ft – SF

   5. The deionized water shall conform to the following properties in maximum allowable concentrations:

Calcium Carbonate Hardness	100 ppm
Chlorides	25 ppm
Sulfates	25 ppm

B. Submit a product data sheet and MSDS sheet for the solution including the inhibitor and/or neutralizing agent.

C. Provide a weather resistant tag on the fill valve for the system that includes description of fluid, freezing and burst point, total gallons of system, Material Safety Data Sheet reference and date of original charge.

D. Provide certified test results for all solutions in systems. At minimum samples for the secondary refrigerant solution shall be drawn at the following times:
   1. 3 months after start-up.
   2. 11 months after start-up.

2.20 SIGNAGE

A. Furnish and install legible permanent signs on the outside of all ice rink equipment mechanical room doors as detailed on the drawings and as follows:
   1. All signs informative signs, emergency signs, charts and labels shall be in accordance with NFPA 704, ANSI/IIAR, ANSI Z535.2 and the International Mechanical Code.
   2. For ammonia refrigerant, the NFPA 704 or Fire Diamond numbering shall be 3-3-0-blank (blue-red-yellow-white) or per current code requirements.
   3. Provide all other signs required by code even if not shown on the drawings.

B. Furnish and install signage, as detailed on the drawings, next to each strobe light and audible alarm.

C. Furnish and install signage, as detailed on the drawings, next to each refrigeration system emergency stop button and ventilation enable switch.

D. Furnish and install schematic drawing or panel giving directions for operation of the system per ASHRAE-15 paragraph 11.7.

E. If Owner requires the format (font, size, colors, etc.) of the signage to match other signage in the facility, provide the format required by the Owner unless it does not meet code requirements.

2.21 STORAGE RECEIVER

A. Approved Manufacturers: HT Industrial, Bitzer, H.A. Phillips, Docal, or equal.

B. Capacity: See Ice Equipment Schedule on drawings.

 © 2026 B32 Engineering Group, Inc. All Rights Reserved

C. Construction: Designed for minimum design parameters outlined in table below. Vessel shall be constructed and stamped per ASME Boiler and Pressure Vessel Code, Section VIII, Division 1 98E/99A.

D.

Refrig.	Minimum Design Pressure	Temperature Range
R-717	250 PSIG	-20 F to 250 F

E. Accessories: Provide a dual relief valve assembly as specified and per code requirements. Provide a 2" diameter external steel site glass column with: welded caps; a minimum of three (3) 1-¼"-12 SPUD with 1-1/4" sight glasses; and two ¾" NPS connections to the vessel with shut-off valves. Provide all valves, piping and other related materials and accessories as necessary for a fully operational system. Name plate shall clearly display code compliance and capacity of vessel.

F. Vessels shall be mounted on a factory constructed steel legs or frame system.

G. Finish: Prepare the exterior surface in accordance with SSPC-SP3 Power Tool Cleaning or SSPC-SP10/NACE 2 Near-White Blast Cleaning. Paint with one coat of primer and one coat of alkyd egg-shell enamel for exterior use.

H. Rust inhibitor shall be used when hydro-testing system. Thoroughly dry vessel interior after hydrotesting and prior to filling system with refrigerant.

2.22 DIFFUSION TANK

A. Approved Manufacturers: Exxon Mobil (Paxon 7000 Series by Indelco 800.486.6456 ext. 335, www.indelco.com), Snyder Industries Inc., ACO Systems, Poly Processing Company, or equal.

B. Design Conditions:
1. See Ice Equipment List on drawings for capacity.
2. Provide 3-year warranty for defects in materials and workmanship and 1 year for fittings and accessories.

C. Construction:
1. Upright, single wall, flat bottom, closed top.
2. Molded one-piece seamless construction according to ASTM D 1998. Virgin polyethylene resin and shall be Type I (cross-linkable polyethylene) or Type II (linear polyethylene) and shall be FDA or NSF 61 listed.
3. Shall be designed for chemical applications and specifically ammonia refrigerant storage.
4. Submit factory test report for verification of wall thickness, impact tests, hydrostatic tests, verification of materials and visual inspection.
5. Tanks shall be manufactured with a minimum of two lift lugs integrally molded into tank.
6. Tanks shall be marked to identify the product, date (month and year) of manufacture, capacity and serial number.

D. Fittings and Accessories
1. Provide all necessary fittings and accessories required for the layout and function of the tank.
2. Double bolted 150-pound flange fittings required for fittings 2 inches and larger below liquid level.
3. Drain fitting and PVC ball valve at lowest possible point. Provide siphon tube to improve drainage capability.
4. Vents and vent line for atmosphere pressure and pressure during filling of tank for proper ventilation complying with OSHA and other requirements.
5. Ammonia sparger tube.
6. Provide flange connections and adapters as required for connecting equipment, piping, relief inlets and outlets, etc.
7. 18-inch threaded manway with 15-inch access. No vent.
8. Integrally molded gallonage marks on side of tank.
9. 1" flange connection on top of tank for make-up water connection.

2.23 WINDSOCK

A. Furnish and install a windsock on the exterior of the building as required by code.

 © 2026 B32 Engineering Group, Inc. All Rights Reserved

PART 3 - EXECUTION

3.01 EQUIPMENT INSTALLATION

A. All equipment shall be installed per manufacturer's requirements.

B. All equipment shall be installed as individual components and not on a steel frame system unless otherwise shown on the drawings. All equipment shall be accessible for safe operation and maintenance.

C. All equipment bases shall be bolted down and filled with concrete unless otherwise specified or noted. Adjust level of concrete as required to provide access to anchor bolts for compressors, motors, etc.

D. All equipment shall be installed and designed such that vibration is minimal and meets acceptable limits. If the amount of vibration is in question, the Contractor shall be responsible for hiring a certified, experienced vibration company to perform the necessary test. A certified test report shall be submitted to the Engineer. If results are not satisfactory, the Contractor shall be responsible for correcting the problem and retesting for vibration as previously specified.

E. Connect cold water make-up line to remote sump. Provide drain line, valves, etc. as shown on the drawings.

F. All meters, gauges, and readouts shall be mounted at eye level.

G. All equipment, vessels, and tanks shall be fully supported with a structural steel framing system anchored to the wall and floor and not to the roof structure unless otherwise approved.

H. ALTERNATE BID: Provide a refrigeration system on a common steel frame system in lieu of installing separate components. Steel frame shall be primed and painted as specified in this Section and equipped with necessary vibration isolators to isolate each piece of equipment and piping. All equipment shall be accessible for safe operation and maintenance. Furnish a Motor Control Panel as specified in this section in place of a Motor Control Center. Revised pump head calculations shall be generated by the contractor for the revised equipment layout and provided to the engineer for review prior to the contractor submitting shop drawings for the pumps.

I. Tanks. If tanks (for example, sump, water, diffusion, expansion, etc.) do not fit through existing or proposed door opening, make all necessary accommodations, including removal and replacement of door(s) and wall(s) for required access.

3.02 VARIABLE FREQUENCY DRIVES (VFD)

A. Provide start-up services with a certified representative of the manufacturer.

3.03 MOTORS

A. Provide motor circuits as required by NFPA 70 including a motor grounding conductor.

B. Testing:

1. Voltage and current measurements shall be performed on all motor driven equipment to confirm that the voltage and current is within the operating range of the motor and the nameplate rating.
2. Perform an insulation resistance test or megger test on each 460-volt motor by applying 500 Vdc phase to ground on each phase for 10 minutes with readings taken at the end of one (1) minute and ten (10) minutes. Minimum acceptable reading is 5 megaohms.

3.04 CONDENSER SUPPORTS

A. Mount condenser in location and on supports as shown on the drawings. All supports including, but not limited to, beams, columns, roof curbs, etc. and all related fasteners, bracing, etc. shall be furnished and installed by the ice rink contractor unless specifically noted otherwise. Support shall be provided as necessary for the installations, whether or not shown on drawings. If the bottom of the condenser is more than 2'-6" above the roof, ground, or slab, furnish and install a rigid galvanized steel screen across the entire bottom of the unit for protection. The cost of this work shall be incidental to the project costs.

3.05 ELECTRICAL

A. Contractor shall provide a complete as-built drawing of all electrical systems installed.

 © 2026 B32 Engineering Group, Inc. All Rights Reserved

B. Provide all electrical work necessary for a complete, operational ice system. All work shall meet the required electrical codes for the Project's location. A licensed electrician shall perform all electrical work. The main electrical feed for each piece of equipment shall be routed beneath the floor slab, not overhead.

C. Locate the Emergency Remote Control button(s), protective case(s), audible alarm(s) and strobe light(s) outside the ice mechanical room at a distance from the entrance door(s) to the ice mechanical room as required by code. Locate other strobe lights and audible alarm assemblies were shown on the drawings and as required by code.

3.06 REFRIGERANT GAS MONITORING SYSTEM

A. Monitoring and display units shall be mounted at eye level.

B. Recalibrate unit at both the unit and each sensor after final completion of project. Provide verification that the unit has been calibrated. Provide calibration and test kits from the manufacturer as required to calibrate the unit per manufacturer’s recommendations and as specified.

3.07 PAINTING AND FINISHES

A. All structural supports and framing shall be painted with one coat of primer and one coat of alkyd egg-shell enamel.

B. Touch up paint on all equipment, vessels, supports and exposed pipes after project is complete.

C. Provide additional touch up paint for equipment and vessels for Owner’s use.

D. Touch up damaged galvanized coatings and corrosion protection systems on condenser and remote sump.

3.08 CLEANING

A. Clean and vacuum all debris from inside the Motor Control Center and all other electrical enclosures. Do not use compressed air to clean out panel.

B. Thoroughly clean equipment of all temporary protective coatings and foreign material prior to assembly of erection.

C. After project completion thoroughly clean all equipment and piping systems.

3.09 START UP AND SHUTDOWN SERVICES

A. See Section 131811 - Ice Rink General Requirements.

END OF SECTION

 © 2026 B32 Engineering Group, Inc. All Rights Reserved

SECTION 13 18 13
ICE RINK FLOOR SYSTEM

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Sand.

B. Insulation, jacketing and vapor barrier.

C. Pipe and reinforcement support chairs.

D. Reinforcement.

E. Pipe and fittings.

F. Expansion joint.

G. Concrete.

H. General materials.

I. Temperature sensors and monitors for sub-floor and ice rink floor.

J. Subgrade preparation.

1.02 RELATED SECTIONS

A. Division 0, Division, General and Supplementary Conditions.

B. Section 131811 - Ice Rink General Requirements.

C. Section 131815 - Ice Rink Waste Heat Recovery Systems.

D. Section 131817 – Ice Rink Central Control System.

1.03 REFERENCES

A. ACI 301 - Specifications for Structural Concrete for Buildings.

B. ACI 304 - Concrete Placement.

C. ACI 305 - Hot Weather Concreting.

D. ACI 306 - Cold Weather Concreting.

E. ACI 309 - Recommended Practices for Consolidation of Concrete.

F. ASTM C94 - Standard Specifications for Ready Mix Concrete.

G. ASTM D 2513 - Thermoplastic Gas Pressure Pipe.

H. ASTM D 2683 - Socket Type Polyethylene Fittings.

I. ASTM D 3261 - Butt Fusion Polyethylene Fittings.

J. ASTM D 3350 - Standard Specification for Polyethylene Plastic Pipe and Fittings.

K. ASTM F 2164-21 Standard Practice for Field Leak Testing of Polyethylene (PE) and Crosslinked Polyethylene (PEX) Pressure Piping Systems Using Hydrostatic Pressure

L. ASTM F 2620-24 – Standard Practice for Heat Fusion Joining of Polyethylene Pipe and Fittings.

M. NSF Standard 61 - Plastic Piping Components and Related Materials.

N. AWWA C901 - Polyethylene Pipe.

O. The Plastic Pipe Institute Handbook of Polyethylene Pipe.

P. Pipe Manufacturer for fusion welding procedure.

1.04 SUBMITTALS

A. Shop Drawings. All submittals shall conform to the requirements of the General Conditions and Section 131811 - Ice Rink General Requirements.

B. Test Reports. Submit four (4) copies of test reports to the Engineer when specified.

 © 2026 B32 Engineering Group, Inc. All Rights Reserved

C. Gradation of clean sand fill.

D. Concrete mix design. Submit fifteen (15) business days prior to placement.

E. High Density Polyethylene Pipe General Submittals.
   1. Submit the list of all persons that will be performing fusion welding on this project. For each person, submit the following:
      a. Training certification showing a minimum of 8 hours of training in accordance with ASTM F2620 – Standard Practice for Heat Fusion Joining of Polyethylene Pipe and Fittings. Certifications shall not be more than 2 years old.
   2. Submit two (2) samples of a typical fusion welded pipe connections as follows. Samples shall be performed by the same person that will be completing the fusion welding on this project and shall be submitted prior to any fabrication.
      a. One sample of 1" rink piping to 1" tee or elbow socket.
      b. One sample of 1" saddle to header pipe.
   3. Submit photos of the following right after fabrication is complete and before the headers are shipped to the site:
      a. Overall piping system from different angles (minimum of 4).
      b. Close up of 1" socket fusion welded to header pipe from all directions (minimum of 6)
      c. Tags on socket fitting and piping markings on header pipe.
   4. Submit letter from a third party certified fusion welding instructor stating all the welds on the header pipe assemble (including all sizes and types) meet the industry standards for fusion welding HDPE pipe and fittings.

F. Rink subgrade and top of pipe surveys.

1.05 WARRANTY/GUARANTY

A. As required in Section 131811 - Ice Rink General Requirements

1.06 PRODUCT DELIVERY, STORAGE AND HANDLING REQUIREMENTS

A. As required in Section 131811 - Ice Rink General Requirements.

PART 2 - PRODUCTS

2.01 FILL AND PIPE BEDDING MATERIAL

A. Clean Sand: Clean natural sand consisting of sound, durable particles. Material gradation shall meet 100% passing the #4 sieve and not more than 5% passing the 200 sieve. Material shall be clean, free of organic matter, loam, trash, snow, ice, frozen soil or other compressible or foreign material or chemicals. This material shall be used for the following:
   1. Sub-floor heating system beneath ice rink floor system.
   2. Sand rink floor system. The material shall be washed clean sand.
   3. Where shown on the drawings.

B. Pipe Bedding: Granular fill or structural fill consisting of clean aggregate sand and gravel mineral soil that is free of organic matter, loam, trash, snow, ice, frozen soil, or other compressible material well-graded and conforming to the following.

Sieve Size (ASTM D422)	Percent Passing by Weight
3 in	100
No. 4	30-80
No. 40	10-50
No. 200	0-8

C. Common Fill/Backfill. Common Fill shall consist of well-graded, natural, mineral soil that is free from organic materials, loam, wood, snow, ice, frozen soil, ash, cinders, asphalt, brick, concrete, trash, debris,

 © 2026 B32 Engineering Group, Inc. All Rights Reserved

and other weak or compressible materials. The material shall not contain materials subject to decay, decomposition, or dissolution.

On-site Fill soils may be used for common fill if they meet these specifications. The Contractor shall mechanically screen on-site soils to remove oversized debris (e.g. boulders, roots, stumps, etc.) prior to reuse as directed by the Engineer.

D. Drainage Fill. Drainage Fill shall be ¾ inch washed crushed stone and shall consist of inert angular material derived from a stone quarry that is hard, durable, double-washed stone that is free from clay, loam, or other deleterious material, with a maximum size of ¾ inch and conforming to the following.

Sieve Size (ASTM D422)	Percent Passing by Weight
1 in.	100
¾ in.	90-100
½ in.	10-50
3/8 in.	0-20
No.4	0-5

2.02 INSULATION, JACKETING AND VAPOR BARRIER

A. Approved manufacturers: Styrofoam brand by the Dow Chemical Company, CertainTeed, Ownes-Corning, DiversiFoam, or equal.

B. Floor Insulation: Insulation material shall meet ASTM C 578 Type IV with a minimum compressive strength of 40 psi, maximum water absorption of 0.1% by volume (ASTM C272) and an R-value per inch at 75 F of 5 Fxsfxh/Btu. Provide the sheet dimensions as indicated on the drawings.

C. Pipe Insulation System:
1. All pipe insulation system shall be installed by a company specializing in these insulation systems.
2. Direct Bury: As specified in Section 131814 – Ice Rink Piping, Valves and Accessories.

D. Accessories: Provide all adhesives, sealants and other products as required by the manufacturer to provide a completely sealed system. Provide vapor barrier for the piping that is non-flammable and fire resistant for all systems operating below 65 F.

E. Vapor Barrier (for Rink Floor):
1. Concrete Rink Floor: Shall conform to ASTM D-4397 for Clear Polyethylene Film except the thickness shall be 6-mil. Tensile strength shall be a minimum of 1700 psi (long direction) and Elongation shall be a minimum of 225% (long direction). The materials shall be supplied in 20’-0” x 100’-0” minimum size sheets. Provide tape manufactured for sealing the seams of poly sheeting.

2.03 PIPE AND REBAR SUPPORT CHAIR

A. Approved Manufacturers: Hunter Wire Products or equal.

B. U-type or M-type configuration designed for both supporting rink piping and reinforcement or equal. Six (6) foot long sections.

C. Material: Wire shall be a minimum of #7-gauge (0.187") steel. Base plate shall be a minimum of 20-gauge steel for sand floors and 24-gauge steel for concrete floors except that 20-gauge steel shall be used on all rink floors with steel rink piping.

D. Shims (for adjusting pipe elevation): Shims shall be plastic or steel and shall be a minimum size of 2” wide x 2” long to provide full support beneath the pipe and rebar support chair.

2.04 REINFORCEMENT

A. Reinforcement: Shall be tagged and conform to ASTM A615 Grade 60.

B. Wire Mesh: 6x6 W2.9/W2.9 (6 gauge) steel mesh conforming to ASTM 1064.

 © 2026 B32 Engineering Group, Inc. All Rights Reserved

C. Tie Wire: Shall be 16-gauge yellow-coated annealed wire or heavier.

2.05 PIPE AND FITTINGS

A. Polyethylene Pipe:

1. SDR 17, pressure rating 100 psi (rink transmission pipe only)

Nominal I.D.	1"	6"	8"
Actual O.D.	1.315	6.625"	8.625"
Wall Thickness*	0.077"	0.390"	0.507

*Minimum thickness. Wall thickness shall be within 10% of that specified.

2. SDR 11, pressure rating 200 psi (rink and subfloor piping and headers, subfloor transmission mains).

Nominal I.D.	3/4"	1"	3"	6"	8"	10”
Actual O.D.	1.050"	1.315"	3.5"	6.625"	8.625"	10.750”
Wall Thickness*	0.095"	0.119"	0.318"	0.602"	0.784	

*Minimum thickness. Wall thickness shall be within 10% of that specified.

3. Shall be high density polyethylene complying with requirements of ASTM D3350 cell classification and have a Plastic Pipe Institute (PPI) designation of PE4710. Minimum density shall be 58 lbs/cf (0.957 gm/cc).
4. Joints/Connections: Fusion welded. Welding process shall be performed by fully trained personnel in the fusion welding process.
5. Fittings:
   a. Approved manufacturers: Charter Plastics, Performance Pipe, Rahn, Georg Fisher, Polycam or equal.
   b. All fittings up to 4” in diameter shall be socket type and fitting larger than 4” diameter shall be butt fusion type. Fittings shall conform to ASTM 2683. Fittings shall be manufactured and not field or shop fabricated. The inside diameter of the fittings shall be equal to the inside diameter of the pipe.
   c. Rink piping return bends: Construct as detailed on the drawings. As alternatives:
      1) POLY-CAM (763.786.6682) Series 734 polyethylene HDPE 3408 socket U-Bend fittings with I.D. of 1.310 inches at 4” o.c. At this time, the new POLY-CAM bend at 3.5” o.c. is NOT APPROVED.
      2) GES Geoglide 180 HDPE pre-molded socket return bend. Only the newest design and product will be approved. www.gesgeo.com
   d. Use manufacturer recommended coupling or coupling method when fusion welding pipe of different gauges or wall thickness.
6. The pipe shall have product traceability by inclusion of product code on the exterior of the pipe and include the manufacturer, the date of manufacture, the lot and supplier of the raw material, the location of the manufacture, and the production shift of which the product was produced.

2.06 EXPANSION JOINT MATERIALS

A. Compression Seals: Shall be D.S. Brown Delastic or equal.

1. D.S. Brown Delastic Catelog Numbers shall be as follows:
   a. For 1” joint (width at time concrete placement) shall be Catalog No. CV-1752.
   b. Provide dimensions as required for the joint width shown on the drawings.
2. Material shall be polyethylene, non-absorbent, non-staining.
3. Compression seal material shall meet the parameters for the specified D.S Brown product.
4. Color: Black
5. Compressible Joint Filler: Ceramar by W.R. Meadows or extruded polystyrene insulation (thickness of expansion joint by depth of rink floor) in one piece with top scored to depth of expansion joint material or as recommended by the manufacturer.

2.07 CONCRETE

A. This section refers to concrete for the ice rink floor only. For perimeter slab concrete and other miscellaneous concrete requirements see Ice Rink General Requirements Section.

 © 2026 B32 Engineering Group, Inc. All Rights Reserved

B. Concrete Mix:
1. Submit mix design fifteen (15) business days prior to placement.
2. Concrete shall be produced by a Ready-Mix Plant approved by the Engineer. Concrete shall meet the requirement of ASTM C94 - Standard Specifications for Ready Mix Concrete.
3. Mix Design Requirements. Prepare design mix for type and strength of concrete in accordance with applicable provisions of ASTM C94, Alternative #3.

Minimum 28-day compressive strength	5000 psi
Coarse aggregate size	3/4 inches to #4 (ASTM C33 No. 67)
Maximum water to cement ratio	0.40
Minimum cement content	600 lbs/cy
Fly ash	15% of cement content max.
High Range Water Reducing Admixture	
Slump (prior to addition of HRWRA)	3 inches maximum
Slump (after addition of HRWRA)	7 inches maximum
Air content	3% maximum

4. Proportion aggregates such that the concrete mix adequately flows into all corners and around reinforcement without segregating, leaving voids or producing honeycombs. There shall be no free water in the mix.
5. The consistency of the concrete mix shall be uniform and such that the cement and other ingredients are uniformly distributed throughout the mix and such that the mortar clings to the coarse aggregate.

C. Material Requirements
1. Cement:
   a. Shall be Portland Cement that meets ASTM C150, Type I or Type I/II. Only the specified manufacturer submitted with design mix will be allowed.
   b. If Type I or Type I/II is not available, Type IL, meeting the requirements of ASTM C595, may be used but the contractor must take every precaution to reduce the potential for efflorescence including, but not limited to, the following:
      1) If a hardener/densifier is specified, it shall be installed immediately after finishing and per the manufacturers recommendations to reduce migration of efflorescence to the top of the slab during the cure.
      2) When the wet cure is removed, the slab shall be washed immediately and not allowed to dry until it is washed.
      3) In cases where efflorescence occurs after the wet cure, the slab shall be washed with an efflorescence cleaner and a hardener/densifier is added to prevent additional efflorescence.
      4) Curing blankets shall be used in place of poly sheeting to prevent dry pockets.
2. Fine Aggregates: Shall be clean, natural sand free of loam, clay and other deleterious or foreign materials. Shall meet ASTM C33 and come from a single source.
3. Coarse Aggregates: Shall be clean, processed aggregates free of loam, clay or other deleterious or foreign materials. Shall be crushed stone or crushed gravel.
4. Water: Shall be clean, potable water. Maximum concentration of chloride ions of 0.1%.
5. Admixtures: All admixtures shall conform to ASTM C494. A representative for the HRWRA supplier shall be on-site at the start of the concrete placement until consistency in the mix has been proven by the testing agency. No changes are allowed once the design mix is approved.
   a. Air Entrainment:
      1) Shall meet ASTM C260.
      2) Shall be compatible with Type 1L cement.
      3) Approved manufacturers:
         Axim Concrete Tech. - Catexol AE 260, VR
         Euclid Chem. Co. - AEA 92S, AEA 92, Air Mix 250
         General Resource Tech - Polychem AE, VR
         GCP – Applied Technologies - Darex II AEA, Daravair 1000, 1400, Airalon 3000

 © 2026 B32 Engineering Group, Inc. All Rights Reserved

Master Builders - MB VR standard, Micro Air, MasterAir AE 90
Sika Corporation – Sika AEA-14, Sika Multi AIR 25
Premiere – ConAir

b. Water Reducing Admixture:
   1) Shall meet ASTM C494, Type A and shall not contain more chloride ions than in potable water source with a maximum of 0.1%.
   2) Shall be compatible with Type 1L cement.
   3) Approved manufacturers:
      Axim Concrete Tech. - Catexol 800N, 1000N, 2000N
      Euclid Chem. Co. - Eucon MR, WR, WR-91
      General Resource Tech - Polychem 1000, KB1000, 400NC
      GCP – Applied Technologies - WRDA 82, MIRA 110
      Master Builders - Pozzolith 220N, MasterPolyhead 997
      Sika Corporation - Sikament HP, Plastocrete 169, 161
      Premiere – OptiFlo MR

c. High Range Water Reducing Admixture (HRWRA) Superplasticizer
   1) Shall meet ASTM C494, Type F or G and shall not contain more chloride ions than in potable water source with a maximum of 0.1%.
   2) Shall be compatible with Type 1L cement.
   3) Approved manufacturers:
      Euclid Chem. Co. - Eucon 37
      GCP – Applied Technologies - ADVA 140M, ADVA CAST 575, 600
      Sika Corporation – Sikament 686
      Master Builders – MasterGlenium 7500
      Premiere – OptiFlo MR

2.08 GENERAL MATERIALS

A. Nylon Ties: Shall be 3/16" wide and UL recognized. For sand rink floor ties shall have a minimum tensile strength of 100 lbs, with metal tabs. For concrete rink floor ties shall have a minimum tensile strength of 50 lbs.

B. Moisture Curing Covers: Shall be a curing cover such Ultra Cure DOT by McTech Group, Hydrocure by PNA Construction Technologies or equal. Polyethylene sheeting is not approved.

2.09 TEMPERATURE SENSOR AND MONITORS

A. Provide sensors for sub-floor heating system and the ice rink floor system. See drawings for number and location. Provide one (1) monitor with selector switch for all sensors.

B. Approved Manufacturers: Omega Engineering, Thermokon, Kele, Honeywell, or equal.

C. Sensor (thermistor or RTD):
   1. Accuracy: +/- 1% accuracy of measuring range.
   2. Sensor pocket shall be aluminum.
   3. Protection: Shall be protected against humidity, vibration and mechanical overstress.
   4. Construction: Shall be suitable for temperature extremes and immune to the effects of moisture and condensation.
   5. Provide wiring as required by monitor manufacturer.
   6. Other control systems – provide compatible 4-20mA sensor.

D. Box: Aluminum construction with 3/4" hub size, threaded connections, flat removable iron or steel cover with neoprene gasket.

E. Conduit: Schedule 80 PVC from box to mechanical room and from box to depth of sensor to prevent heat transfer.

F. Wire: Provide all wiring sizes for application and per code requirements.

G. Monitor: Omega Model DP400 series, Honeywell T775, or equal.

H. Junction Boxes: Water proof metal or PVC junction boxes as required for location.

 © 2026 B32 Engineering Group, Inc. All Rights Reserved

2.10 FLOOR INSERTS

A. Furnish and install floor inserts as detailed on the drawings and for the quantity shown. Inserts shall be designed for 4,000-pound load in any direction.

B. Plug Materials: Furnish and install threaded plugs for each insert. The plug material for goal post inserts shall be 303 stainless steel. The material for dasher board and circus inserts shall be 360 brass.

C. Insert Materials: As shown on the drawings. If not shown, then material shall be 303 stainless steel inserts.

D. Base Plate Material: 303 Stainless steel or carbon steel.

E. Wrench: Furnish two plug wrenches. Each wrench shall have a minimum shaft length of 6”, a minimum handle length 10” and designed to fit insert plugs. Wrench shall be constructed of coated steel or equal.

F. Flexible goal post pegs will be provided by the dasher board manufacturer. Verify peg dimensions prior to manufacturing floor inserts.

2.11 VOLLEYBALL FLOOR INSERTS

A. Furnish and install floor inserts as detailed on the drawings and for the quantity shown. Inserts shall be designed for 4,000-pound load in any direction.
   1. See Architectural drawings for dimensions and location of inserts and quantity. Contractor shall verify final insert layout with Architect and General Contractor when building ice rink floor.

B. Approved manufactures: Sports Import (Model KA 25-S) or approved equal.

C. Insert Material: Stainless Steel.

D. Plug Materials: Shall be a stainless-steel floor plate with hinged cover.
   1. Approved Manufactures: Sports Import (Model KA25-F) or approved equal.

E. Base Plate Material: 6”x6”x1/2” stainless steel welded to bottom of insert. Drill holes in opposite corners of anchor plate for installation of nail of screws to anchor.

PART 3 - EXECUTION

3.01 SITE VISITS AND INSPECTIONS

A. Engineer Site Visit. The Contractor shall notify the Engineer a minimum of seven (7) business days prior to the phases of work described in the Ice Rink General Requirements Section. Piping shall not be covered without notifying the Engineer.

B. Contractors Site Inspection. The Contractor shall examine the site and all work prepared by others and report to the General Contractor and Engineer in writing any conditions detrimental to the proper and timely completion of the Work of this Section. Do not proceed with the Work until unsatisfactory conditions have been corrected in an acceptable manner.

3.02 EXCAVATION AND BACKFILL

A. The Contractor shall be responsible for verifying the location of all existing piping, electrical, and other utilities prior to excavation.

B. Erosion control. Prevent erosion and contain runoff at the site at all times. Temporary dewatering systems is the responsibility of the Contractor.

C. Stockpiles. Establish and maintain material stockpiles on site only at locations acceptable to the Owner and Engineer and which will not interfere with the progress of the Work, traffic, parking, and ongoing operations, and will not damage existing structures. Stockpiling of materials on site shall be conducted so that the material does not erode and/or cause siltation of drainage structures, wetlands, or other sensitive areas.

D. Dust Control. Maintain dust control at all times throughout the construction period.

E. Excavation and Subgrade Preparation:
   1. All excavation and trenching shall be performed in accordance with all applicable OSHA regulations and recommendations, to the depths shown on the drawings, and to the tolerances specified in the table below.

 © 2026 B32 Engineering Group, Inc. All Rights Reserved

2. Contractor is responsible for prescribing and maintaining proper protective measures based on site conditions.
3. Control grading to prevent water from running to excavated areas or damaging subgrade or site improvements.
4. Dewater and maintain drainage control as required to perform the Work.
5. Where final subgrade has been softened, frozen, or otherwise disturbed due to the presence of water, as a result of unfavorable weather, or any other cause, remove the material and replace it with suitable approved material at no additional cost to the Owner.
6. Prevent disturbance of soil subgrades.
7. The ice rink floor subgrade shall be graded to the required elevation by the earthwork Contractor on the project.

Area	Tolerance
Pipe trenches and non-rink floor areas	+/- 0.03 feet (3/8”)
Rink floor subgrade for rink floor with a subfloor heating system	+/- 0.05 feet (5/8”)

F. Verification Surveys and Measurements: The ice rink contractor shall provide verification surveys in the following areas. Submit surveys and measurements to Engineer for review prior to installation of new rink floor system.
   1. Perimeter concrete.
      a. Survey top of perimeter concrete within 2” of the rink floor edge every 10 feet around the entire perimeter of the rink floor. This information will be used by the Engineer to establish a benchmark to use in constructing the ice rink floor system.
      b. Measure ice rink floor opening to perimeter concrete at the following locations.
         i. Length. Provide 2 measurements each from radius point to radius point across the rink floor. 2 measurements total.
         ii. Width. Take 2 measurements each from radius point to radius point across the rink floor and one at center of rink floor (center ice). 3 measurements total.
         iii. Radius. Provide measurement of each radius. 4 measurements total.
   2. Subgrade. Prior to the installation of the piping systems for the subfloor heating system, survey a 10-foot x10 foot grid pattern across the entire ice rink floor subgrade and include the benchmark elevation that was established in item 1 above.
   3. Top of sand layer. Prior to installation of the floor insulation, survey 10-foot x 10-foot grid pattern across the entire final and finished ice rink floor sand layer for the subfloor heating system and include the benchmark elevation that was established in item 1 above.

G. Backfilling: All excavated areas shall be backfilled as soon as possible but not before compaction tests have been taken and approved where required. Backfill materials shall be placed in lifts less than 12 inches thick, uniformly compacted and follow the requirements of the geotechnical report, if report is available. Backfilled areas shall be fine graded to the tolerances specified in the table below. Care shall be taken while backfilling to protect the pipe from damage.

Area	Tolerance
Pipe trenches and non-rink floor areas	+/- 0.03 feet (3/8”)
Rink floor subgrade for rink floor with a subfloor heating system	+/- 0.05 feet (5/8”)
Rink floor subfloor heating system sand layer	+/- 0.015 feet (3/16”)

H. Compaction: Backfill material shall be uniformly compacted to the densities shown in the table below.

Area	Standard Proctor Density
Pipe trenches within building footprint and other structural areas	98%
Rink floor subgrade (below subfloor heating system)	98%
Rink floor subfloor heating system sand layers 6” thick or less	95%

3.03 INSTALLATION OF PIPE

A. No changes to pipe alignment or elevation shall be made without approval from the Engineer.

B. All pipe shall be cleaned out prior to installation. Inspect pipe for defects and damage.

 © 2026 B32 Engineering Group, Inc. All Rights Reserved

C. Buried piping shall be bedded in material recommended by the pipe manufacturer.

D. Support rink and header piping systems as shown on the drawings. Provide additional supports for the rink piping system, over the header trench, as necessary to prevent deflection of piping systems during construction and during the concrete pour.

E. Support all piping in such a manner as to prevent all vibration and vertical or horizontal movement.

F. For polyethylene pipe, butt or socket fusion welds shall be used to connect pipe and fittings. Electro fusion welded couplings should only be used where it is not possible to make a butt and socket weld due to space constraints or manufacturer recommendations. In addition, electro fusion welded couplings and fittings shall not be used in the following locations:
   1. In or beneath the ice rink floor system. This includes, but is not limited to, the header pipe systems for both the rink floor and subfloor systems and the rink floor and subfloor piping systems.
   2. Under permanent bleacher systems except where transmission mains connect to header pipe outside of the rink floor perimeter.
   3. Above ground piping systems.

G. Provide all coring drilling required to install piping system through masonry or concrete walls, footings, screen walls, roof structures and other structures as required to install piping systems. Keep holes to minimal size.

3.04 INSULATION, JACKETING AND VAPOR BARRIER

A. Install floor insulation with staggered joints as required on the drawings. Ends shall be tightly butted together and secured. All cuts must be performed with a sharp-edged tool.

B. Install vapor barrier over insulation with a minimum of 18" overlap at all joints. All joints shall be taped.

C. Install pipe insulation on transmission mains as specified.

3.05 PIPE AND REBAR SUPPORT CHAIR

A. Install as shown on the drawings.

B. Additional supports shall be placed as close to the ice rink piping return bends as possible.

3.06 REINFORCEMENT

A. Reinforcement shall be installed as shown in the drawings.

B. Installation shall meet ACI 315. Reinforcement shall be installed with a minimum of 2" of cover unless otherwise noted on the drawings. Adequately support reinforcement with support chair where specified and concrete blocks. Terminate rebar 2” from the rink edge.

C. Splices shall be installed with minimum lapping distances shown on the plans and bars wired tightly together. If lapping distances are not shown on the plans the following lapping distances shall apply.

Reinforcement Bar Size	**Lap Splice (inches)**	**90º Hook End**
#4	25	8
#5	31	10
#6	37	12

D. Wire mesh shall be placed over rink piping. The loose ends of the wire mesh shall be bent down. The wire mesh sheets shall be overlapped by a minimum of 6" and wired securely to the reinforcement bars at a minimum of 18" on center or as noted on drawings (whichever is the tighter spacing) in both directions and along all edges of mesh. Consider securing to pipe chairs as well to prevent floating of piping system during the concrete pour especially if air is used for testing the piping system. The mesh shall be tightly wired down in all locations. Terminate mesh 2" from the rink edge. Turn all wires down. Contractors shall monitor the location of the wire mesh throughout the concrete placement and finishing processes and provide additional securing as needed.

 © 2026 B32 Engineering Group, Inc. All Rights Reserved

3.07 PIPE AND FITTINGS

A. All sub-floor heating and rink piping shall be continuous. There shall be no joints, splices or additional fittings other than were indicated on the drawings. Header and transmission main piping shall be supplied in typical lengths.

B. All piping and fittings shall be connected by fusion welding. Contractor shall perform and demonstrate in the field, by personal that will be working on this project, for the Engineer prior to placement of polyethylene pipe. Submit two (2) samples of a typical fusion welded joint from the demonstration.

C. All connections to the header pipe shall be at a 90-degree angle to the header pipe. No connections shall be made at an angle.

D. Contractor shall inspect the interior and exterior of all butt and socket joints wherever possible to assure there are no blockages and that joints are formed to manufacturer's specifications.

E. Fasten rink piping to chair supports with specified nylon ties as necessary to secure pipe in position. Varying temperatures may require less restrictions to allow pipe to move. End of ties shall be turned downward.

F. Placement:
   1. Rink piping shall be installed within +/- 1/4" of the elevation shown on the drawings. Shims shall be used to adjust pipe elevations if necessary.
   2. Verification Surveys and Measurements:
      a. Surveys. When rink piping installation is complete the Contractor shall provide a survey of the top of the rink pipe. The survey shall be performed by an independent surveying company and signed by a professional engineer or registered land surveyor licensed in the state of the project. The survey equipment used must have recently documented certification of calibration and must be of the highest accuracy to document the very tight tolerances specified for this work. At minimum, the survey locations shall include the following:
         1) Top of rink pipe in an 8-foot x 8-foot grid pattern over the entire rink surface.
         2) In addition, top of rink pipe at supply and return headers (next to elbow or tee fitting) at an 8-foot spacing.
         3) In addition, the top of rink pipe along radii and ends of rink at a 8-foot spacing, 1 foot from edge of perimeter concrete.
         4) In addition, the top of rink pipe along the row of support chairs on each side of the header trench at a 8-foot spacing.
         5) In addition, perimeter concrete at edge of rink floor every 20 linear feet around entire perimeter of concrete.
         6) The information shall be recorded and submitted to the engineer clearly showing top of pipe elevation in reference to the top of concrete elevation and the difference between the two elevations. The survey shall be completed in adequate time for the Engineer to verify the information and the Contractor to make adjustments prior to the concrete pour.
         7) The survey shall be performed as many times as necessary until the final survey meets the requirements of the specifications.
      b. Goal and volleyball insert locations. Provide measurements of each goal insert from center ice, from end of rink, and distance between inserts. 5 measurements total.
   3. Cleaning and Flushing: Thoroughly flush and clean all piping systems prior to installation and before installation of secondary refrigerants. Remove all water or other fluids used during the cleaning and flushing procedures. The Engineer shall be notified prior to any final cleaning or flushing.

G. Testing:
   1. The entire sub-floor heating system including the headers and transmission mains and the entire rink piping system including the header and transmission mains shall be hydrostatically tested as two separate systems at 100 psi each for the first four (4) hours and reduced to 60 psi for an additional 20 hours with no pressure drop at either setting and in accordance with ASTM F2164-21 Standard Practice for Field Leak Testing of Polyethylene (PE) and Crosslinked Polyethylene (PEX)

 © 2026 B32 Engineering Group, Inc. All Rights Reserved

Pressure Piping Systems Using Hydrostatic Pressure. While each test is being set up the Contractor will likely need to add water for the first 2 to 3 hours as the pipe may stretch slightly. Each test shall not begin until the Contractor is confident all air is removed from the system and the system is completely filled with water. An Owner's representative (general contractor, construction manager or City inspector) shall witness and approve the test.

2. Each test shall be documented on a separate form and include, at minimum, the following information:
   a. General project information such as name, dates, location, etc.
   b. Description of pipe section tested including start and end locations.
   c. Date of test including start date and time and end date and time and any required intervals in between.
   d. Time stamped photos of pressure gauge for start and stop times and any required intervals in between.
   e. Signatures of both the Ice Rink Contractor representative and the Owner's representative.
3. Once the initial testing is approved, the pressure shall be lowered to 50 psi and maintained until 48 hours after the sand and concrete placement is complete.
4. Gauges used for pressure tests must be designed for pressures greater than the test pressure. For example, a 100-psi gauge cannot be used for a 100-psi test. The scale on the gauge must be the next increment up from 100 psi.
5. The insulation systems shall not be installed on the piping until the testing has been accepted.

H. Fill sub-floor piping system with glycol solution specified in Section 131815 - Ice Rink Waste Heat Recovery Systems. Fill rink piping system with secondary refrigerant as specified in Section 131812 - Ice Rink Refrigeration System.

3.08 COMPRESSION SEAL AND EXPANSION JOINT MATERIAL

A. Install extruded polystyrene insulation (thickness of expansion joint by depth of rink floor) in one piece with top scored to depth of expansion joint material or as recommended by the manufacturer.

B. After concrete has been placed and cured, remove the top piece of insulation.

C. Clean all dirt, debris and water from space between perimeter concrete and rink floor using a brush, vacuum or compressed air and as recommended by the manufacturer.

D. Install when concrete substrate is clean, sound, dry and cured for a minimum of 14 days and as recommended by the manufacturer.

E. Install the compression seal material in longest pieces possible and as recommended by the manufacturer. A series of small sections will not be accepted.

F. Install adhesive per manufacturer's recommendations. Do not allow it to freeze prior to installation. Store all components out of direct sunlight in a clean, dry location between 50 F and 90 F.

G. Install adhesive per manufacturer's recommendations.

H. Install compression seal per manufacturer's recommendations.

3.09 CONCRETE WORK

A. Quality Control:
1. A prepour meeting will be scheduled with the Engineer or Owner's representative to discuss the methods of placement, equipment, and quality control procedures.
2. A benchmark shall be approved by the Engineer prior to starting the pour.
3. The survey of the rink floor piping must be approved by the Engineer prior to concrete placement.
4. Prior to placement, an inspection of the rink floor shall be conducted and all debris, soil, trash, and standing water shall be removed before placement begins.
5. Concrete shall not be placed until authorized by the Engineer or the Owner's representative.
6. At least two (2) standby concrete trucks shall be available in case of equipment failure or loads are rejected.
7. Standby pumping equipment shall be on-site in case primary pumping equipment fails. Hand pushed wheelbarrows will not be accepted.

 © 2026 B32 Engineering Group, Inc. All Rights Reserved

8. An extra vibrator shall be kept on-site.
9. The concrete placement for the rink floor shall take place as one continuous pour from start to finish. Method of placement, leveling, finishing and curing shall be approved by the Engineer and the Contractor responsible for the ice rink work.
10. Quality control personnel from the ready-mix company, HRWRA admixture supplier and the Contractor shall be present during the pour.
11. All concrete not meeting the approved design mix parameters will be rejected.
12. Testing:
    a. Contractor shall hire a testing agency to perform the following tests and shall pay for all testing and laboratory costs.
    b. Temperature: Measure the concrete temperature for each truck.
    c. Slump: Measure the slump before and after adding the High Range Water Reducing Admixture (HRWRA)/Super Plasticizer for each truck. Tests shall be performed in accordance with ASTM C143.
    d. Air Content: Tests shall be taken before and after adding the High Range Water Reducing Admixture (HRWRA)/Super Plasticizer during casting of cylinders. Tests shall be performed in accordance with ASTM C231.
    e. Compressive Strength:
        1) Make and cure at least one (1) set of test cylinders, consisting of four (4) individual cylinders, for every 50 cubic yards of concrete placed or fraction thereof. Test specimens and testing shall be performed in accordance with ASTM C31 and ASTM C39.
        2) For each set of cylinders, test one specimen at seven (7) days, two specimens at twenty-eight (28) days and one hold. Acceptance shall be based on the average of the two 28-day tests.
    f. All sampling and tests shall be taken at the point of placement unless otherwise specified.
    g. An electronic copy of the test results shall be submitted to the Engineer as soon as the tests are completed.

B. Placement:
1. All concrete shall be placed and consolidated in accordance with ACI 304 (measuring, mixing, transporting), 305 (hot weather) and 306 (cold weather).
2. The method and manner of placing the concrete shall be such as to minimize the possibility of segregation of the aggregate, the displacement of the reinforcement, pipe or supports and damage to the floor insulation. Place concrete as near to the final position as possible. The vibrator shall not be used to transport or to flow concrete to the extents that causes segregation.
3. The pumping equipment used for conveyance of concrete the equipment shall be suitable for this type of work and have adequate capacity for the work. The pump shall be operated such that a continuous stream of concrete without air pockets is produced.
4. Proper precautions shall be taken to prevent the polyethylene headers from floating up during the pour.
5. Concrete shall be placed in maximum 12" layers in the header trench. Each layer shall be adequately consolidated before the next layer is placed.
6. Mechanical vibration shall be used to consolidate the concrete. Provide and use two (2) vibrators during the pour. Vibrators shall be capable of operating at frequencies sufficient to achieve thorough and uniform consolidation, but not less than 7000 impulses per minute. Methods such as spading shall be used to consolidate concrete in locations where it’s impossible to reach with a vibrator. Vibration shall not be applied directly to the reinforcement or piping. Placement and duration of the vibration shall be such to thoroughly consolidate the concrete without causing segregation or localized areas of grout.
7. Bridge screeds or super screeds shall not be used.
8. Concrete that has been contaminated by foreign materials shall not be deposited or shall be removed from the rink area. Concrete that has been partially hardened shall not be reworked or re-tempered and shall be removed from the rink area.

C. Finishing:

 © 2026 B32 Engineering Group, Inc. All Rights Reserved

1. Immediately after placement and consolidation, the concrete shall be struck off, screeded, and leveled to the required elevation. Begin floating when the surface is ready and bleed water is no longer visible. Floating may be conducted either by hand or with a machine. Check for levelness, fill or cut as necessary, and refloat surface to a smooth, uniform, granular texture.
2. Chemical finishing aids or fogging system shall be used at the Contractor's discretion to prevent rapid surface moisture loss. Water shall not be added to the concrete at any time.
3. After floating, apply a trowel finish using a power-driven trowel. The Contractor shall determine the time to start troweling. Perform final troweling by a combination of hand and power-driven trowels, leaving the surface free of marks, and uniform in appearance and texture. Provide a smooth surface.
4. The perimeter edge of the rink floor, adjacent to the expansion joint, shall be edged to 1/4" radius.
5. Surface Tolerance:
   a. The top of slab elevation for the rink shall be continuously checked by the Contractor throughout the finishing operation with survey equipment.
   b. The final concrete surface elevation shall be within +/- 1/4" from a true level plane and in relation to the approved benchmark.

D. Concrete Surface Verification Survey
1. When concrete placement installation for the rink floor is complete the Contractor shall provide a survey of the concrete surface. The survey shall be performed by an independent surveying company and signed by a professional engineer or registered land surveyor licensed in the state of the project. At minimum, the survey locations shall include the following:
   a. Top of concrete rink floor in a 8-foot x 8-foot grid pattern over the entire rink surface.
   b. In addition, survey along radii and ends of rink at a 8-foot spacing, 1 foot from edge of perimeter concrete.
2. The information shall be recorded and submitted to the engineer clearly showing the top of concrete elevation in reference to the benchmark used to build the rink floor and the difference between the two elevations. The survey shall be completed the same day as the rink pour and according to ASTM and ACI standards.

E. Curing: After finishing and as soon as possible provide a wet cure for a minimum of 14 days by covering the entire surface with curing blankets. The curing blankets shall be installed to prevent air pockets and discoloration in the concrete surface. The Contractor is responsible for maintaining the wet condition for the entire 14 days. The curing blankets shall be removed all at one time to avoid potential damage due to differential shrinkage. Approved manufacturers: Ultra Cure DOT by McTech Group, Hydrocure by PNA Construction Technologies or equal. Polyethylene sheeting is not approved. The wet cure and curing blankets shall be installed by the concrete subcontractor.

F. The concrete floor shall not be refrigerated or open to equipment traffic for 28 days from time of pour. See startup procedures in the Ice Rink General Requirements Section.

3.10 TEMPERATURE SENSORS

A. Install temperature sensors in accordance with manufacturer's recommendations. Sub-soil temperature sensor shall be installed to 1'-6" depth to bottom of sensor. For each sensor, the top of the box cover shall be even with the top of the ice rink slab for easy access and sensor replacement.

B. Junction Box. Provide junction box(es) between the ice rink floor system and the refrigeration room as required to meet current code requirements and as necessary to replace wiring in the future.

C. Testing of conduits. Prior to and after backfilling the conduits, pull a fish wire through each conduit to demonstrate the conduits are not damaged or plugged in any way.

3.11 FLOOR INSERTS

A. Install inserts at the locations shown on the drawings. Inserts shall be carefully lined and leveled with transit before placing concrete for the rink floor.

B. Brass plugs should be installed prior to concrete placement. Grease top of plug.

 © 2026 B32 Engineering Group, Inc. All Rights Reserved

3.12 VOLLEYBALL FLOOR INSERTS

A. Install inserts at the locations shown on the drawings. Inserts shall be carefully lined and leveled with transit before placing concrete for the rink floor.

B. Coordinate exact location of all inserts with General Contractor and Architectural plans.

C. Grease top of volleyball insert floor plate prior to concrete placement.

D. The top of the plate shall be 1/8” below the top of the ice rink slab for easy access. Properly clean insert to function as intended after concrete has cured.

3.13 CLEANING

A. The ice rink floor shall be completely cleaned of all debris, spills, stains, etc. If requested by the Engineer, the contractor shall wash and mop the entire floor to assure the floor is clean.

B. Clean all other material, equipment, and debris from other areas of the building on a daily basis and thoroughly clean at the end of the project.

END OF SECTION

 © 2026 B32 Engineering Group, Inc. All Rights Reserved

SECTION 13 18 14
ICE RINK PIPING, VALVES AND ACCESSORIES

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Pipe and Fittings.

B. Valves and Accessories.

C. Pipe Hangers.

D. Pipe and Equipment Markers.

E. Expansion Tank.

F. Pressure Gauges.

G. Thermometers.

H. Insulation.

I. Sealing and Firestopping.

1.02 RELATED SECTIONS

A. Division 0, Division 1, General and Supplementary Conditions.

B. Section 131811 - Ice Rink General Requirements.

C. Section 131812 - Ice Rink Refrigeration System.

D. Section 131813 - Ice Rink Floor System.

E. Section 131815 - Ice Rink Waste Heat Recovery Systems.

F. Section 131817 – Ice Rink Central Control System.

1.03 SUBMITTALS

A. Shop Drawings. All submittals shall conform to the requirements of the General Conditions and Section 131811 - Ice Rink General Requirements.

1.04 WARRANTY/GUARANTY

A. As required in Section 131811 - Ice Rink General Requirements.

1.05 PRODUCT DELIVERY, STORAGE AND HANDLING REQUIREMENTS

A. As required in Section 131811 - Ice Rink General Requirements.

PART 2 - PRODUCTS

2.01 PIPE AND FITTINGS

A. Polyethylene.
   1. Rink pipe and transmission mains. As specified in Section 131813 – Ice Rink Floor System.

B. Steel.
   1. Primary and secondary refrigerant piping.
   2. Material shall be carbon steel and meet the following:
      a. Smaller than 1 ½ inches diameter shall conform to ASTM A106, Grade B, Schedule 80. Schedule 40 steel may be used for R-717 refrigerant liquid lines 2 inches through 6 inches and all suction and discharge line 6 inches and smaller.
      b. 1 3/4 inch to 12 inches diameter shall conform to ASTM A53, Grade B Schedule 40.
      c. Larger than 12 inches diameter shall conform to ASTM A53, Grade B Schedule 40.
      d. Type F steel shall not be used for refrigerant lines except when discharging to atmosphere.
   3. Joints shall be welded end type. No threaded joints.
   4. Fittings shall be carbon steel with welded end type and shall meet ANSI B16.9. Fittings shall be manufactured and not shop or field fabricated.

 © 2026 B32 Engineering Group, Inc. All Rights Reserved

5. Flanges shall be of the same material as the pipe and shall be rated for a minimum of 150 psi. Shall meet ANSI B16.5

C. Copper
1. Water line piping.
2. Shall meet ASTM B88, ASTM Type L and be seamless tubing with copper sweat fittings. Copper pipe shall not be used for refrigeration piping.

D. PVC
1. Condenser return lines were noted and sanitary sewer drain lines.
2. Shall be Schedule 40 virgin polyvinyl chloride, with maximum operating and required minimum bursting pressures at 73 degrees F for PVC piping and fittings per ASTM D1785 “Standard Specification for Poly (Vinyl Chloride) (PVC) Plastic Pipe. Fittings and flanges shall be the same grade and class of pipe. Solvent welded joints using heavy bodied or heavy-duty cement.

2.02 VALVES AND ACCESSORIES

A. Primary Refrigerant Valves and Accessories
1. Approved Manufacturers: Hansen Technologies, Henry, Refrigeration Specialties, Cyrus Shank Company, Parker, Danfoss, or equal.
2. Minimum working pressure rating: 400 psig.
3. Body: Heavy duty ductile iron, cast steel.
4. Internal parts: Stainless steel.
5. Gaskets and Seats: Neoprene O-rings or flat composite gaskets, Teflon seats.
6. Packing nut and hand wheel: Zinc chromate plated steel.
7. Pressure relief valves to meet requirements of Section IV of the ASME Boiler and Pressure Vessel Code. Maximum release pressure should match vessel pressure rating. Provide discharge indicator such as Pop Eye by Hanson Technologies or equal. Secondary side (glycol/brine) should be set at 150 psi unless otherwise stated.
8. Refrigerant Strainers: Shall include stainless steel screen and body. Shall be easily serviceable in-line.
9. Filter Dryer: Steel shell with corrosion resistant finish, aluminum cover plate with 1/8" FPT connection for valve, and copper fittings.
10. All hand expansion valves, solenoid valves, and regulators shall be supplied with seal caps on the adjusting stem.
11. Check valves: Shall be Hanson HCK4 LR Gravity Drain check valves for low pressure drop applications of 0.25 psid, Danfoss, or equal.
12. Solenoid Valves: Shall be Hansen Model HS4A, Danfoss or equal. Piston and spring mechanism shall be pressure operated. Valves using plunger-needle type assemblies shall not be used.”
13. Pressure Regulating Valve(s): Shall be Hansen Standard Regulator HA4A, Danfoss, or equal. The pressure regulating valve for the compressor discharge line(s) shall include a high range (up to 185 psi) spring assembly.
14. 3-way Oil Temperature Valve: Shall be Hansen HOTV/HOTW or equal.
15. High Side Float (Float Drain Regulator): Shall be Hansen HT or equal. Shall be self-contained, no separate pilot, low friction, self-cleaning slide block, manual operating stem, modulates refrigerants over a wide range of flow, and standard oil and equalizer/purge connections.
16. Liquid Level Float Switch (High Level):
    a. Approved Manufacturers: Phillips Refrigeration, Parker, Danfoss, or equal
    b. Operating temperature: -50F to +150 F.
    c. Float chamber: zinc plated
    d. 10-amp Single pole, double throw switch, hermetically sealed, magnetically actuated.
    e. Standard DIN connector with 15’ cable.
    f. Housing interchangeable with RS LL float switch.
17. Adjustable Level Controllers and External Level Column Systems: Shall be Hansen Vari-Level or equal. System shall include, but not limited to; adjustable control unit with Teflon encased stainless steel sensing principle and control cable, level column with site glasses (minimum of 4 positioned

 © 2026 B32 Engineering Group, Inc. All Rights Reserved

at 6” on center), probe, valve position indicator, isolation valves. Probes shall be full length of the columns.

18. Automatic Expansion Valve: Shall be Hansen Motorized Control Valve and Controller Model MCV, equal by Danfoss, or equal. Provide optional power close feature, remote mounted valve position indicator, Teflon seat, non-electric rotor enclosed in stainless steel case.”
19. All ball valves shall include dual stem design with Teflon packing and secondary seal system.
20. Temperature Controllers:
    a. Surface Mounted: On/off, line voltage signal, 110V, SPDT, JC A19DAC-1 or equal.
21. Refrigerant Liquid Indicators: Hansen SEE-LEVEL or equal. When liquid is present the reflex lens shall appear dark, when vapor is present reflex lens shall appear light. Provide optional Lucite 2” frost shield for clear viewing of liquid under frosting conditions. Steel housing ASME SA36, Soda lime glass fused in steel retainer ring, retainer ring shall be cold rolled steel ASTM A108 and zinc plated, Neoprene O-ring, Red fiber retainer gasket.

B. Secondary Refrigerant Valves and Accessories
1. Approved Manufacturers: Apollo, Aurora, Bell & Gossett, Crane, Flowseal, Milwaukee, Mueller, Nibco, Stockham or equal.
2. Minimum working pressure rating: 125 psig
3. Provide valve neck extensions where needed.
4. Butterfly Valves: Cast iron or ductile iron (ASTM A536) body; Ni-coated duction iron or 316 stainless steel disc; 416 stainless steel stem; EPDM/Buna-N/Teflon/Viton resilient seat; Teflon (PTFE) stem bushing; 316 stainless steel disc screws; EPDM or Buna-N O-Rings.
5. Check Valves: Non-slam design; cast iron body, bonnet, disc plate, and disc cage meeting ASTM A-126 Class B.
6. Combination Valves: Operates as a non-slam check valve, shutoff valve and throttling valve. Cast iron body, brass seat, and bronze disc with EDPM seat insert, stainless steel stem and spring, Teflon-graphite packing.
7. Ball Valves: Bronze body, 316 stainless-steel ball, Teflon seats.
8. Air Release Valves: Cast iron or bronze body. Provide ball valve and drain line to floor. Include 1/2" FPT and 3/4" MPT connections.
9. 3-Way Mixing Valves: Cast iron body, flanged. Controls to operate valve based on fluid temperature.
10. Suction Diffuser/Strainer:
    a. Body and Cover: Cast iron, ASTM A48, flanged.
    b. Vanes & Orifice Cyl: Steel for glycol systems
       Stainless steel for calcium chloride systems.
    c. Strainer: 5/32” perforated, 304 stainless steel.
    d. Start-up Screen: 20 mesh, 304 stainless steel.
    e. O-ring: Buna-N
    f. Purge/Drain Plug: Wrought steel or Cast Carbon Steel
    g. Cap Screws: Wrought steel, SAE Grade 5
    h. Pipe Supports: Steel, adjustable
11. Flexible Connectors: 150 lb plate or carbon steel - flat face type, flexible stainless-steel hose and braid material, and stainless-steel braid collar.
12. Flow Switch or Differential Pressure Switch:
    a. Approved manufacturers: Johnson Controls, Penn by Johnson Controls, United Electric Controls, Hansen, IFM, or equal.
    b. Must be compatible with the system fluid.
    c. Enclosure: NEMA Type 4.
    d. Gold-plated contacts for improved electrical performance.
    e. Stainless steel paddle or opposing metal bellows (seal bellows) to detect pressure differences between two sources.
    f. Adjustable set points.
    g. Epoxy coated enclosure.

 © 2026 B32 Engineering Group, Inc. All Rights Reserved

13. Flow Meter:
    a. Approved manufacturers: Onicon Incorporated, IFM Electronic, or equal
    b. Electronic Impedance Sensing turbine insertion flow meter (non-magnetic, non-photoelectric). Single or dual turbine as required based on length of straight pipe run available for fully conditioned flow.
    c. Accuracy: +/- 0.5% of reading at calibrated velocity, +/- 1-2% of reading over a 50:1 flow range.
    d. Output: Analog 4-20mA and 0-10 VDC signals.
    e. Materials: 316 stainless steel for wetted metal components.
    f. Calibration: NIST traceable factory calibration with certificate of calibration.
14. Resistance Temperature Detectors (RTD) Assemblies:
    a. Approved manufactures: Omega, JW Instruments (763.784.5708) or equal.
    b. RTD: Single Element, platinum, 3 wire, Tolerance Class A, 316 stainless steel sheath. Length to be at approximately 10% longer than radius of pipe.
    c. Temperature Ranges:
        1) Return brine/glycol: 0-50F
        2) Others: As required.
    d. Spring loaded.
    e. NPT stainless steel hex nipple.
    f. Aluminum screw cover head – NEMA 4X rated.
    g. Signal: 4 to 20 mA programmable temperature transmitter, upscale burnout, temperature range to match RTD.
    h. Thermowell: Shall be standard duty threaded (NPT), 304 stainless steel, NPT size as required to accommodate RTD.
    i. Shall coordinate type of RTD and transmitter with controls, VFD or other device that is being connected to RTD Assembly.

C. Valve Tags
1. Provide non-ferrous metal or plastic laminated tags on each valve with non-ferrous or corrosion proof fasteners. Numbering system shall be referenced in the Operation and Maintenance Manual.

2.03 PIPE HANGERS AND SUPPORTS

A. Approved Manufacturers: Anvil International, Crane, Red Head, or equal.

B. Provide a complete pipe support system including hangers, supports, brackets, guides and anchors even if not specifically shown on the drawings. All supports shall conform to the latest requirements of ASME Code for Pressure Piping B31.1 and MSS Standard Practice SP-58, SP-69, SP-89 and SP-90.

C. Pipe hangers shall be capable of supporting the pipe in all conditions of operation without transferring excessive stress to the pipe.

D. Supports shall fit adequately over insulation. Provide 12 gage pipe saddles and inserts of high-density block insulation.

E. Supports shall not be connected to factory provided framework for equipment.

F. Exterior pipe supports shall be galvanized steel.

2.04 PIPE AND EQUIPMENT MARKERS

A. All pipe and equipment markers shall conform to IIAR Bulletin No. 114 (most recent edition): Guidelines for Identification of Ammonia Refrigeration Piping and System Components.

B. Label all pipe in ice equipment room over 1.5 inches in diameter.

C. Label all equipment on nearest pipe (e.g., Pump 1, Compressor 1, Chiller, Snow Melt Heat Exchanger, etc.)

2.05 EXPANSION TANK

A. Approved Manufacturers: Aurora, Xylem Inc. Bell and Gossett, John Wood Company, H.A. Phillips, Armstrong, or equal.

 © 2026 B32 Engineering Group, Inc. All Rights Reserved

B. Capacity: Horizontal compression tank. See capacity in Ice Equipment Schedule on drawings.

C. Materials: Pressure rating of 125 psig in accordance with Section VIII, Division 1, of the ASME Boiler Pressure Vessel Code, and registered with the National Board of Boiler Pressure Vessel Inspectors.

D. Accessories: Liquid level gauge assembly by Apollo Valve or equal and shall include gauge glass, drain valve, glass protector and shut off valves. Air control fitting equal to Xylem Inc. Bell and Gossett tank fitting and ATFL including brass vent tube plug and stainless-steel ball check.

E. Tank shall be painted with one coat of primer and one coat of enamel.

2.06 PRESSURE GAUGES

A. Approved Manufacturers: McDaniel, Ashcroft or equal.

B. Materials and Accessories: Shall have stainless steel case, minimum 4" diameter, bourdon tube type, liquid filled, 1% scale accuracy over entire range of gauge, 1/2" minimum diameter stainless steel sockets. Provide ball valve and snubber for each gauge. Provide 1/2” minimum diameter steel pipe extension to extend ball valve outside of pipe insulation. Steel pipe and ball valve specified elsewhere in the specifications.

C. Sizes: Scaled from 0 to 50 psi for snowmelt, sub-floor, and water systems. Scaled from 0 to 100 psi for all other systems.

2.07 THERMOMETERS

A. Approved Manufacturers: Weksler, Trerice or equal.

B. Materials. Round, bimetal thermometer style using bimetallic sensing element, sensing element consisting of two dissimilar metals, stainless steel stem, highly polished type 300 stainless 4” diameter steel case, adjustable angle, silicone dampened coil, dial pointer, stainless steel stems, non-breakable double strength glass window, accuracy to +/- 1.0% full scale ASME B40.3 Grade A, external reset.

2.08 INSULATION

A. Pipe and equipment insulation system.

B. All pipe and equipment insulation systems shall be installed by a company specializing in these insulation systems.

C. See Insulation Schedule on drawings for required thickness, type and location.

D. Insulation and Jacket Type:

1. Materials: Shall be composite insulation system including insulation, jacket (as specified for specific application), and all sealants and shall have a flame spread rating of 25 or less and a smoke development rating of 50 or less. Shall be puncture resistant based on ASTM D-781, moisture and mildew resistant and vermin proof. Insulation shall be suitable to receive jackets, adhesives and coatings as indicated.
2. Fittings. All fittings shall be preformed from the factory and match the insulation material, thickness, etc. Field fabricated insulation sections for fittings is not allowed.
3. Type 3 Insulation (exposed, interior of building) - Flexible Elastomeric Thermal Pipe Insulation by Armaflex or equal.
   a. Jacketing: None.
4. Type 5 Insulation (exposed, interior and exterior of building) – Dow XPS Styrofoam, Certainteed, Ownes-Corning, Pittsburgh Corning, Extrol, Fibrex, H.B. Fuller, or equal.
   a. Insulation shall meet the following properties:

Properties	**Value**
Density, ASTM D1622, minimum	1.6 lbs/cf
Compressive Strength ASTM D1621, minimum	20 lb/sq. in
K-factor, ASTM C518	0.259 btu-in/hr-cf-F
Water Absorption, % by volume ASTM C272/D2842, max.	0.5/1.0 %
Water Vapor Permeability, ASTM E96, max.	1.5 perm-inch

   b. Jacketing (exposed, interior of building):

 © 2026 B32 Engineering Group, Inc. All Rights Reserved

1) PVC material with thickness of 20 mils, gloss finish on one side, semi-gloss on other side, FS LP-535D. Ultraviolet inhibited indoor/outdoor grade to be used where exposed to high humidity, ultraviolet radiation or installed outdoors. Jackets shall be rated for 0 F to 150 F with maximum flame spread rating of 25 meeting ASTM E-84 and maximum smoke development rating of 50 meeting ASTM E-84.
2) Type: Composition A, Type II, Grade GU, jacketing shall meet above requirements. Type 3 jacketing shall meet ASTM D-1784, Grade 1, and high impact in addition to the above requirements.

c. Jacketing (exposed, exterior of building and vertical pipe chase applications):
1) Aluminum material alloy 3003, 1100, or 3105 meeting ASTM B-209 with H-14 temper, 20 mil, smooth finish, white painted aluminum. UV protected. Jacketing shall have no paper to retain moisture.
2) Provide Polysurlyn moisture barrier with a minimum thickness of 2.5 mil. Dupont, Dow Saran or equal.
3) Banding shall be 0.020" thick by ½" wide, 300 series, stainless steel.
4) Aluminum jacketing for fittings, tees, elbows, valves, caps, etc. shall be sectional, factory contoured, to fit closely around insulation.

5. Type 5A (direct bury interior and exterior applications) – FoamGlas by Owens Corning or equal.
a. Insulation shall meet the following properties:

Properties	Value
Density, ASTM C303, minimum	7.18 lbs/cf
Compressive Strength C165/C240/C552, minimum	90 lb/sq. in
K-factor, ASTM C518, C177 at 0F	0.250 btu-in/hr-cf-F
Water Absorption, % by volume ASTM C240, max.	< 0.2% by Vol
Water Vapor Permeability, ASTM E 96 West Cup, max.	0.0 perm-inch

b. Jacketing:
1) Approved manufacturers: Pittwrap SS by Pittsburgh Corning or equal. Insulrap 50-SJ-NG is not considered an equal.
2) Modified bituminous membrane.
3) Self-healing material
4) Overlap shall be a minimum of 50%.
5) Apply in temperatures above 50F.
6) Properties:

Properties	Value
Thickness (mils), minimum	70
Permeability, ASTM E96 (perm-inches), max.	.002
Tensile Strength, ASTM D882 (at 78F), min.	>1150 lbs/in
Puncture Resistant, ASTM E154, min.	199 lbs

6. Type 5B (direct bury interior and exterior applications) Composite Piping System
a. **This product can only be used with composite piping systems with HDPE jacket** such as Tricon Force Piping Solutions, Inc., or equal. Piping material shall meet the pipe specifications for this project. Shall use HDPE jacket as specified below.
b. Closed cell polyurethane foam insulation. Foamed in place.
c. Insulation shall meet the following properties:

Properties	Value
Density, ASTM D1622, minimum	2.0 lbs/cf
Closed Cell, minimum	90-95%
K-factor, ASTM C177	0.147 btu-in/hr-sf-F

d. Jacketing
1) Direct Bury, Interior and Exterior of Building for Composite Piping Systems:
2) Approved manufacturers: Tricon Piping Systems, Inc. or equal.
3) HDPE materials.

 © 2026 B32 Engineering Group, Inc. All Rights Reserved

4) Must be applied with manufacturers recommended shrink sleeve material connecting pipe section for waterproof application. No substitutions.
5) Properties:

Properties	Value
Resin, ASTM D3350	Type III, Grade P34
Tensile Strength, ASTM D638(at 78F), min.	3300 psi
Ultimate Elongation, ASTM D638 min.	850%
Tangent Flexural Modules, ASTM D790, min.	175,000 psi

E. Insulation Inserts and Pipe Shields
1. Approved Manufacturers: B-Line, Pipe Shields, Value Engineered Products or equal.
2. Construct inserts with calcium silicate, minimum 140 psi compressive strength. Piping 12" and larger, supplement with high density 600 psi structural calcium silicate insert. Provide galvanized steel shield. Insert and shield to be a minimum 180 degrees coverage on bottom supported piping and full 360 degrees coverage on clamped piping. On roller mounted piping and piping designed to slide on support, provide additional load distribution steel plate. On low temperature systems, extruded polystyrene may be substituted for calcium silicate provided insert and shield length and gauge are increased to compensate for lower insulation compressive strength.
3. Where contractor proposes shop/site fabricated inserts and shields, submit schedule of materials, thickness, gauges and lengths for each pipe size to demonstrate equivalency to pre-engineered/pre-manufactured product described above.
4. Precompressed 20 lb density molded fiberglass blocks, Hamfab or equal, of the same thickness as adjacent insulation may be substituted for calcium silicate inserts with a 1" x 6" block for piping through 2 ½" and three 1" x 6" blocks for piping through 4". Submit shield schedule to demonstrate equivalency to pre-engineered/pre-manufactured product described above.
5. Wood blocks will not be accepted.

F. Accessories:
1. Provide all adhesive, sealants, protective finishes, and other products as recommended by the manufacturer to provide a completely sealed system.
2. Provide vapor barrier that is non-flammable, fire resistant and polymeric resin, for all systems operating below 65 F.
3. Insulation bands shall be ¾ inches wide, constructed of aluminum or stainless steel. Minimum thickness to be 0.015 inches for aluminum and 0.010 inches for stainless steel.
4. Tack fasteners shall be stainless steel ring grooved shank tacks.
5. Staples shall be clinch style.
6. Insulating cement shall meet ANSI/ASTM C195, hydraulic setting mineral wool. Finishing cement shall meet ASTM C449.
7. Bedding compounds to be non-flammable, fire resistant, polymeric resin.

2.09 SEALANT AND FIRESTOPPING

A. Sealant and fire stopping of sleeves and openings between ductwork, piping, etc. and the sleeve, structural or partition opening shall be the responsibility of the contractor.

B. Fire and/or Smoke Rated Penetrations:
1. Approved Manufacturers: 3M, Hilti, Rectorseal, STI/SpecSeal, Tremco, or equal.
2. All fire stopping systems shall be provided by the same manufacturer.
3. Fire stop systems shall be UL listed or tested by an independent testing laboratory approved by the State.
4. Use a product that has a rating not less than the rating of the wall or floor being penetrated.
5. Contractor shall use firestop putty, caulk sealant, intumescent wrap strips, intumescent firestop collars, firestop blocks, firestop mortar or a combination of these products to provide a UL listed system for each application required for this project. Provide mineral wool backing where specified in manufacturer's application detail.

C. Non-rated Penetrations:

 © 2026 B32 Engineering Group, Inc. All Rights Reserved

1. Pipe Penetrations Through Below Grade Walls. In exterior wall openings below grade, use a modular mechanical-type seal consisting of interlocking synthetic rubber links shaped to continuously fill the annular space between the uninsulated pipe and the cored opening or a water-stop type wall sleeve.
2. Pipe Penetrations. At pipe penetrations of non-rated interior partitions, floors and exterior walls above grade, use urethane caulk in annular space between pipe insulation and sleeve.

PART 3 - EXECUTION

3.01 INSPECTION

A. The Contractor shall notify the Engineer a minimum of seven (7) business days prior to the phases of work described in the Ice Rink General Requirements Section. Piping shall not be covered without notifying the Engineer.

3.02 EXCAVATION, INSTALLATION OF PIPE, AND BACKFILLING

A. The Contractor shall be responsible for verifying the location of all existing piping, electrical, and other utilities prior to excavation.

B. No changes to pipe alignment or elevation shall be made without approval from the Engineer.

C. All pipes shall be cleaned out prior to installation. Inspect pipe for defects and damage.

D. Buried piping shall be bedded in material recommended by the pipe manufacturer.

E. Decrease line size to pumps as required with long radius reducing elbows or concentric reducers/increasers in vertical piping. All valves and piping specialties must be full line size.

F. Excavation: All excavation and trenching shall be performed in accordance with all applicable OSHA regulations and recommendations, to the depths shown on the drawings, and to the tolerances specified in the table below. Contractor is responsible for prescribing and maintaining proper protective measures based on site conditions.

G. Backfilling: All excavated areas shall be backfilled as soon as possible but not before compaction tests have been taken and approved where required. Backfill materials shall be placed in lifts less than 12 inches thick, uniformly compacted and follow the requirements of the geotechnical report, if report is available. Backfill material for trenches within the building footprint or other structural areas shall be compacted to at least 100% standard moisture density relationship of soils to prevent settlement of the floor slabs. Care shall be taken while backfilling to protect the pipe from damage

H. Support all piping in such a manner as to prevent all vibration and vertical or horizontal movement. All pipe support systems shall be installed to meet local and state code requirements.

I. Provide all coring drilling required to install piping system through masonry or concrete walls, footings, screen walls, roof structures and other structures as required to install piping systems. Keep holes to minimal size.

J. Provide all pipe sleeves required for core drilled penetrations.

K. Relief lines and devices shall be terminated outside of the building in accordance with all current State and Local codes including minimum distance from ground level, openings and exits unless a containment tank is specified.

L. All refrigerant piping shall be installed, tested and placed in operation per these specifications and the state and local mechanical codes.

M. All pipe joints erected on site shall be exposed for visual inspection prior to being covered.

3.03 TESTING OF PIPING SYSTEMS

A. All testing shall be witnessed by the Owner Representative. Provide advanced notification to the Owner and Engineer as specified in Section 131811 - Ice Rink General Requirements.

B. All piping shall be tested prior to insulating and backfilling. Isolate all equipment and any other devices that may be damaged by the pressure test. Testing procedures shall meet all code requirements.

C. Testing Requirements:
1. Polyethylene Pipe: Shall be tested as specified in Section 131813 -Ice Rink Floor System.

 © 2026 B32 Engineering Group, Inc. All Rights Reserved

2. Steel Pipe (secondary refrigerant system): Shall be hydrostatically tested at 75 psig for 24 hours with no pressure drop.
3. Steel Refrigerant Pipe (Primary refrigerant system):
   a. Pressure Test: All refrigeration piping systems shall be pressure tested at the pressures stated in the table below with nitrogen gas for 24 hours with no pressure drop. The pressure shall then be lowered to 200 psig and maintained until system is ready to be charged. The test shall not begin until the Contractor is confident all water and contaminants are removed from the system. The Owner or Owner's representative (e.g. general contractor, construction manager, city inspector) shall witness the test.

Refrigerant	**Pressure (psig)**
Ammonia – High side	250 psi
Ammonia – Low side	250 psi

   b. Vacuum Dehydration: After the piping has been tested, a vacuum pump of adequate size shall be connected to the rink field and associated piping and allowed or run continuously until a vacuum reading of at least 1000 microns (29.882 in. vacuum) or lower is obtained. This test must be maintained with the pump valved off for at least ten (10) minutes. Provide an absolute pressure gauge for monitoring and use per the manufacturer's recommendations. The Engineer shall witness the test.
4. Gauges used for pressure tests must be designed for pressures greater than the test pressure. For example, a 100-psi gauge cannot be used for a 100-psi test. The scale on the gauge must be the next increment up from 100 psi.
5. Each test shall be documented on a separate form and include, at minimum, the following information:
   a. General project information such as name, dates, location, etc.
   b. Description of pipe section tested including start and end locations.
   c. Date of test including start date and time and end date and time and any required intervals in between.
   d. Time stamped photos of pressure gauge for start and stop times and any required intervals in between.
   e. Signatures of both the Ice Rink Contractor representative and the Owner's representative.

3.04 CHARGING OF SYSTEMS

A. Primary Refrigerant Systems: After all pressure tests and vacuum dehydration testing has passed, the system shall then be fully charged with the specified refrigerant.

B. Secondary Refrigerant Systems: After all pressure tests have passed the secondary refrigerant systems shall be fully charged with the specified solutions. Remove all air from the systems.

C. Waste Heat Recovery Systems: After all pressure tests have passed the waste heat recovery systems shall be fully charged with the specified solutions. Remove all air from the systems.

3.05 VALVES AND ACCESSORIES

A. Install valves at the locations shown on the drawings, described in the specifications as required for system operation and maintenance or as required by the manufacturer.

B. Install all valves so that they can be easily replaced in the future including installing unions and allowing adequate clearance.

C. Install isolation valves and unions required for isolation and servicing each piece of equipment and system components whether or not they are shown on the drawings.

D. Install purges and servicing valves on the systems as needed for operating and servicing the system.

E. Install all valves with adequate clearance around the valve for maintenance.

F. Install air release valves at all high points in the system whether or not shown on the drawings.

G. All pressure relief valves shall be located where ambient temperature is normally above 32 F. Pipe all pressure relief piping to within one foot of ice equipment room floor.

 © 2026 B32 Engineering Group, Inc. All Rights Reserved

H. Install valves for system drainage at all exposed low points in the system whether or not shown on the drawings.

I. Provide all power and electrical systems as necessary for operation.

J. Expansion tank shall be supported from the ceiling or supported with a floor mounted frame system with adequate supports and gauge glass placed in highly visible arrangement. Location to be approved by the General Contractor.

K. Construction strainers in suction diffusers shall be removed after system start-up.

L. Install thermowells for all temperature gauges.

M. Resistance Temperature Detector (RTD) Assemblies
   1. Piping system shall be drained and fluid stored for installation of threadolets to install wells and RTD probes. No hot taps allowed.
   2. For new projects, installation shall be done prior to installation of insulation systems. For renovation projects, remove pipe insulation as necessary for installation of wells and sensors. Reinsulate piping system with like materials to provide a sealed insulation system.
   3. Wire sensors directly to VFD's or other devices.
   4. Refill piping systems. Provide additional fluid as necessary for full system charge. Remove air from system.

N. 30 days after start-up the following shall be performed on the system:
   1. Replace filter dryer cores.
   2. Clean screens on pumps, strainers and other equipment.

3.06 GAUGES AND THERMOMETERS

A. All gauges and thermometers shall be installed at eye level wherever possible unless specified otherwise and shall be positioned for ease of reading by operation and maintenance staff. All gauges and thermometers shall be calibrated per the manufacturer's recommendations prior to installation.

3.07 HANGERS AND SUPPORTS

A. The Contractor is responsible for adequately supporting all piping systems and equipment with hangers, floor supports, framing systems and all other components required to adequately support the piping systems and equipment. If supported from the ceiling, the Contractor shall verify that the building structure can support the total weight of all piping and equipment systems where hangers and supports are installed unless otherwise noted on the drawings. If requested, the contractor shall provide calculations, by a registered engineer, to verify construction of hangers and supports is adequate including the building structure they are attached to.

B. Support all piping in such a manner as to prevent all vibration and vertical or horizontal movement.

C. Pipe hangers and supports shall be spaced no more than eight (8) feet on center. Provide additional supports by equipment for assistance with equipment maintenance and replacement. Provide sufficient supports near equipment so that temporary supports are not needed to remove and replace equipment or to service and maintain equipment.

D. All ground supports shall be located so that equipment, valves, etc. are fully accessible for easy maintenance and supports shall not impede the walkways.

E. Supports shall not be connected to factory provided framework for equipment.

3.08 INSULATION AND JACKETS

A. Furnish and install insulation and jacketing on equipment and piping as noted on the drawings and all other cold surfaces which are part of the system including, but not limited to, chilled water pump bodies, chilled water filter, chemical bypass feeder, etc.

B. Systems shall not be insulated until an inspection has been completed by the Engineer and pressure tests have been performed and accepted.

C. All valves, fittings, and accessories connected to pipe and equipment systems shall be insulated and jacketed. Provide handle extensions as required to allow full insulation of valves.

 © 2026 B32 Engineering Group, Inc. All Rights Reserved

D. Provide vapor barrier for all systems operating below 65 F.

E. Install all insulation and jacketing per manufacturer's recommendations. Use full length materials. Install insulation continuous through pipe hangers and supports with hangers and supports on the exterior of insulation. Where a vapor barrier is not required, hangers or supports maybe attached directly to piping with insulation completely covering hanger or support and jacket sealed at support rod penetrations. Where riser clamps are required to be attached directly to piping requiring a vapor barrier, extend insulation and vapor barrier jacketing/coating around riser clamp.

F. Install all jacketing on exposed exterior piping systems with joints at 3'oclock and 9 o'clock position and jacketing secured with specified banding and seals. Banding shall be installed at a maximum of 9" on center. End joints shall be secured with bands and seals centered directly over joint. Jacketing shall be installed in a manner to shed water and in accordance with the Midwest insulation Contractors Association (M.I.C.A) National Commercial and Industrial Standards. Jacketing shall be caulked before closing and banding and positioned in an orientation to avoid water infiltration.

G. All insulation joints shall be staggered and tight. Provide 2" minimum lap on jackets and 2" tape on butt joints, firmly and continuously cemented with lap adhesive or welding solvent as recommended by the manufacturer. Additionally, secure with staples along seams and butt joints. Coat staples with vapor barrier mastic on systems requiring vapor barrier.

H. Provide inserts and pipe shields at all hanger and support locations. Inserts may be omitted on ¾" and smaller copper piping provided 12" long 22-gauge pipe shields are used.

I. Insulate entire piping system for a completely insulated system including all areas that will frost up during operation. This includes filling all gaps, spaces, voids, etc. completely to prevent frost or condensation build up. This also includes providing valve handle extensions and all other material to properly insulate valves and prevent condensation. Insulation shall be tightly butted and free of voids and gaps. Weather seal shall be continuous.

J. All fasteners and bands shall be neatly aligned, and overall work must be of high-quality appearance and workmanship.

K. Provide removable insulated covers for fill valves, equipment lifting hooks, access points to strainers, valves, nameplates, and all other areas that require periodic inspection, service or repair.

L. All site glasses and nameplates shall be insulated to prevent frost build-up.

M. Provide all adhesive, sealants and other products as required by the manufacturer to provide a completely sealed system. Seal all seams of the jacketing.

3.09 SEALING AND FIRESTOPPING

A. All pipes piercing interior and exterior walls, ceiling, and floor shall be tightly sealed to the walls, ceiling and floors through which they pass as specified herein.

1. Fire and/or Smoke Rated Penetrations. Install approved product in accordance with the manufacturer's instructions where pipes penetrate a fire/smoke rated surface. When pipe is insulated, use a product which maintains the integrity of the insulation and vapor barrier. Where firestop mortar is used to infill large fire-rated floor openings that could be required to support weight, provide permanent structural forming. Firestop mortar alone is not adequate to support any substantial weight.
2. Non-Rated Penetrations. At all interior partitions and exterior walls, pipe penetrations are required to be sealed. Apply sealant to both sides of the penetration in such a manner that the annular space between the pipe sleeve and cored opening and the pipe or insulation is completely blocked.

3.10 PAINTING AND FINISHES

A. All interior steel piping, equipment, fittings, supports, and accessories that are exposed to view shall be painted with one coat of primer and one coat of enamel. Ammonia piping colors per IIAR Bulletin No. 114 March 2017. Prepare steel as recommended by the paint manufacturer. Colors shall be as outlined in table below:

Area or item	**Color**
Ammonia high pressure liquid lines	Orange (Pantone 152 C)

 © 2026 B32 Engineering Group, Inc. All Rights Reserved

Ammonia high pressure vapor lines	Yellow (Pantone 109C)
Ammonia low pressure/high temperature liq. & vapor lines (0F to +47.3F)	Light blue (Pantone 298C)
Ammonia low pressure/low temperature liq.&vapor lines	Dark blue (Pantone 3015C)
Pressure relief vent piping	Grey (Pantone 430C)
Other refrigerant piping and vessels	Color selected by Owner
Condenser water piping (refrigerant piping specified above)	Color selected by Owner
Interior supports and frames in refrigeration room	Color selected by Owner
All other areas not mentioned	Color selected by Owner

B. All exterior exposed steel piping shall be painted with one coat of primer and two coats of enamel. Prepare steel as recommended by the paint manufacturer. Owner to select color of paint.

C. Touch up paint on all equipment, vessels, supports and exposed pipes after project is complete.

D. Touch up damaged galvanized coatings and corrosion protection systems on condenser and remote sump.

END OF SECTION

 © 2026 B32 Engineering Group, Inc. All Rights Reserved

SECTION 13 18 15
ICE RINK WASTE HEAT RECOVERY SYSTEM

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. General system description and design criteria.

B. Pumps.

C. Heat Exchanger.

D. Expansion Tank.

E. Snowmelt Coil.

F. Circulation Fluid.

G. Pipe and Accessories.

1.02 GENERAL SYSTEM DESCRIPTION AND DESIGN CRITERIA

A. Provide all materials, equipment and controls necessary for a fully functional waste heat recovery system that recovers waste heat from the refrigeration system and uses it for heating the sub-floor heating system and for melting snow in the snow melt pit. The system shall be a closed piping system.

B. The snow melt pump will operate continuously circulating a glycol/water solution while the compressors are operating. The glycol temperature shall be controlled by a thermostatic solenoid valve which stops the flow of refrigerant through the heat exchanger when the desired temperature is reached. The solenoid control valve shall be capable of automatically controlling glycol temperatures over a range of 40 F to 100 F. The snowmelt pump shall automatically lock out when the compressors are not operating.

C. The sub-floor pump will be operated automatically by sensing the sub-floor temperature sensors in each rink floor as necessary to keep the soils beneath the ice rink slab between 32 F and 45 F. A temperature sensor and Honeywell T-775 controller should monitor the temperature of the glycol going to the sub-floor system. When the glycol temperature drops below 45 F (temperature setting shall be adjustable) the three-way valve shall modulate to allow more of the warmer glycol from the snow melt piping loop into the sub-floor piping loop until the desired glycol temperature and sub-floor temperature is satisfied. The sub-floor pumps shall automatically lock out when the compressors and snowmelt pump are not operating.

D. Preheat/Domestic Hot Water Heat Recovery System. Provide all primary refrigerant side materials, equipment and controls necessary for a separate, waste heat recovery system that recovers waste heat from the refrigeration system and uses it for preheating or heating domestic water for resurfacer water or other uses. The secondary side piping, materials and controls will be provided and installed under mechanical. Coordinate controls of secondary circulation pump with mechanical contractors. The glycol temperature shall be controlled by a thermostatic solenoid valve which stops the flow of refrigerant through the heat exchanger when the desired temperature is reached. The solenoid control valve shall be capable of automatically controlling glycol temperatures over a range of 40 F to 120 F. Pump shall be locked out when compressors are not operating

1.03 RELATED SECTIONS

A. Section 007200 - General Conditions.

B. Section 007300 – Supplementary Conditions.

C. Section 131811 - Ice Rink General.

D. Section 131812 – Ice Rink Refrigeration System.

E. Section 131813 - Ice Rink Floor.

F. Section 131814 - Ice Rink Piping, Valves and Accessories.

G. Section 131817 – ice Rink Central Control System.

 © 2026 B32 Engineering Group, Inc. All Rights Reserved

1.04 SUBMITTALS

A. Shop Drawings. All submittals shall conform to the requirements of General Conditions and Section 131811 - Ice Rink General Requirements.

1.05 WARRANTY/GUARANTY

A. As required in Section 131811 - Ice Rink General Requirements.

1.06 PRODUCT DELIVERY, STORAGE AND HANDLING REQUIREMENTS

A. As required in Section 131811 - Ice Rink General Requirements.

PART 2 - PRODUCTS

2.01 PUMPS (BASE MOUNTED)

A. Approved Manufacturers: Pentair Aurora Series 3800 Series, Xylem Inc. Bell and Gossett Series 1532, Armstrong, or equal.

B. Design Criteria: See Ice Equipment List on drawings.

C. Shall meet all requirements of the Rink Pumps in Section 131812 with the following exceptions:
   1. Shall be horizontal, base mounted or close coupled.
   2. Impellers shall be cast bronze, enclosed type.
   3. Wearing rings shall be bronze construction.

2.02 HEAT EXCHANGER (SHELL AND TUBE)

A. Approved Manufacturers: HT Industrial, Delta Tee, Docal, Isotherm, or equal.

B. Design Criteria: See Ice Equipment List on drawings.

C. Shell and Head Construction: Steel pipe construction conforming to ASME Specifications AS-53 Grade B, seamless or resistance welded; or rolled steel plate conforming to ASME SA-516 Grade 70 with electric fusion welds conforming to ASME Boiler and Pressure Vessel Code, Section VIII, Division 1.

D. Minimum design ratings on vessels shall be as follows:

Refrig.	Shell Side Pressure	Tube Side Pressure	Temperature Range
R-717	250 PSIG	150 PSIG	-20 F to 200 F

E. Tube Construction: Carbon steel with outer diameter of 0.75 inch and a minimum wall thickness of 0.065 inches. Fouling resistance shall be 0.0005. See table above for design pressure and temperatures.

F. Accessories: Provide a dual relief valve assembly as specified and per code requirements. Provide all valves, gauges, piping, electrical and other related materials and accessories as necessary for a fully operational system. Name plate shall clearly display code compliance and capacity of vessel.

G. Vessel shall be mounted on a steel frame system or ceiling mounted. The steel frame and vessels shall be shop painted with one coat of primer and one coat of alkyd egg-shell enamel.

H. All vessels must meet state requirements for national board registration.

2.03 HEAT EXCHANGER (DESUPERHEATER TYPE)

A. Approved Manufacturers: Opti-Stor by BouMatic, Fre-Heaters by Mueller, or equal.

B. Design Criteria: See Ice Equipment Schedule on drawings.

C. Minimum design ratings on vessels shall be as follows:

Refrig.	Refrigerant Side Pressure	Water Side Pressure	Temperature Range
R-717	426 PSIG	150 PSIG	-20 F to 200 F

D. Standard Size: 29.5” diameter x 62” high.

E. Weight: 440 pounds (Empty), 1,300 pounds (Filled)

F. Water Capacity: 119 gallons (nominal).

G. Insulation: 3” Closed Cell Foam Insulation

H. Material and construction: Dual circuit heat exchanger plate welded and expanded for internal refrigerant pressure, insulated glass lined storage tank, UL listed, high refrigerant capacity, ASHRAE 90

 © 2026 B32 Engineering Group, Inc. All Rights Reserved

standards, double wall protection, triple leak checked, shipped with Nitrogen dioxide holding charge, tank is dual anode protected against corrosion, stainless steel exterior, provisions for equalization lines.

I. Accessories: Provide a pressure and temperature relief valve meeting code requirements. Provide all valves, gauges, piping, electrical and other related materials and accessories as necessary for a fully operational system. Name plate shall clearly display code compliance and capacity of vessel.

2.04 EXPANSION TANK

A. Approved Manufacturers: Aurora, Xylem Inc. Bell and Gossett, John Wood Company, Cimco, or equal.

B. Capacity: See Ice Equipment List on drawings.

C. Materials: Minimum pressure rating of 125 psig in accordance with Section VIII, Division 1, of the ASME Boiler Pressure Vessel Code, and registered with the National Board of Boiler Pressure Vessel Inspectors.

D. Accessories: Gauge glass equal in construction to Henry Valve Co. Type 824. Air control fitting equal to Xylem Inc. Bell and Gossett tank fitting and ATFL including brass vent tube plug and stainless-steel ball check.

E. Tank shall be painted with one coat of primer and one coat of enamel.

2.05 SNOW MELT COIL

A. Fabricate coil from 2" and 2.5” Schedule 10 304L stainless steel pipe and fittings as shown on the plans. All connections shall be welded except for the flanged connection at the pit wall.

B. Pipe supports shall be 3” high 304L stainless steel square stock, spaced at 3’ on center to support the snow melt coil. If the snow melt pit is specified with a membrane liner, pipe supports shall be steel tubing, all edges shall be rounded to prevent puncturing liner and supports shall be tack welded to coil.

C. Verify size of snow melt pit and location of drain pipe prior to fabricating the coil.

2.06 CIRCULATION FLUID

A. Furnish and install a complete charge of 35% inhibited ethylene glycol and deionized water.

B. Approved Manufacturers: Dow Chemical Company Dowtherm SR-1 or equal.

C. The ethylene glycol solution shall be an industrial heat transfer fluid specifically designed for use in HVAC systems and shall conform to the following properties:

Specific Gravity	1.064 @ 15 F
Viscosity	7.50 @ 15 F
Freezing Point	-4.3 F
pH	8.0 to 9.2
Density	66.37 lbs./cf @ 15 F
Specific Heat	0.828 BTU/lb. F@ 15F
Thermal Conductivity	0.23 BTU/hr.-ft F @15F

D. The deionized water shall conform to the following properties in maximum allowable concentrations:

Calcium Carbonate Hardness	100 ppm
Calcium plus Magnesium Ions	50 ppm
Chloride plus sulfate Ions	50 ppm

E. The solution shall have a factory mixed corrosion inhibitor or neutralizing agent.

F. Provide a weather resistant tag on the fill valve for the system that includes description of fluid, freezing and burst point, total gallons of system, Material Safety Data Sheet reference and date of original charge.

G. Provide a certified test result of the final solution.

2.07 PIPING AND ACCESSORIES

A. Provide all piping, thermometers, gauges, valves, insulation, controls, electric as required for a complete system, as shown on the drawings, and as specified in Section131814 - Ice Rink Piping, Valves and Accessories.

 © 2026 B32 Engineering Group, Inc. All Rights Reserved

PART 3 - EXECUTION

3.01 INSTALLATION

A. Install, test and start up equipment, piping, valves, insulation, etc. as specified in Sections 131813 - Ice Rink Floor, 131812 - Ice Rink Refrigeration System, and 131814 - Ice Rink Piping, Valves and Accessories.

B. Verify with General Contractor prior to mounting piping, tanks, heat exchangers, to walls or ceiling in ice mechanical room.

C. Provide all controls and electrical work as required for a complete operating system.

3.02 START UP AND SHUTDOWN SERVICES

A. See Section 131811 - Ice Rink General Requirements.

END OF SECTION

 © 2026 B32 Engineering Group, Inc. All Rights Reserved

SECTION 13 18 16

ICE RINK DASHER BOARD SYSTEM AND ACCESSORIES

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Quality assurance - prequalification criteria.

B. Approved manufacturers.

C. Dasher board system materials.

D. Floor anchors.

E. Advertisement panels.

F. Accessories (netting, tools, pegs, carts, edger, etc.).

1.02 QUALITY ASSURANCE

A. Contractors wishing to bid/quote on this project must submit, with their bid, the following prequalification criteria.

1. Submit a list of five (5) ice rink construction projects the company has completed that are similar to this project and that were completed within the past five (5) years. Submittal shall be on company letterhead, signed by an authorized representative of the company and include project description, portion of project completed by the company, location, construction cost, completion date, owner's name, owner's representative, phone number and completion date of work.
2. Contractors/manufacturers listed as approved manufacturers in section 2.1 are not required to submit the prequalification material described in paragraph A.1 of this section.
3. Contractors/manufacturers seeking approval shall supply a sample panel section representative of all components to be used in the dasher board section if requested by the Owner.

B. Contractors wishing to bid on this project shall perform an on-site investigation prior to submitting a bid for the project. Contractor shall field verify all measurements that will affect the work of this project and report any concerns to the Engineer at least five (5) business day prior to the bid opening date. The contractor shall also perform a site visit to verify measurements prior to manufacturing the system.

1.03 RELATED SECTIONS

A. Section 007200 - General Conditions.

B. Section 007300 - Supplementary Conditions.

1.04 CODES AND STANDARDS

A. All parts of the project shall be performed in accordance with the most recent version of the following codes and standards and all amendments:

1. State Building Codes.
2. National Fire Protection Association Codes.
3. OSHA.

1.05 SUBMITTALS

A. Shop Drawings. All submittals shall conform to the requirements of the General Conditions. Shop Drawings shall include product information on all materials, color samples of all standard colors for top sill, facing, kick plate, backer panels, benches, and tables. Shop Drawings shall clearly highlight and note any materials, dimensions, etc. that do not match the contract documents. Samples shall be representative of thickness of material that will be supplied.

B. Structural Calculations: If requested, the manufacturer shall supply structural engineering calculations for the dasher board system.

C. Progress Schedule. Submit progress schedule before project begins.

D. Certifications. Submit four (4) copies of certifications to the Engineer when specified.

E. Project closeout documents:

 © 2026 B32 Engineering Group, Inc. All Rights Reserved

1. Provide all documents required by the General Conditions and these specifications.

F. Payments for all submittals shall be incidental to the cost of the project.

1.06 WARRANTY/GUARANTY

A. In addition to the standard manufacturer's warranty on all equipment and materials, the contractor shall provide a standard two-year materials and labor warranty on all work performed for this project.

1.07 PRODUCT DELIVERY, STORAGE AND HANDLING REQUIREMENTS

A. Transport, handle, store and protect products in accordance with manufacturer's recommendations. Secure products at all times.

B. Store products with seals and labels intact and legible.

C. Store products in a secure environment at all times.

D. Provide adequate labor to handle products and prevent damage.

E. Protect top sill from becoming scratched or marked up during installation.

PART 2 - PRODUCTS

2.01 APPROVED MANUFACTURERS OF DASHER BOARD SYSTEM

A. Becker Arena Products/Sports Systems/Athletica/Cascadia, Rink Systems, Riley Manufacturing, Welmar Group or others by prior approval.

2.02 FRAME

A. All dasher panels whether straight, curved or gated shall have the same design and similar construction. Panels shall be all welded construction.

B. Standard Sizes:

Panel Section	Height	Length	Width
Straight	41”	96”	6”
Curved	41”	88”	6”
Back of Players Boxes	See plan	96”	6”

C. Materials:
1. Aluminum: Shall be structural alloy 6005A-T6. Architectural alloy is not acceptable. Shall meet ASTM B221 and Federal Specifications QQA200-9.
2. Systems shall be constructed with either aluminum or steel materials, not a combination of the two.

D. Components: See drawings.

E. Connections: Panels shall be fastened together through end plates at a minimum of three (3) locations with 1/2" diameter (minimum) bolts.

F. Other Supports: Provide additional supports where required and to accommodate systems such as quick release backer panels, gap closures, material, taller panels, etc.

G. All holes used in the framing system shall be pre-punched with slotted holes to allow for expansion and contraction in the polyethylene materials.

H. Systems that require external support posts on the back side of the dasher panel section are not acceptable unless specified or noted on the drawings.

I. Lift Out Panels:
1. Modify dasher board framework to provide lift out panels in locations shown on the drawings. All materials and construction to meet the requirement of these specifications.
2. Provide one (1) aluminum stair and railing section for each floor access lift out panel.
3. Verify threshold height with adjacent bleacher or concrete sections.

2.03 SHIELDING

A. Shielding shall be as specified herein and shown on the drawings.

B. Tempered Glass Material: Shall be clear float tempered glass. Material shall conform to CAN/CGSB-12.1-2022, Type 2 or equivalent. All edges shall be ground or beveled to minimize breakage.

 © 2026 B32 Engineering Group, Inc. All Rights Reserved

C. Dimensions:
1. Height of shielding: As shown on the drawings. Specified height of shielding shall be measured from top of top sill to top of shielding.
2. Thickness of shielding in inches: As shown in table below with nominal dimensions shown in ():

Type	Sides	Ends	Radius
Acrylic	0.545-0.620	0.545-0.620	0.545-0.620
Glass	0.472 (1/2)	0.591 (5/8)	0.591 (5/8)

3. All shielding shall be equal widths wherever possible, so the panels are interchangeable.
4. The top two corners of each piece of shielding shall be rounded to ½" radius.

D. Other:
1. Provide one (1) 2.5" diameter speaker hole(s) in shielding in front of scorer's box. All edges of hole shall be routed smooth.
2. Provide transition (angled top edge to match height of adjacent shielding pieces of shielding) where two different height shielding meet as shown on the plans.
3. Provide extra pieces of shielding as stated below. Thickness to match specifications for specified area.

Location	Height (inches)	Material	No. of Pieces
Seamless system	72	Tempered glass	2
Support system	72	Tempered glass	2
Support system	96	Tempered glass	2
4' Access gate	72	Tempered glass	1
3' Access gate	72	Tempered glass	1
Equipment gate	72	Tempered glass	1
Emergency Repair	72	0.591" thick Acrylic	2
TOTAL			**11**

4. Curved Acrylic Safety/Termination Sections (Main Rink Only). Provide two (2) + one (1) extra curved acrylic safety/termination shielding sections for termination points at each end of player's boxes. Shall be same material and height as adjacent shielding. Shall be spring loaded to allow movement.

2.04 SHIELDING SUPPORTS

A. Material: Shall be structural alloy 6005A-T6 conforming to ASTM B221 and Federal Specifications QQA200-9 or architectural alloy 6061-T6.

B. As specified in Article 2.02 – Frame, in this Section.

C. Construction:
1. Supports:
a. Between Shielding: Two-piece design with ice side piece to have a flat face. Round construction on ice side will not be accepted. Shall be quick release assembly.
b. End/Terminations: One-piece channel design at all glazing terminations, gates, and 90-degree corners.
c. Finish: Manufacturer's standard 202R1 clean anodized finish.
d. Supports shall fit snuggly through top sill and secured at bottom of the middle stringer as shown on the drawings.

D. Gaskets: Continuous polyethylene gasket shall be provided to hold shielding in place. Thickness of gasket shall vary for varying thickness of shielding to provide snug fit between the shielding and the support.

E. Hardware: All hardware shall be made of extruded aluminum alloy 6005A or 6351-T-6. All fasteners shall be recessed flush with surface of support. All fasteners and hardware shall be removable for easy replacement of shielding and disassembling for removal and reinstallation.

 © 2026 B32 Engineering Group, Inc. All Rights Reserved

F. Height: As indicated on the drawings or 1" max. distance below top of shielding if not indicated on the drawings.

G. Spacing: Nominally 4'-0" on center.

H. Other: Eye bolts shall be provided on each support on ends and radius for connection of netting.

I. Provide 3 extra Polycarbonate H sleeves for each different height of shielding.

2.05 SUPPORTLESS SHIELDING SUPPORT CHANNEL

A. Material:
   1. Aluminum: Material shall meet ASTM B221, Federal Specification QQA200-9 and alloy 6005A or alloy 6351-T-6.
   2. Polyethylene: Material shall be requirements of Section 2.3.

B. Construction: Continuous aluminum channel(s) to support glass welded into frame. The bottom 3 -1/2" minimum of tempered glass shall be covered with U-shaped gaskets inserted in channels. A continuous block of polyethylene may be substituted for the aluminum channel.

C. Gaskets: Continuous polyethylene or equal gasket to hold shield in place. Gaskets shall be mounted to glass with adhesive tape.

D. Hardware: All hardware shall be made of extruded aluminum alloy 6005A or 6351-T-6. All fasteners shall be recessed flush with surface of support. All fasteners and hardware shall be removable for easy replacement of shielding and disassembling for removal and reinstallation.

E. Other:
   1. Provide system to continuously support netting below top of shielding.
   2. The gap between the glass shielding pieces, where there are no gates, shall be 1/4" to 3/8".
   3. Furnish and install spring-loaded Lexan clip assemblies at the top of the shielding to connect shielding sections together. Provide poly protection covers for each bolt on back of each assembly. Provide eight (8) extra clips and twenty (20) extra covers for the Owner's use.
   4. Furnish and install plastic spacers between the shielding panels for proper spacing.
   5. Furnish and install shielding supports as specified in Article 2.8 at doors and 90-degree corners.

2.06 POLYETHYLENE

A. Material: High impact, high density, stress relieved, virgin polyethylene. Reprocessed polyethylene is not acceptable.

B. Dimensions: See drawings.

C. Colors:
   1. As stated in material schedules on drawings. "Owner" means color shall be selected by Owner from the standard colors of white, black, royal blue, red, gold, yellow. It does not include the premium colors of light blue, green, navy blue, and some shades of grey or custom colors.
   2. All like colors shall match.
   3. White: Shall be Bright white in color. Natural white is not acceptable.

D. Fasteners: See Article 2.07 in this section.

E. Top Sill:
   1. Dimensions – see drawing.

F. Kick Plate:
   1. Shall be fastened to facing of dasher board system.

G. Facing Panels:
   1. Shall be one piece, cut to match dimension of frame.
   2. Line Markings:
      a. Shall be installed at locations shown on the drawings and shall be installed flush with dasher board facing.
      b. Facing shall be routed ¼" deep so ¼" colored line marking material can be inserted into facing panel.

 © 2026 B32 Engineering Group, Inc. All Rights Reserved

H. Backer Panels:
1. Shall be one piece, cut to match dimensions of frame.
2. In the player's and penalty boxes, backer panels shall cover all exposed framing, including access gates, and shall only be cut out for water bottle shelf opening.
3. Back panels shall cover all exposed end plates of framing systems for backwalls, open accesses without gates, and official box side walls. Extend cap rail at these locations for flush installation.
4. Provide polyethylene trim pieces (H Mullion) between each section of back panel. Color shall match panel.
5. Quick Release System.
   a. Install a quick release system on all backer panels.
   b. System shall allow panels to be removed without removing fixed fasteners by using three spring latches at the top of the framing per panel.
   c. Spring latches shall be accessed through a ¼" access hole in top sill.
   d. A zinc plated bracket shall secure backer panel at the base of the framing system.
   e. Provide an extra 1 ½" x 3" support welded to dasher frame at mid-point to support quick release backer panels.

I. Officials Table
1. Shall be one piece.
2. Shall be fastened to dasher board system on three side.

J. Thresholds:
1. Thresholds for equipment gates shall be constructed of a metal frame and a polyethylene top piece. Frame height shall be as required to provide an overall height shown in the table on the drawings. See drawings also for thickness of polyethylene. Frame material shall meet the requirements of Article 2.02 and polyethylene shall meet the material requirements of this article.
2. All equipment gate thresholds shall be easily removable for dry floor event access and for easy replacement.

2.07 FASTENERS FOR POLYETHYLENE

A. The fasteners specified in this article shall be used for securing the facing, backing, top sill and kick plate materials.

B. Material:

Framing Material	Fastener Size and Type
Aluminum	¼ "-20 Type F zinc – self tapping, color to match poly material
Steel	¼" Phillip flat head machine screw, flat washers, ¼" nylon insert lock nuts

C. Construction:
1. The heads of the screws shall be painted to match the facing color.
2. Fasteners for bottom row of kick plate shall be stainless steel. For outdoor rinks, all fasteners shall be stainless steel.
3. Spacing shall not exceed 10 inches on center.
4. Screw holes in poly material shall be large enough to allow for expansion and contraction.
5. Thresholds: All fasteners on thresholds shall be counter-sunk ½".

2.08 PLAYERS, PENALTY, SCORER, CAMERA BOXES

A. Dimensions: As shown on the drawings.

B. Framing Systems: Shall be constructed of same material as the dasher frame, conforming to material requirements of Article 2.02, and as shown on the drawings.
1. Components: See drawings.
2. Benches shall be constructed so that they can be easily removed including tube supports built into flooring to support the bench supports.

C. Flooring. Shall be constructed with 3/4" fire treated plywood screwed to framing. Provide coaches walk as shown in the drawings for the full length of the player's benches. All exposed surfaces shall be covered with 1/2" black resilient flooring material as manufactured by Humane or equal.

 © 2026 B32 Engineering Group, Inc. All Rights Reserved

D. Scorers Box Table(s) and Benches:
   1. Provide table(s) and benches with dimensions shown on the drawings.
   2. Framing material as specified in this article.
   3. Bench material as specified in Article 2.07 of this specification. Thickness as specified on the drawings.

E. Fasteners: Fasteners that come in contact with pressure treated or fire-retardant treated wood shall be hot-dipped galvanized steel with a minimum rating of G-185 (1.85 oz. of zinc/sq.ft. of metal) meeting ASTM A153, stainless steel, or silicon bronze as required by the International Building Code Section 2303.1.8.5. Plain finish elsewhere. Electroplated galvanized fasteners shall not be used for exterior applications. Fasteners for benches shall be 3/8" carriage bolts.

F. Backing: Specified in Article 2.07 of these specifications.

G. Other: Incorporate a water bottle shelf in player's and penalty boxes as shown on the drawings. Shelf shall run full length of player's box. Material thickness as shown on the drawings. Color of shelf material shall be white to match color of backer.

2.09 PLAYERS AND ACCESS GATES

A. Provide access and players gates with openings as shown on the drawings.

B. Gates shall be integrated into the standard 8' long panel sections and shall be Left or right swing as directed by the Owner.

C. Gate panel framing shall be similar construction as dasher framing.

D. Gate Latches: Shall be solid, steel welded construction, with a single 3/8" thick x 2" wide steel flat bar, easily opens with glove hand. Fastened to framing with 3/8" x 1 ¼" hex head bold and 3/8" nylon locking nut. Shall latch by gravity and latch on their own when gate is closed.

E. Gate Hinges: Shall be two lift off type hinges welded. All hinge assemblies shall have grease fittings for easy lubrication or use nylon bushings. Piano type hinges, 10 GA, non greasable, bolted to frame, are acceptable where shielding is not used. Hinges shall be adjustable.

F. Doorstop: All gates shall have a steel door stop welded to the frame with minimum dimensions of 3/8" x 3 ½" x 4 ½ long".

G. Ice Side Release Devices: All players and access gates with shielding shall have push button releases located on in the top sill, on the ice side, so that the gate can be opened from the ice side.

H. Finger hold: Route a 3/8" deep x 3/4" wide area in top sill at all access gates with glass shielding to be used as a finger hold to close doors from the ice side of the board system.

I. Gate shall be constructed so top of threshold is located as follows:

Type of Gate	Distance Above Finished Floor (in)
Players	9
Access	3
Equipment	2

J. Casters: For gates over 42" wide, provide 5" diameter, spring loaded, adjustable, zinc plated framing, polyurethane tires. Provide casters on each leaf.

2.10 EQUIPMENT GATES (STANDARD)

A. Shall be double leaf gates with opening sizes as shown on the drawings.

B. Materials: Framing materials to meet requirements of Article 2.02 of this specification and be of similar construction.

C. Latch: Shall be the sliding steel tube with minimum dimensions of 2 ¼" x 2 ¼" x 12 gauge or 2" diameter solid steel rod with large handle (push down). Zinc plated all components. Provide two (2) latches per gate.

D. Lock: Each leaf of gate shall lock into concrete perimeter slab with 3/4" diameter x 12" long solid steel, zinc plated cane bolts.

 © 2026 B32 Engineering Group, Inc. All Rights Reserved

E. Hinges: Zinc plated, heavy duty, manufactured using 3/8” thick steel components and ¾” minimum diameter hinge pins, adjustable, lift off type welded to frame. Shall have grease fittings for easy lubrication. Two hinges per door.

F. Casters: 5” diameter, spring loaded, adjustable, zinc plated framing, polyurethane tires. Provide casters on each leaf.

G. Fasteners: Shall be zinc plated and color to match where necessary.

2.11 GAP CLOSURES

A. Furnish and install material to fill the gap between the back of the dasher board panel and the bleachers, stairs, ramps, and all other raised structures.

B. Material:
1. Polyethylene: 3/8” thick x 3” x 3” angle x width shown on drawings. Length of each piece shall be minimum of 8 feet or longest possible for area of application. Material shall be high impact, high density, stress relieved, virgin polyethylene. Reprocessed polyethylene is not acceptable. Router top edge on opposite side of the bleachers to provide a radius. Furnish and install all additional framing and supports required for fastening to dasher framing and for solid support over gap length. Framing and support material shall match dasher panel framing material. Color selected by Owner from standard colors of white, gold, dark blue, light blue, red, green and yellow. The color of all material shall match.

C. Fasteners: See Article 2.07 in this section.

D. Construction: Gap closure system shall be mounted to the dasher board system only and not to the adjacent structure.

2.12 FLOOR ANCHORS AND INSERTS

A. Anchors components include bolts, inserts, washers, threaded rod, and hold down plate as shown on the drawings and as follows:
1. Where dasher board system is located on the perimeter concrete: New holes shall be drilled for each anchor. Anchors shall be 5/8" x 3” zinc plated inserts by Hilti-HFA 200, Hilti HY 150, or equal. Expansion anchors are not acceptable.
2. Where the dasher board system is located on the ice rink slab: Anchor assembly shall be as detailed on the drawings or equal and shall be cast in place into the concrete ice rink floor. If material type is not shown on the drawings, then insert material shall be:
   a. For removable panels: Anchor inserts, and washers shall be 303 stainless steel, base plate may be 303 Stainless steel or carbon steel and bolts shall be zinc plated material.

B. Bolts shall be 5/8” diameter. Material shall be as stated herein.

C. Hold down plate shall be sized as shown on the drawings.

D. Anchoring Adhesive (for drilled in anchors)
1. Approved Manufacturers: Hilti HIT Doweling Adhesive HIT HY-150 MAX, Red Head A7 Adhesive, Simpson Strong-Tie AT-High Strength or equal.
2. Properties:
   a. ASTM C881 Type IV, Grade 3, Class A, B, C.
   b. Bond Strength: ASTM C 882: 2900 psi min. at 2 days.
   c. Compressive Strength: ASTM D 695: 9200 psi min. at 7 days.
   d. Water Absorption: ASTM D 570: 0.23% (24 hours).

E. Plug Materials: Furnish and install threaded plugs for each insert. Stainless steel for the circus inserts and brass for the dasher board inserts.

2.13 ADA PLATFORMS AND RAMPS

A. All ramps and platforms shall be constructed with the same materials as Player’s, Penalty and Scorer’s boxes. All ramps shall be covered with rubber flooring as specified for the Player’s Penalty and Scorer’s boxes.

B. All ramps and platforms shall be easily removable and storable.

 © 2026 B32 Engineering Group, Inc. All Rights Reserved

C. Coordinate railing requirements with architectural details.

2.14 PROTECTIVE SPECTATOR NETTING SYSTEM

A. Size and Location: Netting shall be installed where shown on the drawings. The netting shall extend from 6” below the top of the shielding supports to the height specified on the drawings. The net shall be custom made to fit the exact length and height required.

B. Material:
1. Nylon. #420 knotless High Tenacity Polypropylene (HTPP) Pylon, 1 1/2" square mesh x 1.8mm twine, 125 lb. minimum break strength, UV and weather resistant and treated with fire retardant coating. Perimeter edging shall be reinforced vinyl, double sewn with #2 brass grommets. Grommets locations shall be a maximum of 24" on center. Color will be black as selected by the Owner.

C. Support System:
1. The top of the netting shall be supported with a continuous rigid conduit or rigid bar system (10-foot minimum length sections) formed to the radius dimensions of the rink. Rigid supports shall be installed at the bottom of the netting at all equipment and access gates. Conduit supports shall be galvanized steel.
2. Support Cables: 3/16" galvanized steel cable to roof structure.
3. Fasteners: Netting shall be attached to top of shielding with cable system and nylon tie straps or metal clips (Main Rink shall be metal clips). Every 4’ o.c., centered on each sheet of shielding, cable shall be attached to shielding with suction cups if supportless shielding, fasteners shall be attached to poly clips at top of shielding. Nylon ties shall be 1/8" wide, UL recognized and a minimum tensile strength of 100 lbs.
4. Provide all other cables, clamps, turnbuckles, eyebolts, suction cups, plastic ties, etc. as required for a complete, clean and neat installation.

2.15 ACCESSORIES

A. Glass Handler Suction Cups.
1. Furnish one (1) pair of suction cup devices for glass handling to aid in removal of tempered glass or acrylic shielding, 8” diameter with Lexan handle, 125-pound capacity as manufactured by Wood’s Power Grip or equal.

B. Glass and Acrylic Cleaning Kits as manufactured by Novus (www.novuspolish.com, 800.548.6872) or equal:
1. Furnish one (1) cleaning starter kit that includes the following:
a. One (1) 8 oz. bottle of Polish 1 - Clean and Shine.
b. One (1) 8 oz. bottle of Polish 2 - Fine Scratch Remover.
c. One (1) 8 oz. bottle of Polish 3 - Heavy Scratch Remover.
d. Two (2) NOVUS Polish Mates
2. Furnish one (1) package of ten (10) polish mates:
a. Size: 13” W x 13” L each.
b. Re-usable and washable.
c. Microfilament, highly absorbent, extra durable.
d. soft and abrasion resistant.

C. Glass Storage Cart.
1. Provide two (2) glass shielding storage cart(s)
2. Size: Large cart (52-inch-wide x 94 inches high x 102-inch-long) Small cart (52-inch-wide x 58 inches high x 60 inch long)
3. Construction: 4,800 lb minimum, steel “A”-frame, heavy duty construction, two rigid and two swivel wheels, and towing tongue and pull handle on each end of cart. Assemble cart(s) for Owner.
4. Accessories: Provide two (2) ratchet strap assemblies with each cart.

D. Board Storage Cart.
1. Provide two (2) board storage cart(s), 60” wide x 60” high x 94” long.

 © 2026 B32 Engineering Group, Inc. All Rights Reserved

2. Construction: 4,000 lb minimum, steel frame, heavy duty construction, end rails, plywood deck, two rigid and two swivel wheels. Shall have 5" diameter wheels rated for 2,000 lb load each. Carts shall be stackable. Assemble cart(s) for Owner.
3. Finish: One coat of primer and two coats of finish paint.
4. Accessories: Provide two (2) ratchet strap assemblies with each cart.

E. Glass Handling Device.
1. Model P1-1104 power frame or equal.
2. Lift Capacity: 700 lbs minimum.
3. Unit shall tilt from vertical to flat position as well as 180 degrees of edgewise rotation. Unit shall be equipped with four suction cups and a push-button switch for operation.
4. Provide forklift attachment assembly.

F. Shielding Pads.
1. Furnish and install shielding pads at all exposed ends of shielding or supports, corners, and termination of shielding.
2. Pads shall full length of shielding or supports and shall be constructed with heavy duty 18 oz. reinforced fabric sleeve with impact-absorbing foam core sealed inside. Pads shall be secured in place with 2" wide Velcro fastening system.
3. Color: Owners shall select color of pads from the manufacturer's standard colors of red, navy, orange, gray, tan, green, burgundy, yellow or black.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Prior to delivering materials to the site and beginning installation, verify that the rink floor has been released for lift access and that the expansion joint has been installed and inspected.

B. The manufacturer shall provide all materials and labor for a complete dasher board system and installation. The dasher board system shall be shop fabricated as much as possible prior to delivering to job site.

C. Installation shall be completed under the direct supervision of an experienced representative from the manufacturer.

D. Installation shall be performed per the manufacturers recommended requirements and instructions. System shall be securely anchored in place. Provide all trim, shims and other accessories required for a complete, level and plumb, installation.

E. Any material that is scratched, marked up, chipped, dented or damaged in any way shall be replaced.

F. All parts of the system shall be thoroughly tested and adjusted, as necessary. Walk through the system with the Owner and make all adjustments necessary for the Owner's satisfaction.

G. Nylon ties used to attach netting at top of shielding and elsewhere shall be cut off or trimmed in such a manner, and with the appropriate tools, to eliminate all sharp edges.

H. All supportless shielding systems shall be installed with a maximum 3/8" wide space between any two pieces of shielding.

I. All top and sides edges of exposed polyethylene caprail, backer panel, end covers ends shall be rounded.

3.02 ANCHORS AND INSERTS

A. The dasher board manufacturer shall be on-site prior to and during the concrete rink floor pour to install, protect and adjust the anchors and inserts when the dasher board system is being installed on the rink floor.

B. Field verify the location of goal inserts in the concrete floor (if applicable) to assure alignment with the goal line markings on the dasher board system.

3.03 RESILIENT FLOORING IN BOXES

A. Cut rubber flooring to fit neatly and tightly around fixed objects and perimeter. Provide flush surfaces at sills and gates. Flooring to be loose laid over plywood substrate on the main box level. Flooring to be

securely fastened on coaches raised platform and other raised floor levels within the box areas. All other exposed aluminum or steel to be covered by rubber flooring (horizontal surfaces) or poly (vertical surfaces).

3.04 CLEANING

A. Clean all surfaces thoroughly prior to leaving the job site. The systems shall not be cleaned until all punch list items have been addressed.

3.05 START-UP SERVICES

A. After all systems have been tested and thoroughly cleaned provide the Owner's operating staff with a minimum of 2 hours of hands-on instructions on the operation and maintenance of the system.

3.06 COORDINATION OF WORK

A. The contractor shall be responsible for coordinating all work specified herein and shall work closely with other subcontractors on the project.

3.07 PERMITS

A. The contractor shall apply for and obtain all permits required to construct the project at no additional cost to the Owner unless specified otherwise.

END OF SECTION

 © 2026 B32 Engineering Group, Inc. All Rights Reserved

SECTION 13 18 17
ICE RINK CENTRAL CONTROL SYSTEM

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. This section includes labor, materials, equipment, skills and related services necessary to furnish and install an ice rink control system (IRCS) for the ice rink refrigeration system.

B. General Requirements

C. General System Description and Design Criteria

D. References

E. Submittals

F. Warranty

G. Products, Delivery, Storage and Handling Requirements

H. Products

I. Execution / Performance

1.02 RELATED SECTIONS

A. Division 0, Division 1, General and Supplemental Conditions

B. Section 131811 – Ice Rink General Requirements

C. Section 131812 – Ice Rink Refrigeration System

D. Section 131815 – Ice Rink Waste Heat Recovery Systems

E. Drawing Sheets show locations and quantities of equipment for the refrigeration system.

1.03 GENERAL REQUIREMENTS

A. All work of this Division shall be coordinated and provided by the single Ice Rink Control System (IRCS) Contractor.

B. The work of this Division shall be scheduled, coordinated and interfaced with the associated work of other trades. Reference the other Division 13 Sections for details.

C. The work of this Division shall be as required by the Specifications, Point Schedules and Drawings.

D. If the IRCS Contractor believes there are conflicts or missing information in the project documents, the Contractor shall promptly request clarification and instruction from the Engineer.

E. Provide connection points to collect and manipulate data from power monitoring device specified in Section 13 18 12 Ice Rink Refrigeration System.

F. The IRCS Contractor is responsible for the design of the control system.

G. The refrigeration system shall have sufficient manual controls to allow the system to operate without the computer control system if the computer control system fails.

1.04 GENERAL SYSTEM DESCRIPTION AND DESIGN CRITERIA

A. The Ice Rink Control System (IRCS) shall be a complete system to operate the ice rink refrigeration system and all its functions and monitoring requirements and include the following:
   1. An 18” (minimum size) touch screen microprocessor control system to control and manage the refrigeration system and all its components, functions and alarms.
   2. The capability of remote access through an Owner provided data/phone circuit. Contractor to supply phone line to unit. Owner will supply any data lines required for connection with building management, energy management or IT systems.
   3. Provide all control and monitoring points and alarms to the Building Management System (BMS) or Energy Management System (EMS) as specified elsewhere.

 © 2026 B32 Engineering Group, Inc. All Rights Reserved

B. The work of the single IRCS Contractor shall be as defined individually and collectively in all Sections of Division 13 of these specifications together with the Drawings.

C. The IRCS work shall consist of the provision of all labor, materials, tools, equipment, software, software licenses, software configurations and database entries, interfaces, wiring, tubing, installation, labeling, engineering, calibration, documentation, samples, submittals, testing, commissioning, training services, permits and licenses, transportation, shipping, handling, administration, supervision, management, insurance, temporary protection, cleaning, cutting and patching, warranties, services, and items, even though these may not be specifically mentioned in these Division documents which are required for the complete, fully functional and commissioned IRCS.

D. Provide a complete, neat and workmanlike installation. Use only manufacturer employees who are skilled, experienced, trained, and familiar with the specific equipment, software, standards and configurations to be provided for this Project.

E. The IRCS shall be integrated with the refrigeration system's specified motor control center (MCC) and shall be located in a wall mounted, NEMA rated, steel enclosure.

1.05 REFERENCES

A. In addition to the references listed in Section 131811 - Ice Rink General, all work shall conform to the following Codes and Standards, as applicable:
1. National Fire Protection Association (NFPA) Standards.
2. National Electric Code (NEC) and applicable local Electric Code
3. Underwriters Laboratories (UL) listing and labels.
4. UL 864 UUKL Smoke Control
5. UL 268 Smoke Detectors.
6. UL 916 Energy Management
7. NFPA 70 - National Electrical Code.
8. NFPA 90A - Standard For The Installation Of Air Conditioning And Ventilating Systems.
9. NFPA 92A and 92B Smoke Purge/Control Equipment. Factory Mutual (FM).
10. American National Standards Institute (ANSI).
11. National Electric Manufacturer's Association (NEMA).
12. American Society of Mechanical Engineers (ASME).
13. American Society of Heating, Refrigerating and Air Conditioning Engineers (ASHRAE)
14. Air Movement and Control Association (AMCA).
15. Institute of Electrical and Electronic Engineers (IEEE).
16. American Standard Code for Information Interchange (ASCII).
17. Electronics Industries Association (EIA).
18. Occupational Safety and Health Administration (OSHA).
19. American Society for Testing and Materials (ASTM).
20. Federal Communications Commission (FCC) including Part 15, Radio Frequency Devices.
21. Americans Disability Act (ADA)
22. ANSI/EIA 909.1-A-1999 (LonWorks)
23. ANSI/ASHRAE Standard 195-2004 (BACnet)

B. In the case of conflicts or discrepancies, the more stringent regulation shall apply.

C. All work shall meet the approval of the authorities having jurisdiction at the project site.

D. Definitions:
1. EMS – Energy Management System
2. BMS – Building Management System
3. DDC – Direct Digital Control
4. IRCS – Ice Rink Control System

1.06 SUBMITTALS

A. Shop Drawings. All submittals shall conform to the requirements of General Conditions and Section 131811 - Ice Rink General Requirements.

 © 2026 B32 Engineering Group, Inc. All Rights Reserved

B. The IRCS contractor shall submit a list of all shop drawings with submittals dates within 45 days of contract award from City to Ice Rink Contractor.

C. Submittals shall be in defined packages. Each package shall be complete and shall only reference itself and previously submitted packages. The packages shall be as approved by the Engineer for Contract compliance.

D. Equipment and systems requiring approval of local authorities must comply with such regulations and be approved. Filing shall be at the expense of the IRCS Contractor where filing is necessary. Provide a copy of all related correspondence and permits to the Owner.

E. Prepare an index of all submittals and shop drawings for the installation. Index shall include a shop drawing identification number, Contract Documents reference and item description.

F. The IRCS Contractor shall correct any errors or omissions noted in the first review.

G. At a minimum, submit the following:
   1. IRCS network architecture diagrams including all nodes and interconnections. Include future/existing BMS/EMS connection.
   2. Systems schematics, sequences and flow diagrams.
   3. Points schedule for each point in the IRCS, including Point Type, Object Name, Expanded ID, Display Units, Controller type, and Address.
   4. Samples of screen menus.
   5. Details of all IRCS interfaces and connections.
   6. Product data sheets or marked catalog pages including part number, photo and description for all products including software.

1.07 RECORD DOCUMENTATION

A. Provide the following information in addition to the requirements of Section 131811 - Ice Rink General Requirements.
   1. Operation and Maintenance Manuals
      a. One (1) hard copy and three (3) electronic copies on compact disc (CD) format of the entire Operation and Maintenance Manuals shall be provided to the Engineer upon completion of the Project. Include the following for the IRCS:
         1) Table of contents.
         2) As-built system record drawings. Computer Aided Drawings (CAD) record drawings shall represent the as-built condition of the system and incorporate all information supplied with the approved submittal.
         3) Manufacturer’s product data sheets or catalog pages for all products including software.
         4) System and Software Operator’s manuals.
         5) Archive copy of all site-specific databases and sequences.
         6) IRCS and BMS network diagrams.
         7) Interfaces to all third-party products and work by other trades.
         8) Operating license for all software.
      b. The Operation and Maintenance Manual CD shall be self-contained, and include all necessary software required to access the product data sheets. A logically organized table of contents shall provide dynamic links to view and print all product data sheets. Viewer software shall provide the ability to display, zoom, and search all documents.

1.08 WARRANTY/GUARANTY

A. As required in Section 131811 - Ice Rink General Requirements.

B. Provide as-built drawings to include a board and points list for the system.

C. The Ice Rink Control Contractor must furnish 8 hours of checkout and walk through time at refrigeration start up with the Owners personnel.

D. Contractor shall ensure all warranties and extended warranties are properly filed for all systems and equipment. A copy of all warranties shall be inserted in the Operation and Maintenance Manuals.

 © 2026 B32 Engineering Group, Inc. All Rights Reserved

1.09 PRODUCT DELIVERY, STORAGE AND HANDLING REQUIREMENTS

A. As required in Section 131811 - Ice Rink General Requirements.

1.10 QUALIFICATIONS

A. As evidence and assurance of the contractor's controls subcontractor's ability to construct the project, the control subcontractor must have successfully completed the design, programming and installation of five (5) ice rink control systems similar to this project within the past five (5) years.

PART 2 - PRODUCTS

2.01 APPROVED MANUFACTURERS

A. Control systems by Alerton by NAC (651.490.9869, www.nac-hvac.com),Tridium-Vykon by Total Mechanical Services, Inc. (651.768.9367, www.totalmech.com) Cimco SmartHub and Distech, WAGO, or equal manufacturer.

2.02 GENERAL

A. Furnish and install a complete ice rink control system (IRCS) including all controllers, alarm devices, enclosures, transformers, sensors, transducers, boards required for a complete monitoring system.

B. Provide an uninterruptible power supply (UPS) that provides 20-minute run time during a power failure. The purpose of this system is to allow the system to run long enough to send out alarms.

2.03 CONTROLLERS

A. Alerton Visual Logic Controller (VLC) or equal. Furnish and install all cards and boards required.

B. Provide remote monitoring capabilities.

C. All panels and devices must utilize BACnet ANSI/ASHRAE Standards 135-2004, as required to interact with the existing/future BMS/EMS, on a single building level network.

D. Provide web accessible graphic monitoring and control system. All system access shall be compatible with standard, current web browsers.

2.04 GRAPHICAL USER INTERFACE (GUI)

A. The Graphical User Interface shall allow the operator to view, configure, and edit values from multiple controllers. The GUI shall be completely programmable and shall be wall mounted.

B. Operator interface shall be via a wall mounted touch screen display with ASHRAE standard user definable graphical icons associated with any displayed variable.

C. Variables such as alarms, trends, set points, analog and digital values may be displayed and/or edited using the GUI.

D. The GUI shall be menu based displaying a minimum of 16 menus. Menus shall be arranged logically.

E. The graphics shall provide a visual representation of the ice rink, refrigeration system and equipment with associated hardware point's locations displayed symbolically and monitoring inputs shown.

2.05 OTHER SYSTEMS

A. ICRS shall communicate with the refrigerant gas monitoring system, power monitoring device, ventilation system, building management system and fire alarm system. See Section 131813 – Ice Rink Refrigeration System.

2.06 ENCLOSURES

A. Furnish and install all required enclosures. Furnish and install weatherproof enclosures for exterior equipment such as the condenser. Seal all unused knockout holes with silicon sealant. Label enclosure.

2.07 SENSORS AND TRANSDUCERS

A. Approved Manufacturers: Rochester Gauges, Inc., Computer Process Controls, Inc., Ashcroft Inc., Kele Inc., Omega, JW Instruments, ACI, SETRA, or equal.

B. Furnish and install all sensors, transducers and all other devices required to control and monitor systems.

 © 2026 B32 Engineering Group, Inc. All Rights Reserved

C. Scale on sensors shall be as specified in the contract drawings for monitoring devices. If not specified, shall be typical of similar systems.

D. Temperature Sensor Accuracy. The following point types (and the accuracy of each) are required, and their associated accuracy values include errors associated with the sensor, lead wire, and A to D conversion:

Point Type	Accuracy
Glycol/Brine (warm or cold)	+ .5°F
Ice/Subfloor Temperature	+ .5°F
All Others	+ .5°F

E. Resistance Temperature Detectors (RTD) Assemblies:
1. RTD: Single Element, platinum, 3 wire, Tolerance Class A, 316 stainless steel sheath. Length to be at approximately 10% longer than radius of pipe.
2. Temperature Ranges:
   a. Return brine/glycol: 0-50F.
   b. Others: As required.
3. Spring loaded.
4. NPT stainless steel hex nipple.
5. Aluminum screw cover head – NEMA 4X rated.

F. Thermowell:
1. Shall be standard duty threaded (NPT), 304 stainless steel, NPT size as required to accommodate RTD or other devices.
2. When thermo wells are required, the sensor and well shall be supplied as a complete assembly, including wellhead and Greenfield fitting.
3. Thermo wells shall be pressure rated and constructed in accordance with the system working pressure.

G. Transducers
1. Replace the adjustable transducers that come with the Bitzer screw compressors and others and replace with a valve and fixed transducer on each gauge port.

2.08 LOW VOLTAGE CABLE

A. Cable: Shall be level-4, twisted pair, stranded and shielded.

B. Wire: Shall be 22 AWG, 0.65 mm diameter.

C. Loop Resistance: 106 ohms/km

D. Capacitance: 49 nf/km

2.09 CABLE FOR SENSORS, TRANSDUCERS AND CONTROL RELAY

A. Temperature Sensors and 2 Wire Inputs Sensors: (Dry contact, 4-20 ma, and low voltage): 2-wire input sensor cable shall be 2 conductor, stranded, shielded, twisted, PVC jacketed 22 AWG, (Belden #8761 or equiv.). Cable runs over 800 feet shall be a minimum of 18 AWG.

B. Control Relays (low voltage or dry contact only): Cable shall be 2 conductors, stranded, twisted, PVC jacketed 18 AWG cable, (Belden #8461 or equiv.).

C. Pressure Transducers: Cable shall be 3 conductors, stranded, shielded, twisted, PVC jacketed 22 AWG, (Belden #8771 or equiv.). Cable runs over 800 feet shall be a minimum of 18 AWG.

2.10 CONDUIT

A. Cable: General: Conduit for all high voltage, low voltage, and communication connections must be run and connected in accordance to meet current electrical code standards.

B. High Voltage Connections:
1. Separate conduit shall be run from each refrigeration/HVAC controller, IRLDS-II panels, Input/output boards, and control boards to each respective enclosure or panel housing their source

 © 2026 B32 Engineering Group, Inc. All Rights Reserved

of power. Conduit will not be necessary if equipment is mounted directly to enclosure housing source of power providing electrical couplings are fitted to link enclosures permitting enough room to supply power wires to equipment.

C. Low Voltage Connections:
   1. Controllers: Separate conduit will be run to connect any Alerton VLC, or equal controllers where by the units are separated from each other in different rooms. Conduit will be labeled at each end as “echelon net and/or 485 com” and to what controller opposite end of conduit leads to.
   2. Input / output boards: Separate conduit will be run to connect any enclosures housing I/O and/or controller boards where communication wires are needed to link each other through an area outside of the building structure ensuring no communication wires are left exposed to outside air. Conduit will be labeled at each end as to what I/O board and/or controller the opposite end of conduit leads to.
   3. Sensors: Separate conduit per island or dual-temp case shall be run in slabs from equipment enclosure housing respective I/O boards of each case to enclosed area of case. Conduit shall be labeled with case or I/O board number on each end of conduit.

2.11 LABELS

A. All components, devices and cables shall be identified with printed labels. Labels shall include name of equipment, unit numbers, identify associated equipment and devices.

B. Cables shall have labels at each end.

C. Input and Output relays, digitals controls shall be labeled with control description.

D. Alarms shall be labeled as “out alarms” or “in alarms”.

2.12 ALARM LIGHT AND STROBE

A. Furnish one (1) alarm strobe light with time delay button.

PART 3 - EXECUTION / PERFORMANCE

3.01 GENERAL INSTALLATION

A. Installation shall be in accordance with manufacturers’ recommendations.

3.02 SENSOR AND TRANSDUCER INSTALLATION

A. All sensors and transducers are to be mounted in an appropriate location. All pressure transducers must be mounted in an upward vertical position and accessible for adjustment. All sensors and transducers are to be properly set up through software and hardware.

3.03 WIRE INSTALLATION

A. No cable will be run in the same conduit as line voltage wiring.

B. All cables can be run exposed whenever permitted by code and shall be secured in such a manner so that they are not visible from the floor.

C. Communications cables connecting boards shall be run from board to board in a logical daisy chained fashion with no breaks, or star configurations.

3.04 GAS MONITORING SYSTEM CONNECTIONS

A. Connect gas monitoring system unit outputs to IRCS for alarming and monitoring functions.

B. An alarm strobe light and bell with time delay button shall be mounted by the controller.

C. Furnish and install one dry contact pushbutton. Mount switches to the outside of alarm panel. Label one switch as "Sign Override".

D. Settings shall enable alarms to stay "on" if system fails.

E. Program all necessary set points, parameters, and alarm settings for proper operation.

3.05 ALARMS

A. All alarm parameters must be programmed and fine-tuned at time of product delivery.

B. Owner must be notified of all alarms through email and text messages.

 © 2026 B32 Engineering Group, Inc. All Rights Reserved

C. Connect ice system controls to automatic dialer system, specified in Section 131812 – Ice Rink Refrigeration System, for alarm notifications.

D. Outside alarms must be tested in the present of Owner's representative.

E. All alarms and settings identified herein are recommended guidelines for initial system setup. These settings shall be fully adjustable.

F. The following alarms and Set Points shall be established.
1. Compressor high discharge pressure - 200 psi
2. Compressor high discharge temperature - 300ºF
3. Compressor low suction pressure - 10 psi
4. Compressor high oil temperature - 150ºF
5. Compressor low oil temperature - 90ºF
6. Compressor low oil net pressure - 15 psi (net = oil pressure – suction pressure)
7. Glycol return high temperature - 24ºF.
8. Heat recovery water heater high water temperature - 150ºF
9. Emergency bypass/crossover solenoid valve activation - 235psi
10. Refrigeration system power failure.

G. The following equipment shall be monitored for status/current after a start command has been given. Alarms shall be recorded and require manual user reset when the current monitoring has identified that the equipment is not operating.
1. Compressors
2. Glycol pumps
3. Cooling tower glycol pumps
4. Cooling tower fan and water pumps
5. Snowmelt pump
6. Subfloor pump

H. The following alarms shall be recorded and automatically de-energize the associated compressor. When the alarms are cleared, the user must manually reset alarms through on-site access or remote access to bring associated compressors back into operation.
1. Compressor high discharge pressure.
2. Compressor low suction pressure.
3. Compressor high discharge temperature.
4. Compressor high oil temperature.
5. Compressor low oil pressure (net).
6. Start failure (MCC failure for motor overload, phase loss, etc.)

I. The following alarms shall be recorded and automatically de-energize all compressors. When the alarm condition is cleared, the compressor shall automatically reset. The alarm shall remain in a latched state for operator to identify that alarm occurred.
1. Chiller flow switch
2. Emergency stop activated.
3. Refrigerant leak detection activation

3.06 CABLE FOR SENSOR, TRANSDUCERS, AND CONTROL RELAY INSTALLATION

A. No cable will be run in the same conduit as line voltage wiring.

B. All cables can be run exposed whenever permitted by code and shall be secured in such a manner so that they are not visible from the floor.

C. Cables with multiple conductors to accommodate more than one sensor can be utilized for island and dual-temp cases only, providing all limitations are met through specifications for each sensor connected.

D. Cables for input sensors shall be run with no breaks or splices from the I/O board to sensors wires. Use wire butt connector. Do not use wire nuts.

E. Cables for control relays shall be run with no breaks or splices from the I/O board to termination on points of relay.

 © 2026 B32 Engineering Group, Inc. All Rights Reserved

3.07 PENETRATIONS

A. Provide fire stopping for all penetrations used by dedicated BMS/EMS conduits and raceways.

B. All openings in fire proofed or fire stopped components shall be closed by using approved fire resistive sealant.

C. All wiring passing through penetrations, including walls shall be in conduit or enclosed raceway.

D. Penetrations of floor slabs shall be by core drilling. All penetrations shall be plumb, true, and square.

3.08 GENERAL POINTS LIST

A. The IRCS shall, at minimum, monitor the following system points and points necessary for a complete control system as described in this section.

B. Points Type Legend:
1. AI – Analog Input
2. AO – Analog Output
3. BI – Binary Input
4. BO – Binary Output

GENERAL				
Description	**Function**	**Units**	**Input/ Output**	**Type**
Outdoor Air Temperature	Monitor	Degree F	Input	AI
Outdoor Relative Humidity	Monitor	%	Input	AI
Refrigeration System Power Status	Monitor	On/Off	Input	BI
Power Usage (Electric Submeter)	Monitor/ Logging	KWH	Input	
System Enable Switch	Monitor	On/Off	Input	
Spare				
Spare				
ALARMS AND SAFETIES				
Description	**Function**	**Units**	**Input/ Output**	**Type**
Refrigeration System Emergency Stop	Control	On/Off	Input	BI
Leak Detection Refrigerant Level	Monitor	PPM	Input	AI
Leak Detection Alarm Level 1	Monitor		Input	BI
Leak Detection Alarm Level 2	Monitor		Input	BI
Leak Detection Alarm Level 3	Monitor		Input	BI
Leak Detection Alarm Level 4	Monitor		Input	BI
Chiller Flow Switch	Monitor		Input	BI
Condenser fan fails to run	Monitor		Input	BI
Spare				
SOLENOID VALVES				
Description	**Function**	**Units**	**Input/ Output**	**Type**
Chiller King Solenoid Valve	Control	Open/Closed	Output	BO
Bypass/Crossover Solenoid Valve	Control	Open/Closed	Output	BO
Compressor Only Enabled Solenoid Valves	Control	Open/Closed	Output	BO
Water Preheat System Solenoid Valve	Control	Open/Closed	Output	BO
COMPRESSORS				

 © 2026 B32 Engineering Group, Inc. All Rights Reserved

Description	Function	Units	Input/ Output	Type
Compressor Common Discharge Pressure 1	Monitor	PSI	Input	AI
Compressor Common Discharge Pressure 2	Monitor	PSI	Input	AI
Compressor 1 Oil Temperature	Monitor	Degree F	Input	AI
Compressor 1 Oil Pressure	Monitor	PSI	Input	AI
Compressor 1 Discharge Pressure	Monitor	PSI	Input	AI
Compressor 1 Suction Pressure	Monitor	PSI	Input	AI
Compressor 1 Command	Control	On/Off	Output	BO
Compressor 1 Status	Monitor	Amps	Input	AI
Compressor 1 Stage 1 Loading	Control	On/Off	Output	BO
Compressor 1 Stage 2 Loading	Control	On/Off	Output	BO
Compressor 2 Oil Temperature	Monitor	Degree F	Input	AI
Compressor 2 Oil Pressure	Monitor	PSI	Input	AI
Compressor 2 Discharge Pressure	Monitor	PSI	Input	AI
Compressor 2 Suction Pressure	Monitor	PSI	Input	AI
Compressor 2 Command	Control	On/Off	Output	BO
Compressor 2 Status	Monitor	Amps	Input	AI
Compressor 2 Stage 1 Loading	Control	On/Off	Output	BO
Compressor 2 Stage 2 Loading	Control	On/Off	Output	BO
Compressor 3 Oil Temperature	Monitor	Degree F	Input	AI
Compressor 3 Oil Pressure	Monitor	PSI	Input	AI
Compressor 3 Discharge Pressure	Monitor	PSI	Input	AI
Compressor 3 Suction Pressure	Monitor	PSI	Input	AI
Compressor 3 Command	Control	On/Off	Output	BO
Compressor 3 Status	Monitor	Amps	Input	AI
Compressor 3 Stage 1 Loading	Control	On/Off	Output	BO
Compressor 3 Stage 2 Loading	Control	On/Off	Output	BO
Compressor 4 Oil Temperature	Monitor	Degree F	Input	AI
Compressor 4 Oil Pressure	Monitor	PSI	Input	AI
Compressor 4 Discharge Pressure	Monitor	PSI	Input	AI
Compressor 4 Suction Pressure	Monitor	PSI	Input	AI
Compressor 4 Command	Control	On/Off	Output	BO
Compressor 4 Status	Monitor	Amps	Input	AI
Compressor 4 Stage 1 Loading	Control	On/Off	Output	BO
Compressor 4 Stage 2 Loading	Control	On/Off	Output	BO
Oil Pressure Filter Sensor (Pre-filter) for screw package 1	Monitor	PSI	Output	
Oil Pressure Filter Sensor (Post-filter) for screws package 1	Monitor	PSI	Output	
Oil Pressure Filter Sensor (Pre-filter) for screws package 2	Monitor	PSI	Output	
Oil Pressure Filter Sensor (Post-filter) for screws package 2	Monitor	PSI	Output	
Spare				
EVAPORATIVE CONDENSER				

 © 2026 B32 Engineering Group, Inc. All Rights Reserved

Fan Command	Control	On/Off	Output	BO
Fan Status	Monitor	Amps	Input	AI
Fan Speed Control (VFD)	Control		Output	AO
Water Pump 1 Command	Control	On/Off	Output	BO
Water Pump 1 Status	Monitor	Amps	Input	AI
Water Pump 2 Command	Control	On/Off	Output	BO
Water Pump 2 Status	Monitor	Amps	Input	AI
Spare				
ICE RINK				
Description	**Function**	**Units**	**Input/ Output**	**Type**
Glycol Supply Temperature – Rink 1	Monitor	Degrees F	Input	AI
Glycol Supply Temperature – Rink 2	Monitor	Degrees F	Input	AI
Glycol Supply Temperature – Rink 3	Monitor	Degrees F	Input	AI
Glycol Return Temperature 1 – Rink 1	Monitor	Degrees F	Input	AI
Glycol Return Temperature 2 – Rink 2	Monitor	Degrees F	Input	AI
Glycol Return Temperature 3 – Rink 3	Monitor	Degrees F	Input	AI
Rink Floor Temperature 1 – Rink 1	Monitor	Degrees F	Input	AI
Rink Floor Temperature 2 – Rink 1	Monitor	Degrees F	Input	AI
Rink Floor Temperature 3 – Rink 2	Monitor	Degrees F	Input	AI
Rink Floor Temperature 4 – Rink 2	Monitor	Degrees F	Input	AI
Rink Floor Temperature 5 – Rink 3	Monitor	Degrees F	Input	AI
Rink Floor Temperature 6 – Rink 3	Monitor	Degrees F	Input	AI
Subfloor Temperature 1 – Rink 1	Monitor	Degrees F	Input	AI
Subfloor Temperature 2 – Rink 1	Monitor	Degrees F	Input	AI
Subfloor Temperature 3 – Rink 2	Monitor	Degrees F	Input	AI
Subfloor Temperature 4 – Rink 2	Monitor	Degrees F	Input	AI
Subfloor Temperature 5 – Rink 3	Monitor	Degrees F	Input	AI
Subfloor Temperature 6 – Rink 3	Monitor	Degrees F	Input	AI
RINK PUMPS				
Description	**Function**	**Units**	**Input/ Output**	**Type**
Rink Pump 1 Command	Control	On/Off	Output	BO
Rink Pump 1 Status	Monitor	Amps	Input	AI
Rink Pump 1 Speed Control (VFD)	Control		Output	AO
Rink Pump 2 Command	Control	On/Off	Output	BO
Rink Pump 2 Status	Monitor	Amps	Input	AI
Rink Pump 2 Speed Control (VFD)	Control		Output	AO
Rink Pump 3 Command	Control	On/Off	Output	BO
Rink Pump 3 Status	Monitor	Amps	Input	AI
Rink Pump 3 Speed Control (VFD)	Control		Output	AO
Rink Pump 4 Command	Control	On/Off	Output	BO
Rink Pump 4 Status	Monitor	Amps	Input	AI
Rink Pump 4 Speed Control (VFD)	Control		Output	AO

 © 2026 B32 Engineering Group, Inc. All Rights Reserved

Rink Pump 5 Command	Control	On/Off	Output	BO
Rink Pump 5 Status	Monitor	Amps	Input	AI
Rink Pump 5 Speed Control (VFD)	Control		Output	AO
HEAT RECOVERY SYSTEMS				
Description	**Function**	**Units**	**Input/ Output**	**Type**
Snowmelt Pump 1 Command	Control	On/Off	Output	BO
Snowmelt Pump 1 Status	Monitor	Amps	Input	AI
Snowmelt Return 1 Temperature	Monitor	Degrees F	Input	AI
Snowmelt Supply 1 Temperature	Monitor	Degrees F	Input	AI
Snowmelt Pump 2 Command	Control	On/Off	Output	BO
Snowmelt Pump 2 Status	Monitor	Amps	Input	AI
Snowmelt Return 2 Temperature	Monitor	Degrees F	Input	AI
Snowmelt Supply 2 Temperature	Monitor	Degrees F	Input	AI
Subfloor Pump 1 Command	Control	On/Off	Output	BO
Subfloor Pump 1 Status	Monitor	Amps	Input	AI
Subfloor Supply Temperature 1	Monitor	Degrees F	Input	AI
Subfloor 3-Way Valve 1	Control		Output	AO
Subfloor Pump 2 Command	Control	On/Off	Output	BO
Subfloor Pump 2 Status	Monitor	Amps	Input	AI
Subfloor Supply Temperature 2	Monitor	Degrees F	Input	AI
Subfloor 3-Way Valve 2	Control		Output	AO
Subfloor Pump 3 Command	Control	On/Off	Output	BO
Subfloor Pump 3 Status	Monitor	Amps	Input	AI
Subfloor Supply Temperature 3	Monitor	Degrees F	Input	AI
Subfloor 3-Way Valve 3	Control		Output	AO
Water Preheat Temperature 1	Monitor	Degrees F	Input	AI
Water Preheat Temperature 3	Monitor	Degrees F	Input	AI
Water Preheat Temperature 3	Monitor	Degrees F	Input	AI

3.09 SEQUENCE OF OPERATION

A. The following is a general sequence of operation to familiarize the control system developer/supplier with the functions and controls of the ice system. It may not be comprehensive sequence or list and may be modified throughout the project.

B. All temperatures and pressure settings identified herein are recommended guidelines for initial system setup. These settings should be adjusted during system operation to achieve optimum system performance.

C. Compressors

1. Compressor Lead/Lag.
   a. The three (3) compressors shall rotate lead / lag positions based on operator sequence selection to rotate order of operation. The following compressor sequences shall be used.

Lead Position	*Lag Position 1*	*Lag Position 2*	*Standby Position*
1	2	3	4
2	3	4	1
3	4	1	2

 © 2026 B32 Engineering Group, Inc. All Rights Reserved

4	1	2	3

2. Compressor Operation
   a. Compressor operation is controlled by secondary refrigerant temperature returning from rink floor based on operator adjustable Set Point (SP).
   b. Lead / Lag compressors shall be energized in accordance with the SP offsets in the table below. SP offsets shall be operator adjustable.

Compressor	***ON (ºF)***	***OFF (ºF)***
Lead	SP + 1º	SP - 1º
Lag 1	SP + 2º	SP - 1º
Lag 2	SP + 3º	SP - 1º

   c. Lag compressors shall not be energized until the SP offset has been reached and the lead compressor has been operating fully loaded for 10-minutes.
   d. If the lead compressor fails to start, the lag compressor shall be energized within 2-minutes of the failure.
   e. The standby compressor shall be automatically enabled if the lead or lag compressor are locked out on start fail or can be enabled manually in an emergency once the lead and lag compressors are enabled.
3. Compressor loading shall be fully adjustable with initial settings as follows:
   a. Stage 1 loading will occur 1-minute after compressor start.
   b. Stage 2 loading will occur 2-minutes after compressor start.

D. Heat Reclaim System
1. Snow Melting
   a. Pump on and solenoid valve open when compressors are running.
2. Subfloor Heating
   a. With subsoil temperature sensors: Pump on when compressors are running and subsoil temperature is less than 40º (F). If glycol temperature is less than 55º (F), the three-way valve shall modulate warmer glycol from the snow melt piping loop into the subfloor heat loop. Pump shall turn off when subsoil temperature reaches 45º (F).
3. Preheat Domestic and Resurfacer Water
   a. Solenoid valve opens when compressors are running and water temperature inside heat recovery water heater is less than 140ºF.

E. Condenser
1. Controlled by compressor discharge head pressure downstream of the pressure regulating valve. Condensing pressure shall be controlled by a combination of the fan and water pump to maintain the specified condensing temperature. Add ambient air sensor to assure water pump does not operate at very low air temperatures (0F, etc.) to avoid freeze up of unit. Typical set points are as follows. The fan speed is regulated by VFD. Initial fan and water pump set points are as follows:

Operation	***Discharge Pressure (psi)***
Fan ON @ min. speed	145
Fan ON @ max. speed	165
Water Pump ON	175
Water Pump OFF	150
Fan OFF	135

2. Provide two modes of operation.
   a. Winter mode: Condenser fan leads and water pump follows.
   b. Summer mode: Water pumps leads and condenser fan follows. Fans to shut off first as pressure decreases.

 © 2026 B32 Engineering Group, Inc. All Rights Reserved

c. Provide an automatic switchover mode between winter and summer modes. When this mode is enabled, if the temperature falls below the User setpoint, the control switches to winter mode.

F. Chiller
1. The level of refrigerant in the chiller vessel is controlled by:
a. A solenoid valve (king valve) as described below.
b. An automatic expansion valve regulated by the specified adjustable level controller that is mounted on the liquid refrigerant column.
c. A high-level float switch shall be wired in series with the solenoid valve (king valve) to close the solenoid valve if the maximum set level in the chiller is reached.

G. Rink Pumps
1. Continuously running. Pump speed regulated by VFD based on operator adjustable Set Point (SP) for the ice rink floor temperature as measured by the rink floor sensors. One pump should always operate at 100%.

H. Solenoid Valves:
1. Chiller Vessel:
a. This valve allows refrigerant to pass from the high-pressure receiver to the chiller vessel.
b. This valve shall be enabled with any one or more compressors are running.
c. This valve shall be opened and closed by the specified adjustable level controller that is mounted on the liquid refrigerant column.
d. This valve shall be wired in series with the chiller high level float switch to close the solenoid valve if the maximum set level in the chiller is reached.
2. Emergency Bypass/Crossover Solenoid Valve: This valve allows high and low-pressure refrigerant to equalize if high discharge pressures are reached. Valve opens if compressor discharge pressure reaches 235 psi (adj.) Compressors shall be locked out when valve is open. Valve shall be controlled by a dedicated mechanical pressure safety switch.
3. Compressor Only Enabled Solenoid Valve: These valves control refrigerant hot gas flow to heat exchangers. Valves are open when compressors are running.
4. Water Preheat System Solenoid Valve: This valve controls refrigerant hot gas flow to the heat recovery water heaters. Valve is open when compressors are running and the water temperature inside the heat recovery water heaters is less than 140ºF.

I. King Valve
1. This valve allow refrigerant to pass from the high-pressure receiver to the chiller vessel and is a manually operated isolation valve.

J. The following programming shall be included in the control system.
1. Modes of Operation. The following modes of operation shall be programmed into the control system. The modes of operation shall be fully programmable and adjustable per the Owner's requirements and direction. The temperatures may vary depending on the type of refrigeration system and equipment.

Name of Mode	Return Glycol Setpoint	Maximum Chiller Capacity
Ice Making Mode	10F	100%
Day Mode	16F	70%
Practice Mode	14F	80%
Game Mode	12F	90%
Night Mode	19F	70%

2. Calendar. Provide a programmable daily calendar that allows different modes of operation to be incorporated in the calendar. The calendar shall be fully adjustable and programmable by the Owner.

END OF SECTION

 © 2026 B32 Engineering Group, Inc. All Rights Reserved

SECTION 13 3419
METAL BUILDING SYSTEMS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Manufacturer-engineered, shop-fabricated structural steel building frame.

B. Metal wall and roof panels including soffits and gutters and downspouts.

C. Roof and wall insulation systems.

D. Building components.

E. Accessories and trim.

1.02 RELATED REQUIREMENTS

A. Section 033000 - Cast-In-Place Concrete: Anchor bolt installation.

B. Section 05 3100 – Steel Decking.

C. Section 05 5000 - Metal Fabrications.

D. Section 07 4113 - Metal Roof Panels – Bid Package 1 – Base Bid

E. Section 07 4213.19 - Insulated Metal Wall Panels – Bid Package 1 – Base Bid

F. Section 07 9200 - Joint Sealants: Sealing joints between accessory components and wall system.

G. Section 08 1113 - Hollow Metal Doors and Frames.

H. Section 08 3613 - Sectional Doors.

I. Section 08 4313 – Aluminum-Framed Storefronts

J. Mechanical & Fire Protection Specifications

K. Electrical Specifications

1.03 REFERENCE STANDARDS

A. AISC 360 - Specification for Structural Steel Buildings; 2022, with Errata (2025).

B. ASTM A36/A36M - Standard Specification for Carbon Structural Steel; 2019.

C. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware; 2023.

D. ASTM A500/A500M - Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes; 2023.

E. ASTM A529/A529M - Standard Specification for High-Strength Carbon-Manganese Steel of Structural Quality; 2019.

F. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2025a.

G. ASTM A792/A792M - Standard Specification for Steel Sheet, 55% Aluminum-Zinc Alloy-Coated by the Hot-Dip Process; 2025.

H. ASTM C920 - Standard Specification for Elastomeric Joint Sealants; 2018 (Reapproved 2024).

I. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2026.

J. ASTM E96/E96M - Standard Test Methods for Gravimetric Determination of Water Vapor Transmission Rate of Materials; 2024a.

K. ASTM F1554 - Standard Specification for Anchor Bolts, Steel, 36, 55, and 105-ksi Yield Strength; 2020.

L. ASTM F3125/F3125M - Standard Specification for High Strength Structural Bolts and Assemblies, Steel and Alloy Steel, Heat Treated, Inch Dimensions 120 ksi, 144 ksi, and 150 ksi Minimum Tensile Strength, and Metric Dimensions 830 MPa and 1040 MPa Minimum Tensile Strength; 2025a.

M. AWS A2.4 - Standard Symbols for Welding, Brazing, and Nondestructive Examination; 2020.

N. AWS B2.1/B2.1M - Specification for Welding Procedure and Performance Qualification; 2021, with Errata (2023).

O. AWS D1.1/D1.1M - Structural Welding Code - Steel; 2025, with Errata (2026).

P. IAS AC472 - Accreditation Criteria for Inspection Programs for Manufacturers of Metal Building Systems; 2024.

Q. MBMA (MBSM) - Metal Building Systems Manual; 2024.

R. UL 580 - Standard for Tests for Uplift Resistance of Roof Assemblies; Current Edition, Including All Revisions.

1.04 ADMINISTRATIVE REQUIREMENTS

A. Preinstallation Meeting: Convene one week before starting work of this section.
   1. Preinstallation meeting shall cover on-site safety, safety procedures throughout erection process, on-site security, site clean-up, testing and inspections.
   2. Preinstallation meeting shall cover the installation of the insulation system, vapor barrier, and other building envelope components. Include coordination of penetrations with all trades.
   3. Contractor shall produce meeting documentation of topics of discussion and any resolutions formed during preinstallation meeting

1.05 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements for submittal procedures.

B. Product Data: Provide data on profiles, component dimensions, fasteners. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for each type of the following metal building system components:
   1. Structural-framing system.
   2. Roof panels.
   3. Wall panels
   4. Insulation products and vapor barrier – Alternate #3
      a. Include manufacturer’s product brochures; component specifications, samples of the painted support strapping, and samples of the reinforced polyethylene vapor retarder fabric, including a sample of the triple extrusion welded seam; specific detailed drawings for the project showing purlin spacings, support strap locations and spacings, fastening points, liner system fabric sizes and locations; insulation widths and thicknesses, sizes and locations and detailed installation instructions for quality assurance and OSHA compliance.
   5. Accessories.

C. Shop Drawings: Indicate assembly dimensions, locations of structural members, connections, attachments, openings, cambers, and loads; wall and roof system dimensions, panel layout, general construction details, anchors and methods of anchorage, and installation; framing anchor bolt settings, sizes, locations from datum, and foundation loads; indicate welded connections with AWS A2.4 welding symbols; indicate net weld lengths; provide professional seal and signature.
   1. For installed components indicated to comply with design loads, include structural analysis data signed and sealed by the qualified professional engineer responsible for their preparation.
   2. Anchor-Bolt Plans: Include location, diameter, and projection of anchor bolts required to attach metal building to foundation. Indicate column reactions at each location.
   3. Structural-Framing Drawings: Show complete fabrication of primary and secondary framing. Indicate welds and bolted connections, distinguishing between shop and field applications. Include transverse cross-sections.
   4. Building reactions indicating individual load cases as well as combined load combinations and maximum and minimum reactions shall be provided within three (3) weeks of metal building system subcontract award.
   5. Insulation System Shop Drawings: Indicate locations of connections and attachments, general details, anchorages and method of anchorage and installation. – Alternate #3

D. Samples: Submit two samples of precoated metal panels for each color selected, 2 by 4 inch in size illustrating color and texture of finish.

E. Verification Samples: For each finish product specified, two complete sets of color chips representing manufacturer's full range of available colors and patterns.

F. Verification Samples for vapor barrier: For each finish product specified, two samples, minimum size 6 inches (150 mm) square or long, representing actual products required for this project. – Alternate #3

G. Manufacturer's Instructions: Indicate preparation requirements, anchor bolt placement, and installation methods.

H. 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.

I. Erection Drawings: Indicate members by label, assembly sequence, and temporary erection bracing.

J. Designer's Qualification Statement.

K. Manufacturer's Qualification Statement: Provide documentation showing metal building manufacturer is accredited under IAS AC472.
   1. Include statement that manufacturer designs and fabricates metal building system as integrated components and assemblies, including but not limited to primary structural members, secondary members, joints, roof, and wall cladding components specifically designed to support and transfer loads and properly assembled components form a complete or partial building shell.

L. Erector's Qualification Statement.

M. Welders' Qualification Statement: Welders' certificates in accordance with AWS B2.1/B2.1M and dated no more than 12 months before start of scheduled welding work.

N. Project Record Documents: Record actual locations of concealed components and utilities.

O. Energy Code Compliance: Include COMcheck report showing compliance with 2024 International Energy Conservation Code for roof and wall assemblies.

1.06 QUALITY ASSURANCE

A. Designer Qualifications: Design structural components, develop shop drawings, and perform shop and site work under direct supervision of a Professional Structural Engineer experienced in design of this type of work.
   1. Design Engineer Qualifications: Licensed in the State in which the Project is located. 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 design and installation of metal building systems that are like those indicated for this project in material, design, and extent.
   2. Comply with applicable code for submission of design calculations and reviewed shop and erection drawings as required for acquiring permits.
   3. Cooperate with regulatory agency or authorities having jurisdiction (AHJ), and provide data as requested.

B. Delegated-Design Submittal: For metal building systems.
   1. Include analysis data indicating compliance with performance requirements and design data signed and sealed by the qualified professional engineer responsible for their preparation.

C. Perform work in accordance with AISC 360 and MBMA (MBSM).
   1. Maintain one copy on site.

D. Manufacturer Qualifications: Company specializing in the manufacture of products similar to those required for this project.
   1. Not less than 5 years of documented experience.
   2. Accredited by IAS in accordance with IAS AC472.
   3. Engineering Responsibility: Preparation of Shop Drawings, testing program development, test result interpretation, and comprehensive engineering analysis by a qualified professional engineer.

E. Erector Qualifications: Company specializing in performing the work of this section approved by manufacturer.

F. Welder Qualifications: Welding processes and welding operators qualified in accordance with AWS D1.1/D1.1M and no more than 12 months before start of scheduled welding work.

G. Insulation System Installer Qualifications: Company specializing in performing work of this section and with 5 years documented experience.

H. Source Limitations: Obtain each type of metal building system component through one source from a single manufacturer.

I. Regulatory Requirements: Fabricate and label structural framing to comply with special inspection requirements at point of fabrication for welding and other connections required by authorities having jurisdiction.

J. Structural Steel: Comply with AISC 360, "Specification for Structural Steel Buildings."

K. Cold-Formed Steel: Comply with AISI's "North American Specification for the Design of Cold-Formed Steel Structural Members" for design requirements and allowable stresses.

L. Insulation system shall pass ASTM E 2178 for air permeance.

1.07 DELIVERY, STORAGE AND HANDLING

A. Deliver components, sheets, panels, and other manufactured items so as not to be damaged or deformed. Package roof and wall panels for protection during transportation and handling.

B. Handling: Unload, store, and erect roof and wall panels to prevent bending, warping, twisting, and surface damage.

C. Stack materials on platforms or pallets, covered with tarpaulins or other suitable weathertight and ventilated covering. Store steel components, roof and wall panels to ensure dryness. Do not store steel or panels in contact with other materials that might cause staining, denting, or other surface damage.

1. Established Dimensions for Foundations: Where field measurements cannot be made without delaying the Work, establish foundation dimensions and proceed with fabricating structural framing without field measurements. Coordinate anchor-bolt installation to ensure that actual anchorage dimensions correspond to established dimensions.

D. Established Dimensions for Panels: Where field measurements cannot be made without delaying the Work, either establish framing and opening dimensions and proceed with fabricating roof and wall panels without field measurements or allow for field-trimming panels. Coordinate roof and wall construction to ensure that actual building dimensions, locations of structural members, and openings correspond to established dimensions.

1.08 COORDINATION

A. Coordinate size and location of concrete foundations and casting of anchor-bolt inserts into foundation walls and footings. Concrete, reinforcement, and formwork requirements are specified in Division 3 Section "Cast-in-Place Concrete."

B. Coordinate the insulation system with the size of the girts, purlins, and applicable framing members.

C. Coordinate all penetrations with the mechanical and electrical design. All penetrations and roof curbs on the roof of the metal building must be an approved products and compatible with the roof system and building manufacturer.

1.09 WARRANTY

A. See Section 01 7800 - Closeout Submittals for additional warranty requirements.

B. Correct defective Work within a five-year period after Date of Substantial Completion. Written warranty, executed by manufacturer agreeing to repair or replace roof and wall panels that fail in materials or workmanship within specified warranty period.

C. Provide 20-year manufacturer warranty for Panel Finishes.

1. Include coverage for exterior pre-finished surfaces to cover pre-finished color coat against chipping, cracking or crazing, blistering, peeling, chalking, or fading. Include coverage for weather tightness of building enclosure elements after installation.

D. Special Warranty on Standing-Seam Roof Panel Weathertightness: Written warranty, signed by manufacturer agreeing to repair or replace standing-seam roof panel assemblies that fail to remain weathertight within specified warranty period due to material defect(s).
1. Warranty Period: 20 years from date of Substantial Completion.
2. Insulation system components to include a ten-year limited material warranty.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Metal Buildings Systems:
1. Alliance Steel Building Systems; https://allianceokc.com/.
2. American Buildings: www.americanbuildings.com
3. Butler Manufacturing Company: www.butlermfg.com/#sle.
4. Ceco Building Systems: www.cecobuildings.com/#sle.
5. Chief Buildings: www.chiefbuildings.com/#sle.
6. Kirby Building Systems, a Nucor Company: www.kirbybuildingsystems.com/#sle.
7. Metallic Building Systems: www.metallic.com/#sle.
8. Nucor Building Systems: www.nucorbuildingsystems.com/#sle.
9. VP Buildings: www.vp.com/#sle.
10. Substitutions: See Section 01 6000 - Product Requirements.

2.02 ASSEMBLIES

A. Single span rigid frame, multi-span rigid frame, lean-to rigid frame, bearing endwall –as indicated on drawings.

B. Bay Spacing: As indicated.

C. Primary Framing: Rigid frame of rafter beams and columns, canopy beams, intermediate columns, braced end frames, and end wall columns, and wind bracing.

D. Secondary Framing: Purlins, Girts, Eave struts, Flange bracing, Sill supports, and Clips, and other items detailed.

E. Wall System: Preformed insulated metal panels of horizontal profile, with sub-column framing/anchorage assembly, insulation, and liner sheets, and accessory components.
1. Wall girts are to be provided only at wall openings.

F. Roof System: Preformed metal panels oriented parallel to slope, with sub-girt framing/anchorage assembly, insulation, and accessory components.
1. All roof purlins are to be simple-span, flush with the top of the rigid frame rafter beams.
2. Alternate #3 – If Simple Saver Insulation System is selected, the roof purlins become continuous, bypass members.

2.03 PERFORMANCE REQUIREMENTS

A. General: Provide a complete, integrated set of metal building system manufacturer's standard mutually dependent components and assemblies that form a metal building system capable of withstanding structural and other loads, thermally induced movement, and exposure to weather without failure or infiltration of water into building interior. Include primary and secondary framing, roof and wall panels, and accessories complying with requirements indicated, including those in this Article.

B. Installed Thermal Resistance of Wall System: R 32.4. system min. Prescriptive U Factor: U-0.050. Installed R-Value R-20.4. Foam thermal break (3/16") applied to girt flange is required.

C. Installed Thermal Resistance of Roof System: R 25 + R11 system with thermal spacer blocks. Installed R-Value R-32.3. Installed R-Value R-32.3.

D. Insulating system shall have a continuous vapor barrier inside of building purlins, girts, and insulation to provide complete isolation from inside conditioned air.

E. Metal Building thermal performance must comply with 2024 IECC requirements.

F. Water Penetration for Roof Panels: Provide roof panel assemblies with no water penetration as defined in the test method when tested according to ASTM E 1646 at a minimum differential pressure of 20 percent of inward-acting, wind-load design pressure of not less than 6.24 lbf/sq. ft. and not more than 12 lbf/sq. ft.

G. Water Penetration for Wall Panels: Provide wall panel assemblies with no water penetration as defined in the test method when tested according to ASTM E 331 at a minimum differential pressure of 20 percent of inward-acting, wind-load design pressure of not less than 6.24 lbf/sq. ft. and not more than 12 lbf/sq. ft.

H. Design structural members to withstand dead load, applicable snow load, and design loads due to pressure and suction of wind calculated in accordance with applicable code.

I. Design structural members to withstand loading indicated and described in drawings.

J. Design structural members to withstand Class 90 wind uplift in accordance with UL 580.

K. Serviceability Criteria:
   1. Rigid Frame & post and beam rafter lateral drift: Eave Height / 60 horizontal
   2. Sidewall & endwall columns: Column Height / 120 horizontal.
   3. Rigid Frame & post and beam rafter vertical deflection: Span / 180 vertical
   4. Roof purlins: Bay / 120 vertical
   5. Wall girts: Bay / 120 Horizontal
   6. Floor beams and joists: Span / 360 vertical live load; Span / 240 vertical total load

L. Provide drainage to exterior for water entering or condensation occurring within wall or roof system.

M. Permit movement of components without buckling, failure of joint seals, undue stress on fasteners or other detrimental effects, when subject to temperature range of 120 degrees F.

N. Size and fabricate wall and roof systems free of distortion or defects detrimental to appearance or performance.

2.04 MATERIALS - FRAMING

A. Structural Steel Members: ASTM A36/A36M.

B. Structural Tubing: ASTM A500/A500M Grade C cold-formed.

C. Plate or Bar Stock: ASTM A529/A529M, Grade 50.

D. Anchor Bolts: ASTM F1554, Grade 36, Class 1A, with no preference for protective coating.

E. Bolts, Nuts, and Washers: ASTM F3125/F3125M, Type 1; galvanized to ASTM A153/A153M.

F. Welding Materials: Perform in accordance with AWS D1.1/D1.1M.

G. Primer: Manufacturer's Standard (Gray).

H. Alternate #3 – If Simple Saver Insulation System is selected the Purlins that become hidden behind Fabric can remain Primed since they are not exposed.

2.05 MATERIALS - WALLS AND ROOF

A. Steel Sheet: ASTM A792/A792M aluminum-zinc alloy coated to AZ 55 /AZM ___.

B. INSULATION MATERIALS:
   1. Fire-Test-Response Characteristics for Insulation: 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.
      a. Surface-Burning Characteristics: ASTM E 84.
      b. Fire-Resistance Ratings: ASTM E 119.
   2. Combustion Characteristics: ASTM E 136.

3. Insulation R-value, system and components shall be provided as described by architectural drawings and details.
4. Alternate #3 - Basis-of-Design Product: Subject to compliance with requirements, provide Thermal Design, Inc., Simple Saver Air-Tight System. P.O. Box 468, 601 N. Main Street, Madison, NE 68748. ASD. Tel: (800) 255-0776 or (402) 454-6591. Fax: (402) 454-2708. Email: sales@thermaldesign.com, www.thermaldesign.com.,
5. Alternate #3: If selected Top of Steel heights to move up the depth of the purlins at both high roofs (Arena roofs) so that clearance below structure is maintained. Simple Saver Airtight System consists of Batt Insulation, Roof Insulation, Vapor Barrier Liner Fabric, Sealants, Thermal Breaks, Straps, and other devices and components in an insulation system.
    a. Roof Insulation: Formaldehyde-free fiberglass batt or fiberglass blanket complying with ASTM C 991 Type 1 and ASTM E 84 with a thermal resistance and thickness of Purlins – 10" min.
    b. Walls: Not an option - will be insulated metal panel as shown on drawings. This Alternate is only for the roof.
    c. Vapor Barrier Liner Fabric: Syseal, or approved equal, type woven, reinforced, high-density polyethylene yarns coated on both sides with a continuous white or colored polyethylene coatings, as follows:
        1) Product complies with ASTM C 1136, Types I through Type VI.
        2) Perm rating: 0.02 for fabric and for seams in accordance with ASTM E 96.
        3) Flame/Smoke Properties:
            (a) 25/50 in accordance with ASTM E 84.
            (b) Self-extinguishes with field test using matches or butane lighter.
        4) Ultra violet radiation inhibitor to minimum UVMAX rating of 8.
    d. Size and seaming: Manufactured in large custom pieces by extrusion welding from roll goods, and fabricated to substantially fit defined building area with minimum practicable job site sealing.
        1) Provide with factory double, extrusion welded seams. Stapled seams or heat-melted seams are not acceptable due to degradation of fabric.
        2) Factory-folded to allow for rapid installation.
        3) Color:
            (a) White.
    e. Vapor Barrier Lap Sealant: Solvent-based, Simple Saver polyethylene fabric adhesive. Shall be G720 Simple Saver Air-Tight Sealant and shall be: Simple Saver System G524+ High Tack Sealant for sealing vapor retarder laps and/or Simple Saver System G220 Pressure Sensitive Sealant.
    f. Vapor Barrier Tape: Double-sided sealant tape 3/4 inch (19 mm) wide by 1/32 inch (.79 mm) thick. Syseal Sticky Tape (double-sided bonding tape) 3/4" wide by 1/32" thick extruded vapor retarder sealant from Thermal Design.
    g. Vapor Barrier Patch Tape: Single-sided, adhesive backed sealant tape 3 inches (76 mm) wide made from same material as Syseal® type liner fabric.
    h. Thermal Breaks:
        1) Roof: Basis of Design: Snap-R Thermal Block by Thermal Design, or approved equal.
    i. Straps:
        1) 100 KSI minimum yield tempered, high-tensile-strength steel.
        2) Size: Not less than 0.020 inch (0.50 mm) thick by 1 inch (25 mm) by continuous lenght.
        3) Galvanized, primed, and painted to match specified finish color on the exposed side.
        4) Color:
            (a) White.
        5) High-tensile-strength stainless steel.
        6) Woven polyester plastic. Color as selected.
    j. Fasteners:
        1) For light gage steel: #12 by 3/4 (19 mm) inch plated Tek 2 type screws with sealing washer, painted to match specified color.

2) For heavy gage steel: #12 by 1-1/2 inch (38 mm) plated Tek 4 type screws with sealing washer, painted to match specified color.
3) For wood, concrete, other materials: As recommended by manufacturer.

C. Joint Seal Gaskets: Manufacturer's standard type.

D. Fasteners: Manufacturer's standard type, high performance organic coating, finish to match adjacent surfaces when exterior exposed.

E. Bituminous Paint: Asphaltic type.

F. Sealant: ASTM C920, elastomeric sealant with movement capability of at least plus/minus 50 percent; 100 percent silicone; for exposed applications, match adjacent colors as closely as possible.

G. Trim, Closure Pieces, Caps, Flashings, Gutters, Downspouts, Rain Water Diverter, Fascias, and Infills: Same material, thickness and finish as exterior sheets; brake formed to required profiles.

2.06 COMPONENTS

A. Doors and Frames: See Section 08 1113.

B. Overhead Doors: See Section 08 3613.

C. Windows: See Section 08 5200.

2.07 FABRICATION - FRAMING

A. Fabricate members in accordance with AISC 360 for plate, bar, tube, or rolled structural shapes.

B. Provide wall opening framing for doors, windows, and other accessory components.

2.08 FABRICATION - WALL AND ROOF PANELS

A. Insulated Metal Panels: see specification sections 07 4113 and 07 4213.19.

B. Wall Panels: Back side of Parapet Wall at Main Entry - Provide manufacturer's standard panels complying with the following:
1. Ribbed Panels: Reverse-rolled wall panel with 1 1/4 inch (32mm) ribs at 12 inches (305mm) on center with semi-concealed fasteners.
2. Finish: Match Roof color
3. Gauge: 26 ga.

C. Insulated Roof Panels: see specification section

D. Alternate #3 - Roofing: Minimum 24 ga., 0.024-0.028 inch metal thickness, standing seam profile, lapped edges fitted with continuous gaskets.

E. Alternate #3 - Standing-Seam Roof Panels: A mechanically seamed trapezoidal standing seam roof panel with concealed clips. Installed directly over purlins, with thermal spacer. Tested in accordance with ASTM E 1646 and E 1680 for water penetration and air infiltration, and per ASTM E1592 for wind uplift capacity.
1. Finish:
2. Gauge: 24 ga
3. Basis of Design:
a. Nucor CFR Standing Seam Roof System; Vise-Lock 360º
b. Alliance; AS-24 (Alliance Seam 24 Panel); QuadLok Seam.
c. American Buildings; Standing Seam 360.

F. Roof Panel Accessories: Provide components required for a complete roof panel assembly including trim, copings, fasciae, mullions, sills, corner units, ridge closures, clips, seam covers, battens, flashings, gutters, sealants, gaskets, fillers, closure strips, and similar items. Match materials and finishes of roof panels, unless otherwise indicated.
1. Closures: Provide closures at eave and ridge, fabricated of same metal as roof panels.
2. Clips: Minimum 0.0625-inch- thick, corrosion-resistant panel clips designed to withstand negative-load requirements. Floating to accommodate thermal movement.
3. Cleats: Mechanically seamed cleats formed from minimum 0.0250-inch- thick, stainless-steel or nylon-coated aluminum sheet.

4. Alternate #3 - Thermal Spacer Blocks: Where panels attach directly to purlins, provide 1-inch-thick, thermal spacer blocks; fabricated from extruded polystyrene.
5. Backing Plates: Provide metal backing plates at panel end splices, fabricated from material recommended by manufacturer.

G. Girts/Purlins: Rolled formed structural shape to receive siding, roofing and liner sheet.

H. Internal and External Corners: Same material thickness and finish as adjacent material, profile brake formed to required angles. Back brace mitered internal corners with fabricated material recommended by manufacturer.

I. Flashings, Closure Pieces, Fascia: Same material and finish see drawing elevations, profile to suit system.

J. Fasteners: To maintain load requirements and weather tight installation, same finish as cladding, non-corrosive type.

2.09 FABRICATION - GUTTERS AND DOWNSPOUTS

A. Fabricate of same material and finish as roofing metal.

B. Form gutters and downspouts of K profile and size to collect and remove water. Fabricate with connection pieces.

C. Form sections in maximum possible lengths. Hem exposed edges. Allow for expansion at joints.

D. Fabricate support straps of same material and finish as roofing metal, color as selected.

E. Gutters and Downspouts: Size for rainfall intensity determined by a storm occurrence of 1 in 10 years in accordance with SMACNA Architectural Sheet Metal Manual.

F. Parapet Gutter with Scupper and Conductor Heads: Weld watertight. Set in sealant and secured to structure.

G. Downspout Boots to in ground inlets.

2.10 SNOW GUARDS

A. Basis of Design: Sno Gem; 2" iClad-S Snow Retention System for standing seam metal roof systems. 2 in. iBeam-S. Aluminum

B. Finish: Match Color of Roof Panel.

C. Attachment: Coordinate with standing seam roof. Basis of Design: "Sno Cube Wide".

D. Fasteners: Stainless Steel. Basis of Design: "Silver Bullet"

2.11 FINISHES

A. Framing Members Painted: Clean, prepare, and shop prime and paint. Do not prime and paint surfaces to be field welded. See finish plans in Drawings

B. Framing Members Primed: Unless otherwise noted on drawings – Clean, prepare, and shop prime. Do not prime surfaces to be field welded.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that foundation, floor slab, mechanical and electrical utilities, and placed anchors are in correct position

3.02 ERECTION - FRAMING

A. Contractor is solely responsible for erection safety.

B. Erect framing in accordance with AISC 360.

C. Provide for erection and wind loads. Provide temporary bracing to maintain structure plumb and in alignment until completion of erection and installation of permanent bracing. Locate braced bays as indicated.

D. Set column base plates with non-shrink grout to achieve full plate bearing.

E. Do not field cut or alter structural members without approval.

F. Abrasion cutting of panels is not permitted.

G. After erection, prime welds, abrasions, and surfaces not shop primed.

3.03 ERECTION - WALL AND ROOF PANELS

A. Install in accordance with manufacturer's instructions.

B. Exercise care when cutting prefinished material to ensure cuttings do not remain on finish surface.

C. Fasten cladding system to structural supports, aligned level and plumb.

D. Locate end laps over supports. End laps minimum 4 inches or as recommended by manufacturer. Install side laps with minimum of 1 full corrugation. Place side laps over bearing.

E. Provide expansion joints where indicated.

F. Use concealed fasteners.

G. Alternate #3 - Install insulation and vapor retarder utilizing wall insulation hangers for attachment.

H. Install sealant and gaskets, providing weather tight installation.

3.04 THERMAL INSULATION INSTALLATION – ALTERNATE #3

A. General: Install insulation concurrently with metal panel installation, in thickness indicated to cover entire surface, according to manufacturer's written instructions
   1. Install pre-engineered building insulation system in accordance with manufacturer's installation instructions and the approved shop drawings.
   2. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.
   3. Install in exterior spaces without gaps or voids. Do not compress insulation.
   4. Trim insulation neatly to fit spaces. Insulate miscellaneous gaps and voids.
   5. Fit insulation tight in spaces and tight to exterior side of the sealed liner fabric and around mechanical and electrical services within plane of insulation.

B. Roof Insulation Installation:
   1. Straps:
      a. Cut straps to length and install in the pattern and spacings indicated on shop drawings.
      b. Tension straps to required value.
   2. Vapor Barrier Fabric:
      a. Install vapor barrier fabric in large one-piece custom fabricated pieces to substantially fit defined building areas with minimum practicable job site sealing.
      b. Position pre-folded fabric on the strap platform along one eave purlin.
      c. Clamp the two bottom corners at the eave and also centered on the bay.
      d. Pull the other end of the pleat-folded fabric across the building width on the strap platform, pausing only at the ridge to fasten the straps and fabric in position where plane of roof changes and to release temporary fasteners on the opposite ridge purlins.
      e. Once positioned, install fasteners from the bottom side at each strap/purlins intersection.
      f. Trim edges and seal along the rafters.
      g. All seams must be completely sealed and stapled seams not acceptable.
   3. Insulation:
      a. Unpack, and shake to a thickness exceeding the specified thickness.
      b. Ensure that cavities are filled completely with insulation.
      c. Place on the vapor barrier liner fabric without voids or gaps.
      d. Place top layer of insulation over and perpendicular to the purlins without voids or gaps, as roof sheathing is applied.
      e. Place thermal block on top of purlins or bottom of purlins for retrofit work, if no other thermal break exists.
      f. Place new insulation between purlins at the required thickness for the R-value specified.

g. Seal vapor barrier fabric to the wall fabric and elsewhere as required to provide a continuous vapor barrier. Seal vapor barrier fabric to clean and dry structure with sealant and then seal completely with Simple Saver Air-Tight™ Sealant. Simple Saver Syseal patch tape and Simple Saver Air-Tight™ Sealant shall be used to effectively and permanently seal around any and all penetrations through Syseal fabric liner. Attention to detail is crucial. Utilize methods to reduce penetrations

3.05 INSTALLATION - ACCESSORY COMPONENTS IN WALL SYSTEM

A. Provide all metal trim and flashing at all penetrations including but not limited to Storefront, Doors, Louvers, and Mechanical Ducts.

3.06 TOLERANCES

A. Structural-Steel Erection Tolerances: Comply with erection tolerance limits of AISC S303, "Code of Standard Practice for Steel Buildings and Bridges."

B. Framing Members: 1/4 inch from level; 1/8 inch from plumb.

C. Siding and Roofing: 1/8 inch from true position.

3.07 CLEANING AND PROTECTION

A. Touchup Painting: Immediately after erection, clean, prepare, and prime or re-prime welds, bolted connections, and abraded surfaces of prime-painted primary and secondary framing, accessories, and bearing plates.
   1. Clean and prepare surfaces by hand-tool cleaning, SSPC-SP 2, or power-tool cleaning, SSPC-SP 3.
   2. Apply compatible primer of same type as shop primer used on adjacent surfaces.

B. Touchup Painting: Cleaning and touchup painting of field welds, bolted connections, and abraded surfaces of shop-painted primary and secondary framing, accessories, and bearing plates are included in Division 9 Section "Painting."

C. Repair damaged galvanized coatings on exposed surfaces with galvanized repair paint according to ASTM A 780 and manufacturer's written instructions.

D. Roof and Wall Panels: Remove temporary protective coverings and strippable films, if any, as soon as each panel is installed. On completion of panel installation, clean finished surfaces as recommended by panel manufacturer and maintain in a clean condition during construction.
   1. Replace panels that have been damaged or have deteriorated beyond successful repair by finish touchup or similar minor repair procedures.

E. Contractor shall clean all mud, prints or dirt from structure.

F. Contractor shall ensure that all loose metal fragments and fasteners are continuously picked up and discarded.

G. Thin primer or rusted steel shall receive additional coat of primer in field prior to completion.

END OF SECTION 13 3419

SECTION 14 2400
HYDRAULIC ELEVATORS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Complete hydraulic elevator systems.
   1. Passenger type.

B. All engineering, equipment, labor and permits required to satisfactorily complete elevator installation as required by contract documents.

C. Hoistway, pit and machine room barricades as required.

D. Pit ladder and accessories.

E. Cartage and Hoisting: all required staging, hoisting, and movement to, on and from site including new equipment, reused equipment or dismantling and removal of existing equipment.

F. Perform required inspections and tests before the elevator is turned over to the owner at the time of substantial completion

G. Permit, license and inspection fees necessary to complete the work.

H. Elevator Maintenance Contract.

1.02 RELATED REQUIREMENTS

A. Section 03 3000 - Cast-in-Place Concrete: Includes elevator pit and grouting thresholds.

B. Section 03 30 00 - Cast-in-Place Concrete: Execution requirements for placement of elevator machine anchors in concrete.

C. Section 04 20 00 - Unit Masonry: Execution requirements for placement of special guide rail brackets and inserts.

D. Section 04 2000 - Unit Masonry: Masonry hoistway enclosure; building-in and grouting hoistway door frames.

E. Section 05 1200 - Structural Steel Framing: Includes overhead hoist beams.

F. Section 05 5000 - Metal Fabrications: Includes sill supports, overhead hoist beams, and plates, angle brackets, and other preparation of structural steel for fastening guide-rail brackets.

G. Section 07 14 00 - Fluid-Applied Waterproofing: Waterproofing of elevator pit walls and floor.

H. Section 07 8400 - Firestopping: Fire rated sealant in hoistway.

I. Section 10 4400 - Fire Protection Specialties: Fire extinguisher in elevator machine room.

J. Section 21 1300 - Fire-Suppression Sprinkler Systems: Sprinkler heads in hoistway.

K. Section 22 0513 - Common Motor Requirements for Plumbing Equipment: Motor for sump pump in pit.

L. Section 22 3000 - Plumbing Equipment: Pit sump and pump.

M. Section 26 0533.13 - Conduit for Electrical Systems:
   1. Conduit to elevator equipment devices remote from elevator machine room or hoistway.
   2. Conduit between controller cabinet in machine room to remote group supervisory panel location indicated or as directed by owner.

N. Section 26 0583 - Wiring Connections:
   1. Electrical characteristics and wiring connections.
   2. Electrical service to main disconnect located in elevator machine room.
   3. Emergency power transfer cabinet.
   4. Electrical power for elevator installation and testing.
   5. Electrical disconnecting device to elevator equipment prior to activation of sprinkler system.
   6. Electrical service for machine room, convenience outlets, and elevator pit.
   7. Lighting in elevator pit.

8. Conduit for telephone service to location(s) as indicated on drawings.

O. Section 26 3600 - Transfer Switches: For interface with elevator controls.

P. Section 28 4600 - Fire Detection and Alarm:
1. Fire and smoke detectors and interconnecting devices.
2. Fire alarm signal lines to elevator controller cabinet.

Q. Section 31 2316 - Excavation: Excavation for cylinder casing, hydraulic lines, and remote machine room.

R. Section 31 2323 - Fill: Backfilling for cylinder casing, hydraulic lines, and remote machine room.

1.03 REFERENCE STANDARDS

A. AAMA 611 - Specification for Anodized Architectural Aluminum.

B. ADA Standards - 2010 ADA Standards for Accessible Design.

C. AISC 360 - Specification for Structural Steel Buildings.

D. ASME A17.1 - Safety Code for Elevators and Escalators Includes Requirements for Elevators, Escalators, Dumbwaiters, Moving Walks, Material Lifts, and Dumbwaiters with Automatic Transfer Devices.

E. 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, Dumbwaiters, and Material Lifts.

F. ASTM A36/A36M - Standard Specification for Carbon Structural Steel.

G. ASTM A139/A139M - Standard Specification for Electric-Fusion (Arc)-Welded Steel Pipe (NPS 4 and Over).

H. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.

I. ASTM A666/A666M - Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar.

J. ASTM A1008/A1008M - Standard Specification for Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, Required Hardness, Solution Hardened, and Bake Hardenable.

K. ASTM B209/B209M - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate.

L. ASTM B221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes.

M. ASTM B221M - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes (Metric).

N. AWS B2.1/B2.1M - Specification for Welding Procedure and Performance Qualification.

O. AWS D1.1/D1.1M - Structural Welding Code - Steel.

P. ITS (DIR) - Directory of Listed Products.

Q. NEMA MG 00001 - Motors and Generators.

R. NFPA 70 - National Electrical Code.

S. NFPA 80 - Standard for Fire Doors and Other Opening Protectives.

T. UL (DIR) - Online Certifications Directory.

1.04 ADMINISTRATIVE REQUIREMENTS

A. Coordination:
1. Coordinate required shaft size with shaft construction contractors.

2. Coordinate work with other installers to provide conduits necessary for installation of wiring including but not limited to:
   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.
3. Coordinate work with other installers for equipment provisions necessary for proper elevator operation, including but not limited to, the following:
   a. Automatic transfer switches with auxiliary contacts for emergency power transfer status indication.
   b. Shunt trip devices for automatic disconnection of elevator power prior to fire suppression system activation.
   c. Overcurrent protection devices selected to achieve required selective coordination.

B. Preinstallation Meeting: Convene meeting at least two weeks prior to start of this work.
1. Review schedule of installation, proper procedures and conditions, and coordination with related work.

C. Construction Use of Elevator: Not permitted.

1.05 PERMIT, TEST AND INSPECTION

A. Obtain and pay for permit, license and inspection fee necessary to complete the work.

B. Perform tests required by Governing Authority in accordance with procedure described in ASME A17.1 Safety Code for Elevators and Escalators in the presence of Authorized Representative.

C. Supply personnel and equipment for test and final review required by consultant.

1.06 SUBMITTALS

A. See Section 01 3000 - 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 guide rails, buffers, jack unit and other components.
3. Rail bracket spacing; maximum loads imposed on guide rails requiring load transfer to building structural framing.
4. Individual weight of principal components; load reaction at points of support.
5. Clearances and over-travel of car.
6. Locations in hoistway and machine room of traveling cables and connections for car lighting and telephone.
7. Location and sizes of hoistway and car doors and frames.
8. Calculated heat dissipation of elevator equipment in machine room.
9. Interface with building security system.
10. Electrical characteristics and connection requirements.
11. Indicate arrangement of elevator equipment and allow for clear passage of equipment through access openings.

D. Samples: Submit samples illustrating 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. Welders' Qualification Statement: Welders92 certificates in accordance with AWS B2.1/B2.1M and dated no more than 12 months before start of scheduled welding work.

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.
   2. No prorations of equipment or parts shall be allowed on the preventative maintenance contract.

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 hydraulic piping, and wiring diagrams of installed electrical equipment with list of corresponding symbols to identify markings on machine room and hoistway apparatus.

I. Specimen warranty.

J. Executed warranty.

1.07 QUALITY ASSURANCE

A. Designer Qualifications: Design guide rails, brackets, anchors, and machine anchors under direct supervision of a licensed Professional Structural Engineer experienced in design of this type of work and licensed in the State in which the Project is located.

B. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum ten years documented experience.

C. Installer Qualifications: Trained personnel and supervisor on staff of elevator equipment manufacturer.

D. The installation must comply with the provisions of the latest ANSI A17.1 followed by the authority having jurisdiction and any state and/or local requirements, if more stringent. Elevator mechanics and apprentices shall perform their work in a professional manor.

E. Products Requiring Fire Resistance Rating: Listed and classified by ITS (DIR), UL (DIR), or testing agency acceptable to authorities having jurisdiction.

F. 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.

G. Accessibility Requirements: In addition to local governing regulations, comply with ANSI A117.1-2003.

1.08 STORAGE AND PROTECTION

A. Designate receiving/storage areas for incoming products so that they are delivered according to installation schedule and placed convenient to work area in order to minimize waste due to excessive materials handling and misapplication.

B. Store and protect products in accordance with manufacturers' instructions.

C. Store with seals and labels intact and legible.

D. Store sensitive products in weather tight, climate controlled, enclosures in an environment favorable to product.

E. For exterior storage of fabricated products, place on sloped supports above ground.

F. Cover products subject to deterioration with impervious sheet covering. Provide ventilation to prevent condensation and degradation of products.

G. Prevent contact with material that may cause corrosion, discoloration, or staining.

1.09 WARRANTY

A. See Section 01 7800 - Closeout Submittals for additional warranty requirements.

B. Manufacturer Warranty: Provide 1-year manufacturer warranty for elevator operating equipment and devices. Complete forms in Owner's name and register with manufacturer.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Hydraulic Elevators:
1. Otis Elevator Company; Hydrofit: www.otis.com/#sle.
2. **BASIS OF DESIGN:** ThyssenKrupp Elevator; Endura: www.thyssenkruppelevator.com/#sle.
3. Substitutions: See Section 01 6000 - Product Requirements.

B. Source Limitations: Provide elevator and associated equipment and components produced by a single manufacturer and obtained from a single supplier.

2.02 HYDRAULIC ELEVATORS

A. Hydraulic Passenger Elevator:
1. Hydraulic Elevator Equipment:
   a. Holeless hydraulic with cylinder mounted within hoistway.
2. Drive System:
   a. Variable voltage variable frequency (VVVF) to modulate motor speed.
3. Operation Control Type:
   a. Selective Collective Automatic Operation Control.
4. Service Control Types:
   a. Standard service control.
5. Interior Car Height: 96 inch. Not less than 93 inches to underside of ceiling.
6. Electrical Power: 480 volts; alternating current (AC); three phase; 60 Hz.
7. Rated Net Capacity: 5000 pounds.
8. Rated Speed: 150 feet per minute.
9. Hoistway Size: As indicated on drawings.
10. Interior Car Platform Size: As indicated on drawings, approximately 8'-5" x 8'-5" inside car dimension.
11. Elevator Pit Depth: 60 inch, unless otherwise indicated.
12. Overhead Clearance at Top Floor: 150 inch, minimum.
13. Travel Distance: as indicated on drawings.
14. Number of Stops: 2.
15. Number of Openings: 2 Front.
16. Machine Equipment Location: in the elevator shaft, machine roomless

2.03 COMPONENTS

A. Elevator Equipment:
1. Motors, Hydraulic Equipment, Controllers, Controls, Buttons, Wiring, Devices, and Indicators: Comply with NFPA 70.
2. Guide Rails, Cables, 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:
   a. Spring type for elevators with speed less than or equal to 200 fpm.

B. Electrical Equipment:
1. Motors: NEMA MG 1.
2. Boxes, Conduit, Wiring, and Devices: As required by NFPA 70.
3. Spare Conductors: Provide ten percent in extra conductors and two pairs of shielded audio cables in traveling cables.
4. Include wiring and connections to elevator devices remote from hoistway. See Section 26 0583.

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 in compliance with requirements of authorities having jurisdiction.

F. Perform electrical work in accordance with NFPA 70.

G. Comply with fire protection sprinkler system of hoistway design in accordance with NFPA 13 requirements and authorities having jurisdiction (AHJ).

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. Non-proprietary Equipment Design
   1. For the Owner to maintain flexibility and a competitive posture in the procurement of preventative maintenance after the installation has been completed. Bidders shall furnish non-proprietary elevator control equipment as specified. Any other control manufacturers do not meet the specifications will not be accepted. The Owner shall have access to software revisions and any necessary technical support after completion of the installation. Any diagnostic devices necessary to adjust, troubleshoot and change parameters, shall be part of the control system and shall become Owner’s property. If exceptions to this language are taken or the language is in any way altered by the bidder, their bid shall be considered non-responsive. The acceptable control manufacturers are:
      a. GAL Manufacturing Corporation
      b. Motion Control Engineering (MCE)
      c. Koyo PLC or BRX PLC
      d. Elevator Control Inc.
      e. No other controls will be accepted.

C. Interconnect elevator control system with building security, fire alarm, smoke alarm, and building management control systems.

D. 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 object proximity detector device.

E. Automatic Operation of Lights and Fan: When elevator is stopped and unoccupied with doors closed, lighting, ventilation fan, and cab displays are de-energized after five minutes and are re- energized before car doors open.

F. Security features shall not affect emergency firefighters' service.
   1. Card Access: Activated and deactivated by security card system at car-control stations.

G. Provide "Firefighter's Emergency Operation" in accordance with ASME A17.1, applicable building codes, and authorities having jurisdiction (AHJ).
   1. Designated Landing: Main Lobby.

2.06 OPERATION CONTROL TYPE

A. 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.

B. Infrared Array: Provide door reopening device with uniform array of 36 or more microprocessor-controlled, infrared light beams projecting across car entrance. Interruption of one or more light beams shall cause doors to stop and reopen.

C. Nudging
1. If the doors are prevented from closing after a preset time interval because of an obstruction in the door opening, the doors will become inoperative and a buzzer will sound until the obstruction is removed. After the obstruction is removed, the car will recycle and return to normal operation.

2.07 SERVICE CONTROL TYPE

A. Emergency Fire Service
1. Provide Fire Service and proper signage as required by local statures and National Elevator Code. Manufacturer will supply contacts in the controller for the provisions of heat and/or smoke detectors.
a. Heat and Smoke" or "Products of Combustion" Sensing Devices must be installed in accordance with NFPA No. 72E in the elevator lobby at each floor and in the elevator machine room. The activation of any elevator lobby-sensing device shall cause the elevator to serve the lobby to return non-stop to the main floor. When the sensing device at the main floor elevator lobby is activated, the elevator that serves the lobby shall return non-stop to a predetermined alternate floor. Activation of a machine room Sensing Device shall cause the elevator to return to a predetermined landing. The key operated switch at the main floor (described above), when turned to the RESET position, shall restore normal service independent of the sensing devices.Heat and/or smoke sensors and all related wiring to the controller are supplied and installed by the electrical contractor.
2. Key Operated Switch at Main Floor
a. A three-position key operated switch shall be provided at the floor closest to the grade level (i.e. main floor) for each single elevator or each group of elevators in one common bank. The key shall be removable in the ON or OFF positions only. When the switch is in the ON position, all elevators controlled by this switch (which are on automatic service) shall return non-stopto the main floor where the door shall open and remain open.
3. Special Service Signal
a. When either the main floor key switch or a sensing device is activated and elevators are operating under an Special Service condition (including Inspection Service), both a visual and audible signal shall be activated in the cars, alerting the "attendant" to return non-stop to the main floor.
4. Key Operated Switch in Cars
a. A three-position (OFF, HOLD & ON) key operated switch shall be provided in the operating panel in each car. It shall be effective only when the main floor key-operated switch (previously described) is in the ON position or when a sensing device has been activated and the car has returned to the main floor. The key shall be removable in each position. When the switch is in the ON position, the elevator shall be placed on Emergency Service:
1) The elevators shall be operable only from in the elevator.
2) Elevators shall not respond to the elevator corridor (hall) calls.

3) The opening of doors shall be by continuous pressure on the DOOR OPEN button. If that button is released prior to the doors reaching the fully open position, the doors shall automatically close. Fully open doors shall be closed by continuous pressure on the DOOR CLOSE button.
4) When the switch is in the HOLD position, the car shall remain at the floor with doors open and with the DOOR CLOSE and CAR FLOOR pushbuttons inoperative.
5) Each car shall be equipped with a CALL CANCEL button. When the switch is in the ON position, pressure on the CALL CANCEL shall cancel all registered car calls. A traveling car shall stop at or near the next available floor.

2.08 EMERGENCY POWER

A. Set-up elevator operation to run with elevator emergency power supply when the normal building power supply fails, and in compliance with ASME A17.1 requirements.

B. Elevator Emergency Power Supply: Supplied by battery backup; provide elevator system components as required for emergency power characteristics.

C. Emergency Lighting: Comply with ASME A17.1 elevator lighting requirements.

D. Provide operational control circuitry for adapting the change from normal to emergency power.

E. Upon transfer to emergency power, advance one elevator at a time to a pre-selected landing, stop car, open doors, disable operating circuits, and hold in standby condition.

2.09 MATERIALS

A. Steel Cylinder Casing: ASTM A139/A139M, Grade A steel.

B. Rolled Steel Sections, Shapes, Rods: ASTM A36/A36M.

C. Steel Sheet: ASTM A1008/A1008M, Designation CS (commercial steel), with matte finish.

D. Sheet Steel: Hot-dipped galvanized steel sheet, ASTM A653/A653M, with G90/Z275 coating.

E. Stainless Steel Sheet: ASTM A666/A666M, Type 304; No. 4 Brushed finish unless otherwise indicated.

F. Extruded Aluminum: ASTM B221 (ASTM B221M), natural anodized finish unless otherwise indicated.

G. Aluminum Sheet: ASTM B209/B209M, 3105 alloy, O temper.

2.10 CAR AND HOISTWAY ENTRANCES

A. Elevator, E1:
1. Car and Hoistway Entrances, Each Elevator Floor Lobby:
a. Hoistway Fire Rating: As indicated on drawings.
b. Framed Opening Finish and Material: Brushed stainless steel.
c. Car Door Material: Stainless steel, with rigid sandwich panel construction.
d. Hoistway Door Material: Stainless steel, with rigid sandwich panel construction.
e. Door Type:
1) Double leaf.
f. Door Operation:Center opening, single speed
g. Door Width: 54 inch.
h. Door Height: 84 inches.
i. Sills: Extruded aluminum.

B. Sills/Thresholds: Configure to align with frame return and coordinate with floor finish.

C. Toe Guard: code compliant toe guard.

D. Gasketing: Provide acoustic type gasketing at hoistway doors and frames to eliminate audible noise due to car activities in the hoistway, and air pressure differential between hoistway and landing floors.

E. Hall Call Stations

1. One hall station will be located at each landing beside the hoistway entrance at proper ADA height, one button at terminal landings and two buttons at intermediate landings indicating the direction of travel possible. The buttons will light and stay lit until the hall call is answered. Faceplates will be finished in #4 stainless steel and will be made to cover the opening in the wall where the existing push button is located.
2. A code compliant “DO NOT USE IN CASE OF FIRE” pictograph at each hall station will be provided by manufacturer.

F. Jamb Braille
1. Braille will be provided on both door jambs. Characters will be 2” high, raised 1/32”, upper case block letters, grade 2 Braille and located 60” above the floor.

2.11 CAR EQUIPMENT AND MATERIALS

A. Elevator Car, E1:
1. Car Operating Panel: Provide main; flush-mounted applied face plate, with illuminated call buttons corresponding to floors served with "Door Open/Door Close" buttons, "Door Open" button, "Door Close" button, and alarm button.
   a. Panel Material: Integral with front return; one per car.
   b. Car Floor Position Indicator: Above car operating panel with illuminating position indicators.
   c. Locate alarm button where it is unlikely to be accidentally actuated; not more than 54 inch above car finished floor.
   d. Provide matching service cabinet integral with front return panel, with hinged door and keyed lock in each car.
   e. The car station will be manufactured with #4 stainless steel finish, including the following operation devices: one button for each floor served; alarm bell button; keyed emergency stop button; door open button; door close button; digital car position indicator; keyed light and fan switch.
   f. Provide "No Smoking" sign matching car-control station, either integral with car-control station or mounted adjacent to it, with text and graphics as required by authorities having jurisdiction.
   g. Emergency Communication System: Two-way voice communication system, with visible signal, which dials preprogrammed number of monitoring station and does not require handset use. System is contained in flush-mounted cabinet, with identification, instructions for use, and battery backup power supply.
   h. Video communication.
   i. Car Riding Lantern and Passing Chime
      1) A car-riding lantern will be mounted in the return jamb of the car door entrance. The lantern will contain one arrow for the up direction and one arrow for the down direction. The arrow corresponding to the direction the car is traveling will be lit. The lantern will be equipped with audible tones corresponding to the direction of travel one tone for travel in the up direction and two tones for travel in the down direction. Faceplates will be finished in #4 stainless steel.
      2) b. A passing gong that will sound as the elevator stops at or passes each floor will be installed.
   j. Provide following within service cabinet as part of car operating panel:
      1) Switches for fan, light, and inspection control.
      2) Emergency light.
      3) Control for each other special feature specified.
      4) Convenience outlet receptacle; 110VAC, 15 amps.
2. Ventilation: Two speed fan with grille above ceiling.
3. Flooring: CPT-1, as indicated in Finish Plans.
4. Wall Base: Recessed stainless steel, 4 inch high.
5. Front Return Panel: Stainless steel.
6. Door Wall: Stainless steel.
7. Side Walls: Stainless steel.

8. Rear Wall: Stainless steel.
9. Hand Rail: Stainless steel, at each side wall, and rear wall at E5. Provide open clearance space 1-1/2 inch (38 mm) wide to face of wall.
    a. Flat Bar Stock, Solid.
    b. Stainless Steel Finish: No. 4 Brushed.
10. Ceiling:
    a. Concealed Frame Suspended Ceiling: Stainless steel, mount 7 inch below car canopy with 1-1/2 inch nominal space between edge of ceiling and wall. Align ceiling panel joints with joints between wall panels.
    b. Frame Finish: Clear anodized aluminum
    c. Panel Finish: No. 4 Brushed stainless steel.
    d. Lighting: LED, four low-voltage downlights in each panel.
11. Provide emergency access panel for egress from car at ceiling.

B. Car Accessories:
1. Certificate Frame: Stainless steel frame glazed with polycarbonate, and attached with tamper-proof screws.
2. Protective Pads: Heavy-Duty cover, padded with impact-resistant fill material, sewn with piping edges; fire resistant in compliance with ASME A17.1; brass grommets for supports, covering side and rear walls and front return, with cut-out for control panel; provide one set for each elevator.
    a. Color: As selected by Architect.
    b. Provide at least 4 inch clearance from bottom of pad to finished floor.
    c. Pad Supports: Stainless steel studs, and mounted from top of wall panels.

C. Provide steel-framed car enclosures with nonremovable wall panels, with removable car roof, access doors, power door operators, and ventilation.
1. Provide standard railings complying with ASME A17.1/CSA B44 on car tops where required by ASME A17.1/CSA B44.

2.12 MACHINE ROOM FITTINGS

A. Wall-Mounted Frames: Glazed with clear plastic; sized as required. Provide one chart each for master schematic and for lubrication chart. Install charts.

B. Key Cabinet: Wall-mounted, lockable, keyed to building keying system, for control and operating panel keys.
1. Provide one key cabinet keys.
2. Provide two control/operating panel keys.
3. Provide two card access keys.

C. Monitoring Device Interface:
1. Fabricate one multiple terminal block in controller relay panel or selector, in location indicated, for connection of monitoring devices for:
    a. Landing and car registration circuits.
    b. Motor generator running circuits.
    c. Load weighing circuits.
    d. Up and down peak programming circuits.
    e. Independent service switches.
2. Label terminals for use with alligator test clips.

2.13 FINISHES

A. Clear Anodized Finish: Class I, AAMA 611 AA-M12C22A41, clear anodic coating with electrolytically deposited organic seal; not less than 0.7 mil, 0.0007 inch thick.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify existing conditions before starting this work.

B. Verify that hoistway, pit, and machine room are ready for work of this section.

C. Verify hoistway shaft and openings are of correct size and within tolerance.

D. Verify location and size of machine foundation and position of machine foundation bolts.

E. Verify that electrical power is available and of correct characteristics.

F. Coordinate telephone and fire alarm tie-ins with owner's fire alarm and electrical contractors and be present when these devices are tested.

3.02 PREPARATION

A. Arrange for temporary electrical power for installation work and testing of elevator components; see Section 01 5000 - Temporary Facilities and Controls for additional requirements.

B. Excavate for in-ground hydraulic cylinder casing and remove subsoil from site; see Section 31 2316.

C. Maintain in-ground shaft alignment of 1/2 inch maximum from plumb.
   1. Fill over-excavated shaft depth with lean concrete.

D. Maintain elevator pit excavation free of water.

E. Maintain in-ground elevator shaft excavation free of water.

F. Place in-ground plunger casing full depth of shaft. Align to 1/4 inch from plumb. Cut top of casing at hoistway pit slab elevation.

G. Backfill around in-ground cylinder casing; see Section 31 2323.

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 Division 26

D. Install hydraulic piping between cylinder and pump unit.

E. Mount machines, motors, and pumps on vibration and acoustic isolators.
   1. Place on structural supports and bearing plates.
   2. Securely fasten to building supports.
   3. Prevent lateral displacement.

F. Install hoistway, elevator equipment, and components in accordance with approved shop drawings.

G. Install guide rails to allow for thermal expansion and contraction movement of guide rails.

H. Accurately machine and align guide rails, forming smooth joints with machined splice plates.

I. Bolt brackets to inserts placed in concrete form work.

J. Field Welds: Chip and clean away oxidation and residue with wire brush; spot prime surface with two coats.

K. 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.

L. Structural Metal Surfaces: Clean surfaces of rust, oil or grease; wipe clean with solvent; prime two coats.

M. Machine Room Components: Clean and degrease; prime one coat, finish with two coats of enamel.

N. Wood Surfaces not Exposed to Public View: Finish with one coat primer; two coats enamel.

O. Adjust equipment for smooth and quiet operation.

3.04 TOLERANCES

A. Guide Rail Alignment: Plumb and parallel to each other in accordance with ASME A17.1 and ASME A17.2.

B. Car Movement on Aligned Guide Rails: Smooth movement, without any objectionable lateral or oscillating movement or vibration.

3.05 FIELD QUALITY CONTROL

A. See Section 01 4000 - Quality Requirements for additional requirements.

B. At completion of installation and before final acceptance, perform all tests and inspections required for certification by the prevailing code and regulatory agency.

C. The owner's representative before final acceptance shall conduct test and inspection, to certify compliance with all requirements of this section.

D. Obtain required permits and schedule tests with jurisdictional code authority.

E. Operational Tests:
   1. Perform operational tests in the presence of Owner and Architect.
   2. At an agreed time, and the building occupied with normal building traffic, conduct tests to verify performance.
      a. Furnish event recording of each landing call registrations, time initiated, and response time throughout entire working day.
      b. Measure time from moment doors start to close until car has stopped level at next floor landing and doors are opening.

3.06 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.

3.07 CLEANING

A. See Section 01 7000 - 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.

3.08 CLOSEOUT ACTIVITIES

A. See Section 01 7800 - Closeout Submittals for closeout submittals.

B. See Section 01 7900 - Demonstration and Training for additional requirements.

C. Demonstrate proper operation of equipment to Owner's designated representative.

D. 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.

E. 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 four hours of training.
   3. Instructor: Manufacturer's training personnel.
   4. Location: At project site, unless noted otherwise.

3.09 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 prior to Date of Substantial Completion.

3.10 MAINTENANCE

A. See Section 01 7000 - Execution and Closeout Requirements for additional requirements relating to initial maintenance service.

B. Provide Initial Maintenance Contract of elevator system and components in accordance with ASME A17.1 and requirements as indicated for 12 months from Date of Substantial Completion.

C. Perform maintenance contract services using competent and qualified personnel under the supervision and direct employ of the elevator manufacturer or original installer.

D. Maintenance contract services shall not be assigned or transferred to any agent or other entity without prior written consent of Owner.

E. Examine system components monthly.

F. Include systematic examination, adjustment, and lubrication of elevator equipment.

G. Maintain and repair or replace parts, whenever required, using parts produced by original equipment manufacturer.

H. Perform work without removing cars from use during peak traffic periods.

I. Provide emergency call back service during regular working hours throughout period of this maintenance contract.

J. Maintain an adequate stock of parts for replacement or emergency purposes, and have personnel available to ensure the fulfillment of this maintenance contract without unreasonable loss of time.

END OF SECTION