

Project Manual

ARCHITECT'S PROJECT NUMBER: 220120.00

Volume 1 of 2



CAMPUS POLICE RENOVATIONS

FOR THE

Board of Trustees
Joliet Junior College
1215 Houbolt Road
Joliet, Illinois 60431

June 28, 2021

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GEOTECHNICAL DATA

PART 1 GENERAL

1.01 EXISTING CONDITIONS

- A. Geotechnical Report:
1. Subsurface Exploration and Geotechnical Engineering Report for:
 - a. Entitled: Proposed JJC Campus Police Sally Port & Vehicle Storage Addition
 - b. Date: June 25, 2021.
 - c. Prepared by: ECS Midwest, LLC.
 - d. Project Number: 16:13614-A.
 2. This report identifies properties of below grade conditions and offers recommendations for the design of foundations, prepared primarily for the use of Architect.
 3. The recommendations described shall not be construed as a requirement of this Contract, unless specifically referenced in Contract Documents.
 4. 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 Price accruing to Owner.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)



ECS Midwest, LLC

Subsurface Exploration and Geotechnical Engineering Report

Proposed JJC Campus Police Sally Port & Vehicle Storage Addition

1215 Houbolt Road
Joliet, Illinois

ECS Project Number 16:13614-A

June 25, 2021





ECS MIDWEST, LLC

Geotechnical • Construction Materials • Environmental • Facilities

"Setting the Standard for Service"

June 25, 2021

Mr. Michael J. Lundeen
Legat Architects
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Chicago, Illinois 60661
Email: MLundeen@legat.com

ECS Project No. 16:13614-A

Reference: Report of Subsurface Exploration and Geotechnical Engineering
Proposed Campus Police Vehicle Storage Addition
1215 Houbolt Road
Joliet, Illinois 60046

Dear Mr. Lundeen:

ECS Midwest, LLC (ECS) has completed the subsurface exploration, laboratory testing, and geotechnical engineering analyses for the above-referenced project. This report presents our understanding of the geotechnical aspects of the project along, the results of the field exploration and laboratory testing conducted, and our design and construction recommendations.

It has been our pleasure to be of service to you on this project. We would like to continue our services during design and provide our services during construction to verify the assumptions of subsurface conditions made for this report. Please contact us should you have questions about the information contained in this report, or if we can be of further assistance to you.

Respectfully submitted,

ECS Midwest, LLC

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- Boring Location Diagram

Appendix B – Field and Laboratory Operations

- Reference Notes for Boring Logs
- Boring Logs B-1, B-2, B-3, P-1 and P-2
- Generalized Subsurface Soil Profile
- Subsurface Exploration Procedures: SPT
- Laboratory Testing Procedures: Index Testing

Appendix C – Supplemental Report Documents

- Important Information about This Geotechnical-Engineering Report

EXECUTIVE SUMMARY

This Executive Summary is intended as a very brief overview of the primary geotechnical conditions that are expected to affect design and construction. Information gleaned from this Executive Summary should not be utilized in lieu of reading the entire geotechnical report.

- The planned structure may be supported by conventional shallow foundations consisting of spread footings bearing on competent native soils or engineered fill overlying competent native soils proportioned for a maximum net allowable bearing pressure of 4,000 psf. A higher bearing pressure may be feasible for foundations bearing on competent bedrock, but rock cores should be performed to confirm bedrock.
- The building floor slab thicknesses may be determined based on an assumed modulus of subgrade reaction of 100 pounds per cubic inch (pci). We recommend the slabs be designed with a minimum thickness of 5 inches. The structural engineer should determine the actual slab thickness and steel reinforcing requirements.
- It is recommended ECS review the design documents to evaluate consistency with our recommendations.
- ECS is recommended to be retained for the construction materials testing to help facilitate proper implementation of our recommendations.

1.0 INTRODUCTION

The purpose of this report is to provide geotechnical information for the design of foundations, floor slabs, and pavements for the proposed development. The project will include a vehicular storage facility addition. The recommendations developed for this report are based on project information supplied by you.

ECS provided its services in accordance with ECS Proposal No. 16:20861-GPR, dated May 25, 2021, as authorized by Michael Lundeen on May 28, 2021, and includes the Terms and Conditions of Service included therein.

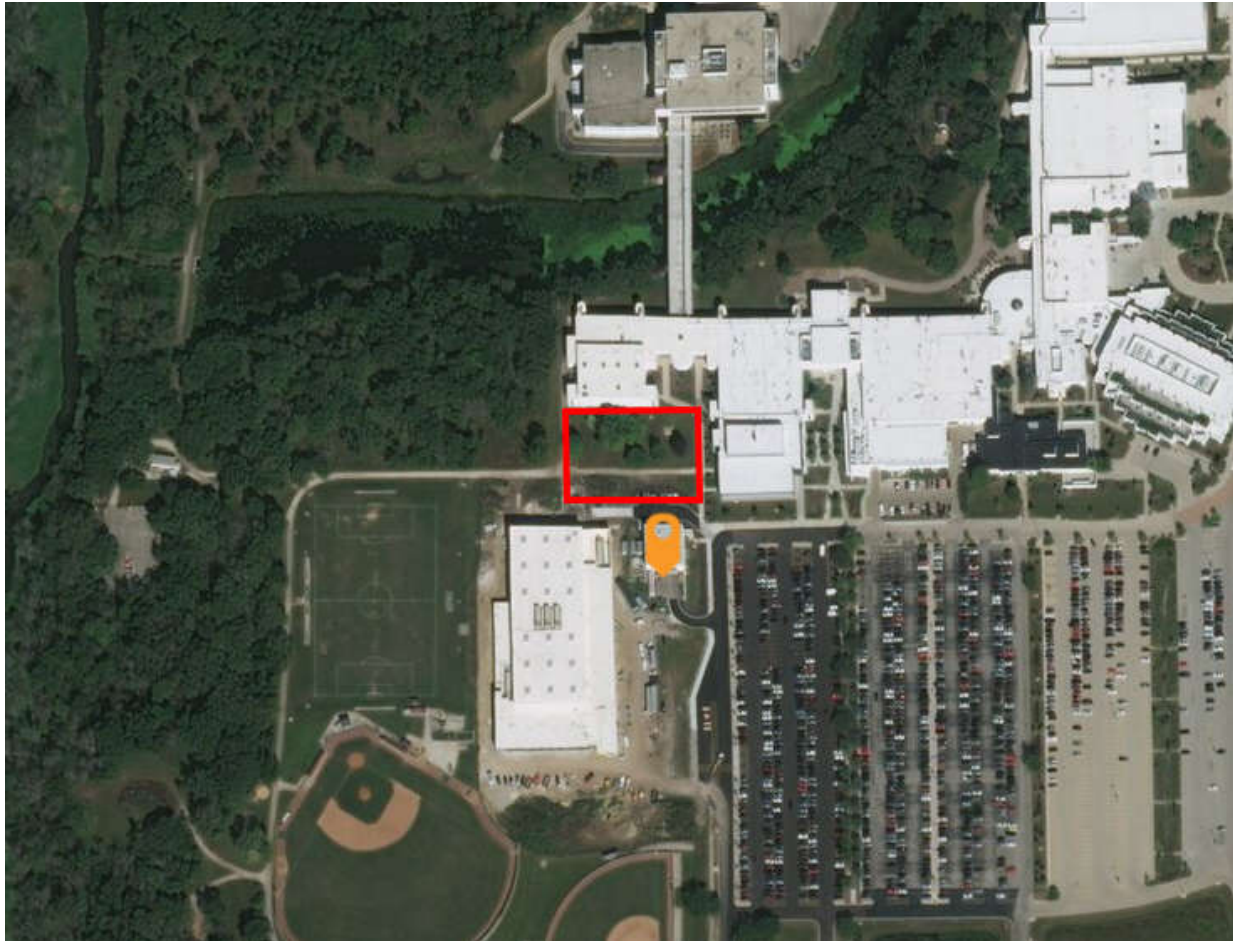
This report contains the procedures and results of the subsurface exploration and laboratory testing programs, a description of existing site conditions, engineering analyses, and geotechnical recommendations for the design and construction.

- The report includes the following items. A brief description of the field and laboratory test procedures and the results of testing conducted.
- A description of surface topographical features and site conditions.
- A description of subsurface soil stratigraphy with pertinent available physical properties.
- Records of the subsurface exploration (test boring logs).
- Recommendations for site preparation and construction of compacted fills, including an evaluation of on-site soils for use as compacted fills and delineation of potentially unsuitable soils at the time of sampling.
- Recommended foundation type(s).
- Recommendations for the design and construction of soil-supported slabs.
- General recommendations for pavement design, including a recommended design CBR value.
- Considerations relative to groundwater control.

2.0 PROJECT INFORMATION

2.1 PROJECT LOCATION AND CURRENT CONDITIONS

The project site is located at 1215 Houbolt Road in Joliet, Illinois. The site is located within the Joliet Junior College property. The site location is shown below, and on the Site Location Diagram in Appendix A.



Site Location

The project site is currently an undeveloped area of the Joliet Junior College campus. Ground cover in the proposed addition area consists of grass, sidewalk and a few trees. The site was relatively flat, and based on Google Earth topographic data, the ground surface elevations at the site vary from approximately EL. 555 feet to EL. 557 feet MSL.

2.2 PROPOSED CONSTRUCTION

We understand the development at the site will consist of a vehicular storage facility addition facility, which will include a building, and an associated parking lot.

Building: At the time this report was written, the structure loads and finished floor elevations (FFE) were not available. The information listed below summarizes our understanding and assumptions of the structure and its loads.

BUILDING DESIGN INFORMATION	
Subject	Expectation
Building Footprint	3,500 square feet in plan view
No. of Stories	One-story, slab-on-grade
Framing	Metal-frame
Column Loads	50 to 100 kips
Wall Loads	2 to 5 kips per linear foot (klf)
Slab on Grade Floor Live Load	200 psf live load
Finish Floor Elevation	556 +/-

The settlement tolerance of the proposed structure was not provided. Based on similar type construction we assume the maximum tolerable building settlement is 1 inch total and ½ to ¾ inch differential.

Pavement: The development will also include paved parking and drive lanes. The design traffic was not provided to us. Therefore, it was necessary for us to arbitrarily select design traffic volumes. The information below summarizes our assumptions of the traffic.

PAVEMENT DESIGN INFORMATION	
Pavement Area	Maximum Daily Traffic
Light Duty	250 automobiles and 3 delivery trucks
Heavy Duty	1000 automobiles and 12 delivery trucks

Site Grading: Based on the assumed floor elevation and considering the site topography when the borings were performed, it is assumed that approximately 1 foot or less of cut and fill will be needed to develop the floor elevation independent of subgrade preparation recommendations.

If ECS' understanding of the project is not correct, especially if the structural loads or elevations are different, please contact ECS so that we may review these changes and revise our recommendations, as appropriate.

3.0 FIELD EXPLORATION AND LABORATORY TESTING

3.1 FIELD EXPLORATION

The exploration procedures are described in greater detail in Appendix B including the insert titled Subsurface Exploration Procedures: SPT.

ECS used a measuring tape/wheel to identify boring locations in the field relative to existing site features prior to mobilization of the drilling equipment. These staked locations were then referenced using a handheld GPS. The manufacturer states the typical expected accuracy for this GPS receiver, in an open sky, is 2 to 4 meters. The approximate as-drilled boring locations are shown on the Boring Location Diagram in Appendix A. Ground surface elevations, noted on the boring logs, were estimated from the topographic information on Google Earth. Ground surface elevations and boring locations determined without professional survey are approximate and may not be appropriate for final design.

Prior to drilling our subcontracted driller contacted the State of Illinois Utility One-Call Center, JULIE, to clear and mark underground utilities in the vicinity of the project site.

Five (5) test borings were advanced at the site on June 15, 2021 by a subcontracted driller under the general guidance of ECS. Borings B-1, B-2 and B-3 located in the proposed building area each refused at an approximate depth of 9 to 12½ feet below existing site grade. Borings P-1 and P-2 located in proposed pavement areas were each advanced to an approximate depth of 10 feet. The drill crew utilized an ATV-mounted rotary drilling rig equipped with continuous flight, hollow stem augers to drill the borings.

The drill crew backfilled the boreholes at the completion of drilling. Borehole backfill settlement or expansion can and will occur over time. Monitoring the boreholes after the initial drilling activities is not within our scope. Settlement of the borehole backfill can create a trip hazard which should be carefully monitored by the client or property owner.

3.2 SUBSURFACE CHARACTERIZATION

The subsurface conditions encountered were generally consistent with published geological mapping. Listed in the following table is a generalized characterization of the soil strata encountered at the boring locations during the subsurface exploration. For subsurface information at a specific location, refer to the Boring Logs in Appendix B. A Generalized Subsurface Soil Profile (cross-section) of select borings is also included in Appendix B.

GENERALIZE SUBSURFACE STRATIGRAPHY					
Approximate Depth to Bottom of Stratum (feet)	Stratum	Description	Calibrated Penetrometer Resistance Q_p (tsf)	Water Content (%)	SPT ⁽¹⁾ N-values (bpf)
Surface cover	NA	Topsoil: 12 to 18 inches +/-	NA	NA	NA
1 to 3	I-A	(CL/ML Possible Fill) Silty Clay/Sandy Silty Clay , dark brown & brown, moist, stiff	4.5	11 to 12	11 to 21
1 to 3	I-B	(SP Possible Fill) Sand with Gravel , brown, medium dense	NA	NA	20
3 to 10	II	(SP/GP) Sand with Gravel/Gravel with Sand , brown, moist, dense to very dense (Observed only at borings B-1, B-3 & P-2)	NA	NA	27 to 52
3 to 6½	III	(CL/ML) Silty Clay , brown, moist, very stiff to hard	3 to 4.5	18	30 to 46
6 to 12½	IV	(WR) Weathered Limestone	NA	NA	50/2"

1. Standard Penetration Test

The Shallow Bedrock Groundwater Elevation map on the Illinois State Water Survey website (<https://www.arcgis.com/apps/webappviewer/index.html?id=e37efa4bb31e49c497d3d49f02340eaa>) indicates the bedrock elevation may be around EL. 550 feet above MSL.

The soil stratification shown on the boring logs represents the soil conditions at the actual boring locations. Variations in the stratification can occur between sample intervals and boring locations. The subsurface conditions at other times and locations on the site may differ from those found at the boring locations. If different site conditions are encountered during construction, ECS should be contacted to review our recommendations relative to the new information.

Because the split-spoon sampler has a 1½-inch inside diameter, the soil classifications noted on the boring logs may not be representative of the entire soil/bedrock matrix. Material larger than the 1½-inch inside diameter of the split-spoon sampler cannot be collected and observed directly. ***Although not specifically noted, the very high blow count and low recovery material generally encountered below approximately 6 to 8 feet may be highly weathered bedrock or contain cobbles/boulders.***

3.3 GROUNDWATER OBSERVATIONS

The drillers observed the boreholes for the presence of measurable water during drilling and at the completion of drilling. No measurable free water was observed at the borings during or at completion of drilling.

Based on the boring data, we estimate the static groundwater level to be at a depth deeper than the depths of exploration of approximately 10 to 12½ feet below the site surface at the boring locations (below approximately EL. 545 to EL. 548 +/- MSL).

Variations in the long-term water table elevation may occur because of changes in precipitation, evaporation, surface water runoff, construction activities, and other factors. Perched water conditions may also develop and/or exist at shallower depths seasonally, particularly within more permeable soil underlain by less permeable soil or bedrock.

3.4 LABORATORY SERVICES

The laboratory services performed by ECS for this project included classification and index property tests on representative soil samples. These tests included:

- Moisture content (ASTM D2216)
- Calibrated Penetrometer Resistance

The laboratory procedures are described in greater detail in Appendix B including the insert titled Laboratory Procedures. The results of the laboratory tests are included on the boring logs in Appendix B.

Each soil sample was visually classified on the basis of texture and plasticity using ASTM D2488, Standard Practice for Description and Identification of Soils (Visual-Manual Procedures) as a general guideline. After classification, the samples were grouped into the major zones noted on the boring logs in Appendix B. The USCS group symbols for each soil type are indicated in parentheses along with the soil descriptions. The stratification lines between strata on the boring logs are approximate; in-situ, the transitions may be gradual.

The soil samples will be retained in our laboratory for a period of 60 days, after which, they will be discarded unless other instructions are received as to their disposal.

4.0 DESIGN RECOMMENDATIONS

The following sections contain geotechnical design recommendations for foundations, soil supported slabs, and pavement.

4.1 FOUNDATIONS

The foundation analysis was conducted using the assumed floor elevation noted in the **Proposed Construction** section, the building area boring information, and the assumption the perimeter foundations will bear at approximately 3½ feet below the finished exterior grade and interior footings in heated areas will bear approximately 2 feet below the floor surface. Provided subgrades and engineered fills are prepared as discussed herein and the maximum column and wall loads are as assumed in the **Proposed Construction** section of this report, the proposed structure can be supported by conventional shallow foundations: individual column footings and continuous wall footings bearing on suitable natural soils and/or engineered fill placed continuous from a suitable bearing native soil subgrade. The design of the foundation is recommended to utilize the following parameters:

FOUNDATION DESIGN ⁽¹⁾		
Design Parameter		Value
Net Allowable Bearing Pressure ⁽²⁾		4,000 psf
Minimum Foundation Width	Wall (Strip)	18 inches
	Column (Spread)	30 inches
Post-Construction Estimated Settlement ⁽³⁾	Total	1 inch
	Differential	½ inch

1. We recommend a structural engineer provide specific foundation details including footing dimensions, reinforcing, and other details.
2. The applied pressure in excess of the surrounding overburden soils above the base of the foundation, based on a factor of safety of 3.
3. Based on assumed structural loads and assumed bearing elevations. If final loads and bearing elevations are different, ECS must be contacted to update foundation recommendations and settlement estimates. Differential settlement is based on maximum column/wall loads and variability among the borings. Differential settlement can be re-evaluated once the foundation plans are available.

Footing pads are recommended to be directly and entirely supported by suitable-bearing native soil and/or on engineered fill placed continuous from a suitable bearing native soil subgrade. Soils suitable for direct foundation support or as the subgrade for engineered fill and indirect foundation support should have parameters as noted in the following table or greater, unless otherwise recommended by ECS.

Footings On Bedrock: Relatively shallow weathered bedrock may be present at the test boring locations. A higher bearing capacity is possible but should be confirmed with rock cores. A shallow foundation system bearing in bedrock or bearing on lean concrete overlying bedrock may be preliminarily designed for a maximum, net, allowable bearing pressure of 6,000 psf. If supported on bedrock, footing pads are recommended to be directly and entirely supported by suitable bedrock and/or on engineered fill placed continuous from a suitable bedrock subgrade. Exposed bedrock surfaces should be free of loose bedrock, soil, water, and bedrock irregularities. It is expected that some foundation preparation would be required on the rock to facilitate a relatively flat and smooth bearing surface, and to remove loose rock. It is likely that a leveling course of lean concrete or granular material would be required to create a suitable working surface for structure work. The foundations are recommended to bear completely on bedrock. Where the foundations would be supported on a combination of soil and bedrock, abrupt differential

settlement is expected at transitions between soil and bedrock support. Where the footings bear on bedrock, unless all footings bear on rock, undercut the bedrock at least 1 foot below the planned footing grade and replacement with a compacted granular engineered backfill yield cushion to help reduce abrupt transitions is recommended.

TARGET BEARING MATERIAL PROPERTIES				
Bearing Capacity (psf)	Cohesive Soil		Cohesionless Soil	
	Relative Density	Unconfined Compressive Strength (tsf)	Relative Density	SPT N-values (bpf)
4,000	Very Stiff	2	Medium Dense	12

Where soft or otherwise unsuitable soils are observed at the footing bearing elevations, the unsuitable soils should be undercut and removed. Existing fill soils are recommended to be removed from below foundations. We recommend ECS be retained to observe and test the foundation bearing grade as recommended in the **Foundation and Slab Observations** section. It is also recommended backfill of foundation undercuts be done as recommended in the **Earthwork Operations** section.

Frost Depth: Footings should be placed at a depth to provide adequate frost cover protection. We recommend the perimeter footings be placed at a minimum depth of 3½ feet below finished exterior grade. Interior footings in heated areas can be placed at a minimum of 2 feet below grade provided suitable bearing soils are present and the foundations will not be subjected to freezing weather either during or after construction. Bear footings beyond the building which will not have the benefit of building heat at least 4 feet below the finished ground grade.

Adjacent Existing Foundations: Care must be taken to protect the existing structure. Excavations must be done so as not to undermine the existing construction, or otherwise adversely affect the structural integrity of the existing building.

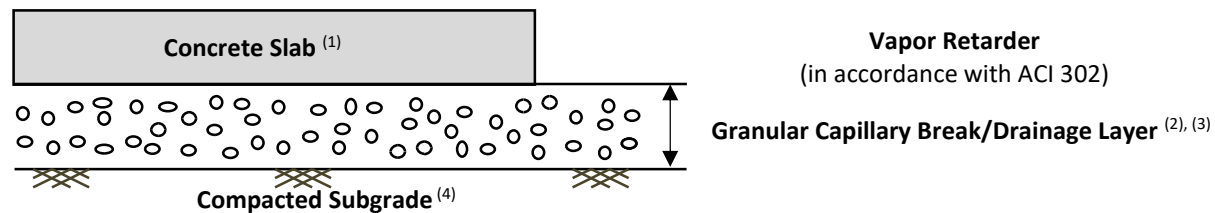
Excavations should not extend below adjacent existing foundations unless underpinning or other forms of support are provided. It is unknown if load will be added directly to existing foundations or to the support soil within the influence zone of the existing foundations. Contact ECS if new load will be added directly or indirectly to the existing foundations and/or support soil. Load added directly or indirectly can result in additional settlement. The amount of settlement will depend on the added load, the existing load, size of the existing footings, and strength and settlement characteristics of the support soil. Test pits in the presence of ECS are recommended to help determine the characteristics of the existing foundation bearing material, and to help evaluate the degree to which load on the existing foundations may be increased, if needed.

The new foundations are recommended to bear at the same elevation as nearby existing foundations. When the actual existing and proposed foundation systems and depths can be confirmed, contact ECS to evaluate whether our recommendations need to be altered to accommodate either foundation system accordingly. If the new and existing footings will bear at different elevations, a structural engineer should evaluate the stresses to be imposed on the lower foundation system and confirm that the structural integrity of both will be maintained.

4.2 SLABS ON GRADE

Based on the boring information and assumed finished floor elevation, the soil at the subgrade elevation is expected to be clay possible fill and native soil and engineered fill used to raise site grades. Some undercut or repair of the subgrade is expected to be necessary in areas to develop a suitable floor slab sub-grade, especially if the subgrade is subjected to wet weather and/or construction traffic disturbance.

Based on the anticipated subgrade soils and floor loading, the following graphic depicts our general soil-supported slab recommendations.



1. **Concrete Slab:** Minimum 5 inches thick
2. **Drainage Layer:** Minimum 6 inches thick
3. **Drainage Layer Material:** GRAVEL (GP, GW) having a maximum aggregate size of 1 inch, no more than 10 percent passing the No. 200 sieve and follow the recommendations of ACI 302.
4. **Compacted Subgrade:** Compacted to at least 95 percent of the maximum dry density per ASTM D1557.

The structural engineer should determine the slab thickness and other requirements such as steel reinforcement. The design should include adequate construction joints, contraction joints and isolation joints in the slab to reduce the impacts of cracking and shrinkage. Refer to the ACI 302.1R04 *Guide for Concrete Floor and Slab Construction* for additional information regarding concrete slab joint design. Inclusion of welded wire fabric or an appropriate fiber mesh admixture is recommended to help control shrinkage cracking.

We recommend slabs-on-grade be underlain by a granular drainage layer placed on a properly prepared subgrade as recommended in the **Site Construction Considerations** section. The granular material will serve as a capillary break, which if properly designed and installed can assist in more uniform curing of concrete.

Inclusion of a vapor retarder should be considered if the building will contain moisture-sensitive floor coverings, equipment or materials. The vapor retarder will help reduce the potential of upward migration of water vapor from the soil into and through the concrete slab, which can contribute to excess humidity and microbial growth in the building. Where a vapor retarder is considered to help provide additional moisture protection, special attention should be given to the surface curing of the slabs to reduce uneven drying of the slabs and associated cracking and/or slab curling. The designer should consider the moisture sensitivity of floor coverings and finishes, and the potential effects of slab curling and cracking when determining if the vapor retarder will be in direct contact with the slab or beneath a layer of granular fill. The use of a blotter or cushion layer above the vapor retarder may be considered for project specific reasons. Refer to ACI 302.1R04 *Guide for Concrete Floor and Slab Construction* and ASTM E 1643 *Standard Practice for Installation of Water Vapor Retarders Used in Contact with Earth or Granular Fill Under Concrete Slabs* for additional guidance on these issues.

Positive drainage around the perimeter of the proposed structures should be used to reduce the potential for water accumulation under the floor slab and foundation elements. Slope exterior grades

adjacent to the building such that runoff is directed away from the building walls. Direct building downspouts away from the building walls/foundations. Direct slab and pavement surface runoff to appropriate stormwater infrastructure.

Modulus of Subgrade Reaction: Provided the subgrade is prepared and engineered fill and the granular drainage layer are placed as recommended in this report, design the slabs assuming an un-factored modulus of subgrade reaction, k_{v1} of 100 psi/in (pounds per square inch per inch). This modulus of subgrade reaction value assumed is based on the recommended minimum drainage base thickness and correlation of index properties and soil type to historical 1 foot by 1 foot plate load tests on similar soil. The modulus value used in design should be adjusted for areas larger than 1 foot by 1 foot.

Slab Isolation: Isolate ground-supported slabs from the foundations and foundation-supported elements of the structure to reduce shear and bending stresses in the floor caused by differential movement between the foundations and slab. Where the structural configuration prevents the use of a free-floating slab, design the slab with suitable reinforcement and load transfer devices to preclude overstressing of the slab.

Frost Susceptible Areas: Frost susceptible soils were encountered at the site. Exterior slabs and slabs in poorly or unheated areas may be subject to frost heave. To help reduce frost heave potential, consider additional insulation, installation of subgrade drainage, and/or replacement to the frost depth with non-frost-susceptible backfill. Slope pavement and ground surface grades away from the building and flatwork, to help reduce water infiltration and potential frost heave problems.

4.3 PAVEMENT DESIGN CONSIDERATIONS

The following sections provide recommendations for pavements.

Subgrade Characteristics: A California Bearing Ratio (CBR) test is commonly used to determine soil support parameters for pavement design. A CBR test or other appropriate test was not part of the scope for this project, so it was necessary to assume the CBR design value. Based on the borings, it appears the pavement subgrade soils will mostly consist of CLAY fill soils or dense granular soils. The clay soil at the borings was found to have a firm to very stiff consistency at the anticipated subgrade, but because it is frost susceptible and does not drain well, it is generally considered a poor subgrade material. We assumed a preliminary design CBR value of 3. The pavement design recommendations assume the subgrade consists of suitable materials evaluated by ECS, and the subgrade is prepared as recommended in the **Subgrade Preparation** and **Earthwork Operations** sections of this report.

The subgrade soils are frost susceptible. A reduced service life, increased pavement maintenance and associated costs should be expected where the frost susceptible silty clay soil is present. The risk associated with frost susceptible soils could be reduced by removal of frost susceptible soils within 3 feet of the finished pavement grade and replacement with properly drained low frost susceptible engineered fill. In areas where the pavement grade will be raised, low frost susceptible fill should be used.

Pavement Sections: The recommended minimum pavement sections listed in the table below are based on the anticipated usage at the project site and a 20-year design service life, but were not developed based on specific traffic patterns, loading and resiliency factors, as those parameters were not provided by the design team. ***If the anticipated traffic will exceed that assumed in the Proposed Construction section, ECS should be contacted for revised pavement design recommendations; otherwise, increased***

pavement maintenance and a shortened pavement life should be expected. The preliminary pavement sections below are guidelines that may or may not comply with local jurisdictional minimums.

RECOMMENDED MINIMUM PAVEMENT SECTIONS				
Pavement Material	Compacted Material Thickness (inches)			
	Flexible Pavement		Rigid Pavement	
	Light Duty	Heavy Duty	Light Duty	Heavy Duty
Portland Cement Concrete ⁽¹⁾	--	--	5	6
Hot Mix Asphalt ⁽²⁾ Surface Course	1½	1½	--	--
Hot Mix Asphalt ⁽²⁾ Binder Course	2	2½	--	--
Aggregate Base Course ⁽³⁾	8	10	6	6
Total Pavement Section Thickness	11½	14	11	12

1. Section 420 of IDOT Standard Specification for Road and Bridge Construction.
2. Section 406 of IDOT Standard Specification for Road and Bridge Construction.
3. Section 351 of IDOT Standard Specification for Road and Bridge Construction. If crushed gravel or some other material is used in lieu of crushed stone, the material may have a lower structural coefficient and a thicker base may be required.

In frequent and higher stress traffic areas, such as where trucks frequently turn, delivery areas, trash enclosure pads, and points of ingress or egress, the heavy duty rigid pavement is recommended to be used. All pavement materials and construction should be in accordance with the AASHTO Guide for Design of Pavement Structures, and the IDOT Standard Specifications for Highway and Structure Construction.

If the pavements will be constructed early during site development to accommodate construction traffic, consideration should be given to the construction of designated haul roads, where thickened pavement sections are provided to accommodate the construction traffic, as well as the future in-service traffic. ECS can provide additional design assistance with recommended pavement sections for haul roads if requested.

We recommend the crushed granular base course be compacted to at least 95 percent of the maximum dry density obtained in accordance with ASTM D1557, Modified Proctor Method, within ±3 percent of the optimum moisture content value. The hot mix asphalt should be compacted to a minimum of 93 percent of the maximum theoretical density value.

Rigid Pavements: We recommend an air-entrained concrete mix (compressive strength of at least 4,000 pounds per square inch at 28 days) for rigid pavement. Adequate construction joints, contraction joints and isolation joints should be provided in the areas of rigid pavement to reduce the impacts of cracking and shrinkage. Please refer to ACI 330R-92 *Guide for Design of Concrete Parking Lots*. The Guide recommends an appropriate spacing strategy for the anticipated loads and pavement thickness. It has been our experience that joint spacing closer to the minimum values results in a pavement with less cracking and better long-term performance. Control joint spacing should be determined in accordance with the current ACI code. Separation joints should be provided where pavement abuts fixed objects, such as the buildings and light poles.

Weather Restrictions: Daily temperatures from mid-November to April can often stay below 40°F, limiting the days that asphalt placement can occur. In this region, asphalt plants may close during the months of December, January, and/or February if particularly cold weather conditions prevail. However, this can change based on year to year temperature fluctuations.

Pavement Drainage: An important consideration with the design and construction of pavements is surface and subsurface drainage. Based on the estimated groundwater level, we consider surface water infiltration to be the main source of water to be considered for pavement design.

The final pavement surface is recommended to be shaped or crowned to properly direct surface water to suitable on or off-site stormwater drainage infrastructure. The pavement subgrade should be properly sloped to avoid dips or pockets where water may become trapped. Dips in the subgrade can result in a “bathtub” effect, which may trap water. This trapped water can soften the subgrade and potentially heave the pavement during freezing weather. The subgrade in areas requiring undercut and backfill with granular soils are recommended to be graded to drain toward a drain tile. The drain tile should be sloped a minimum of ½ to 1 percent to discharge to nearby storm sewers, drainage ditches or other appropriate drainage facilities. Edge drains should be installed where site grades slope toward the pavement edge to reduce the potential for water to enter the base course layer. Edge drains should be sloped to the nearest appropriate drainage facility. Water that ponds on the subgrade surface can lead to deterioration of the subgrade soils, reduction of the base course support characteristics, and result in pavement heave during freezing conditions. Good drainage should help reduce the possibility of the subgrade materials being wet over a long period of time.

To reduce the potential for shallow perched water to develop in areas of the site, install “stub” or “finger” drains around catch basins and in other low-lying areas of the parking lot to reduce the accumulation of water above and within the subgrade soils and aggregate base. As an alternative to the use of stub or finger drains, perforate existing manholes and storm sewer inlets with 1-inch diameter holes at 2-foot centers, cover the holes with a wire mesh and wrap the manhole/inlet with a non-woven geotextile to reduce migration of material into the manhole/inlet. The holes could be placed at 90-degree intervals around the perimeter of the manhole, and the excavation around the manhole backfilled with free draining granular materials. Consider installation of pavement edge drains or trench drains to reduce the accumulation of water within the base course and on the subgrade soils.

Pavement Maintenance: A sound maintenance program should be implemented to help maintain and enhance the performance of pavements and help attain the design service life. A preventative maintenance program should be started early in the pavement life to be effective. The “standard in the industry” supported by research indicates that preventative maintenance should typically begin within 2 to 5 years of the placement of pavement. Seal joints and cracks with elastomeric caulk in a timely manner to help reduce water infiltration thru the pavement section into the base course layer, which may result in softening of the subgrade and deterioration of the pavement. Observe pavements for distresses, such as cracks, depressions and poor drainage, at least twice a year, typically once in the spring and once in the fall.

Shrinkage cracking is common with asphalt and occurs with age. Development of cracks should be expected with normal exposure to weather, wear and age. These cracks may become larger when exposed to such things as weather and vegetation growth, so should be treated promptly.

5.0 SITE CONSTRUCTION RECOMMENDATIONS

5.1 SUBGRADE PREPARATION

The method of site preparation will depend on some factors that were unknown at the time this report was prepared, which may include weather before and during construction, the possibility of subsurface conditions not revealed by the borings, and the final details of the proposed development.

5.1.1 Stripping and Initial Site Preparation

The subgrade preparation should include stripping pavement, vegetation, rootmat, topsoil, and other soft or otherwise unsuitable materials from the 10-foot expanded building limits, 5-foot expanded pavement limits, and 5 feet beyond the toe of engineered fills, where feasible. ECS should be retained to observe and document that topsoil and other unsuitable surficial materials have been removed prior to the placement of engineered fill or construction of structures.

ECS recommends the subgrade not be exposed to the elements or construction traffic for a prolonged period of time as the subgrade may become disturbed and/or softened. If footings are not planned to be constructed within a few days after exposing the final design subgrade, consideration should be given to leaving the subgrade approximately 1 foot above the final design subgrade, where feasible, to help reduce softening of the design subgrade soil.

5.1.2 Proofrolling

Prior to fill placement or other construction on subgrades, the subgrades should be evaluated by ECS. The exposed subgrade is recommended to be thoroughly proofrolled with construction equipment having a minimum axle load of 10 tons (e.g. fully loaded tandem-axle dump truck). The subgrade should be traversed with the proofroll equipment in two perpendicular (orthogonal) directions with overlapping passes of the vehicle. This procedure is intended to assist identification of yielding subgrade materials.

Unstable or pumping subgrade areas identified during the proofroll should be repaired prior to the placement of subsequent engineered fill or other construction materials. Unstable subgrade repair methods, such as undercutting, or moisture conditioning and recompaction, or chemical stabilization, should be discussed with ECS to determine the appropriate procedures regarding the existing conditions causing the instability. Test pits may be excavated in unstable areas to explore the shallow subsurface materials and to help determine the appropriate remedial action to stabilize the subgrade.

Seasonal reduction of the near surface soil strength can occur during wet times of the year (such as during the spring and fall months) or immediately following extended periods of rain. This may result in additional unstable or pumping subgrade areas. Some undercutting or repair of unstable subgrade soils should be anticipated during slab and pavement subgrade preparation. The method of subgrade repair or improvement chosen may be influenced by several factors such as weather and schedule, as well as the area, depth and nature of the unstable subgrade soils. Depending on these and other factors, potential subgrade repair methods are described below, but the actual depth of subgrade undercut and/or stabilization method should be determined at the time of construction. Some common subgrade repair methods include:

Scarification and Compaction: Soils can be scarified, moisture conditioned (i.e., dried or wetted) to within a narrow range of the material's optimum moisture content and compacted. Scarification and compaction is generally most applicable where very shallow unstable

conditions are encountered and at times when the soil can be properly dried or wetted to within a narrow range of the materials optimum moisture content.

Undercut and Replacement: We recommend soft or yielding soils be evaluated in approximately 6 to 12-inch intervals to help limit the volume of undercuts. If soft or yielding soils are identified, the contractor should remove only 6 to 12 inches of material at a time in the subject area and then proofroll/evaluate the undercut subgrade to determine if additional undercut is needed. This may take more time but could potentially reduce the removal of more soil than necessary. Use of a geogrid could also be considered to reduce undercut depths. A geogrid, if used, should be placed after underground work, such as utility construction, is complete. Do not operate equipment on the geogrid until after engineered fill is placed above it. Depending on the conditions at the time of repair, use of an aggregate engineered fill, such as crushed stone, crushed concrete or gravel, may be needed.

Chemical Modification: Alternatively, if these soils cannot be stabilized by conventional methods, chemical modification of the subgrade soils, such as with lime, lime kiln dust, cement, cement kiln dust, or other materials, may be utilized to reduce the moisture content and/or provide additional stabilization. An experienced pre-qualified contractor that has successfully chemically modified similar-sized projects with similar soil conditions is recommended to be used. The soil modification procedure, such as determination of the type and quantity of additive, and mixing and curing procedures, should be evaluated before implementation. This evaluation may include testing the soil to check if an adverse chemical reaction could occur. Chemical modification agents can have caustic effects to humans and property. The contractor should be required to minimize dusting or implement dust control measures, as required. For preliminary estimating purposes, the approximate incorporation rate (based on dry weight of soil) is typically in the range of 4 to 7 percent, by dry weight, for hydrated lime or lime by-products, and 4 to 10 percent, by dry weight, for Portland cement. Typically, the percentage needed is less for hydrated lime than other lime by-products because the available calcium oxide content of lime by-products tends to be lower. Note insufficient mellowing of modified soils could lead to heaving after placement. Subgrade modification can result in the creation of an 'aquiclude' layer which will allow water to pond above the stabilized surface within the base course. Such water, if not drained properly, can freeze in cold weather potentially resulting in significant heave of the pavement. Alterations to the pavement sections to include additional drainage, such as an open-graded drainage aggregate layer, may be needed if a chemically modified subgrade is used.

5.1.3 Site Temporary Dewatering

The contractor shall make their own assessment of temporary dewatering needs based upon the limited subsurface groundwater information presented in this report. Soil and groundwater conditions may vary between sampling intervals. If the contractor believes additional subsurface information is needed to assess dewatering needs, they should obtain such information at their own expense. ECS makes no warranties or guarantees regarding the adequacy of the provided information to determine dewatering requirements; such recommendations are beyond our scope of services.

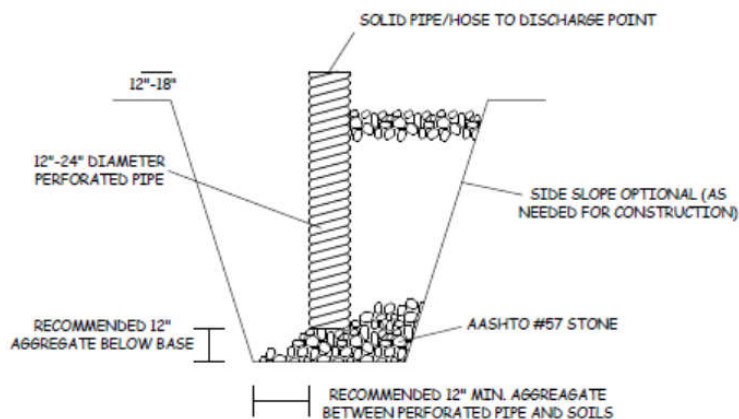
Dewatering systems are a critical component of many construction projects. Dewatering systems must be selected, designed, and maintained by a qualified and experienced (specialty or other) contractor familiar with the geotechnical and other aspects of the project. The failure to properly design and

maintain a dewatering system for a given project can result in delayed construction, unnecessary undercuts, detrimental phenomena such as 'running sand' conditions, heaved subgrades, internal erosion (i.e., 'piping'), the migration of 'fines' down-gradient towards the dewatering system, localized settlement of nearby infrastructure, foundations, slabs-on-grade and pavements, etc. Water discharged from site dewatering systems are recommended to be discharged in accordance with all local, state and federal requirements.

Surface Water: The surface of the site should be kept properly graded to enhance drainage of the surface water to appropriate discharge or storage areas during construction. We recommend that an attempt be made to enhance the natural drainage without interrupting its pattern.

Subsurface Water: Groundwater observations are described in the **Groundwater Observations** section of this report. It appears the hydrostatic groundwater level at this site may be approximately 10 to 12½ feet below grade. Excavations for new conventional shallow foundations are not expected to extend below the groundwater level encountered at the boring locations. Based upon the results of the subsurface exploration and proposed construction, we believe construction dewatering at this site will be mainly to remove accumulated runoff water and perched water. Strategies for addressing groundwater are discussed below.

Strategies for Addressing Perched Groundwater: The typical strategy for addressing perched groundwater seepage into excavations and where excavations extend typically less than 1 to 2 feet below the water level, especially in areas containing primarily clay soils, is pumping from trench (or French) drains and sump pits with sump pumps which are backfilled with drainage aggregate such as AASHTO Size No. 57 Stone or open-graded bedding material. A typical sump pump drain (found in a sump pit or along a French drain) is depicted below. The inlet of the sump pump is placed at the bottom of the corrugated pipe and the discharge end of the sump is directed to an appropriate stormwater drain.



Sump Pit/Pump Conceptual Sketch

A typical French drain consists of an 18 to 24-inch wide by 18- to 24-inch-deep bed of AASHTO No. 57 aggregate (or similar open graded aggregate) wrapped in a medium duty, non-woven geotextile and (sometimes) containing a 6-inch diameter, Schedule 40 PVC perforated or slotted pipe. Actual dimensions should be determined during construction. After installation, the geotextile should be wrapped over the top of the aggregate and pipe followed by placement of backfill. The top of the drain

should be positioned at least 3½ feet below the design subgrade elevation. Drains should not be routed within the expanded building limits.

Pumping wells or a vacuum system could also be used to address perched groundwater. These techniques often are only effective during the initial depletion of the perched water quantity and may quickly be ineffective at addressing accumulation of water from rain, snow, etc.

5.2 EARTHWORK OPERATIONS

5.2.1 Engineered Fill Materials

Product Submittals: Prior to placement of engineered fill, representative bulk samples (typically at least 50 to 100 pounds) of on-site and off-site borrow should be submitted to ECS for laboratory testing, which may include natural moisture content, organic content, grain-size distribution, Atterberg limits, and moisture-density relationships for compaction. Import material should be tested prior to being hauled to the site to determine if it complies with project specifications.

Satisfactory Engineered Fill Materials: Engineered fills should consist of materials free of debris with the following engineering properties.

ENGINEERED FILL INDEX PROPERTIES		
Subject		Property
Plasticity	Upper 4 feet in Building Areas and Upper 2 feet in Pavement Areas	LL ≤ 40, PI ≤ 15
	Below 4 feet in Building Areas and Below 2 feet in Pavement Areas	LL ≤ 50, PI ≤ 20
Max. Particle Size		3 inches
Max. Organic Content		5 percent

Open-graded materials, such as coarser sands, and gravels (SP and GP), which contain increased void space in their mass may need to be encapsulated within a filter geotextile. If the fill is to provide low-frost susceptible characteristics, it must be classified as a clean GW, GP, SW or SP per Unified Soil Classification System (ASTM D-2487), and must be properly drained.

Unsatisfactory Materials: Unsatisfactory engineered fill materials, which do not satisfy the requirements for suitable materials, include topsoil and organic materials (PT, OH, OL), frost susceptible silt (ML), and high plasticity soils elastic silt (MH) and fat clay (CH).

Pea gravel is not recommended to be used as engineered fill. Pea gravel has round/smooth characteristics, no fines and does not interlock when compacted, which makes it more susceptible to future movement and instability resulting in excessive and variable settlement.

On-Site Borrow Suitability: On-site soil used as engineered fill must not contain more than 3 percent organic matter as determined by ASTM D2974, and must be free of frozen matter, deleterious materials, over-sized material (maximum 3-inch particle diameter), or chemicals that may result in the material being classified as “contaminated.” The on-site soil may be feasible to use as engineered fill during favorable weather conditions but should be further evaluated by ECS prior to its use. Additionally, the clay soils had relatively high moisture so drying of on-site soil prior to reuse is expected to be needed. Some conditions at the time of construction, such as wet or freezing weather, may preclude the use of

on-site soil that have appreciable fines content (i.e. silt and clay), and use of “cleaner” on-site soil or an imported less moisture sensitive or less frost susceptible granular material may be needed.

5.2.2 Compaction

Subgrade Benching: Fill material should be placed in horizontal lifts. Where fill materials will be placed to widen existing embankment fills, or placed up against sloping ground, the soil subgrade should be scarified, and the new fill benched and keyed into the existing material. Placement and compaction of fill is recommended to be on a 5 (H):1 (V) or flatter slope, or stepped or benched as required to flatten.

Engineered fill Compaction: Engineered fill is recommended to be placed and compacted in appropriate thickness loose lifts as recommended below. Give as much importance to the moisture content requirements of the material as the density requirements during placement and compaction considering the moisture sensitivity of the soil.

ENGINEERED FILL COMPACTION RECOMMENDATIONS		
Subject		Recommendation
Compaction Standard		Modified Proctor, ASTM D1557
Recommended Compaction		≥ 95 percent of Max. Dry Density
Moisture Content	Fine-grained	-1 to +3 % points of the material’s optimum value
	Coarse-grained	-3 to +3 % points of the material’s optimum value

Compaction equipment suitable to the material type being compacted should be used. Sheepsfoot compaction equipment is typically suitable for the fine-grained soils (clays). A vibratory steel drum roller is typically used for compaction of coarse-grained soils (sands and gravels) as well as to help seal compacted surfaces. Vibratory compaction methods should be done with caution near the water table because an unstable subgrade condition could develop. Static compaction and thinner lifts may be needed near the water table.

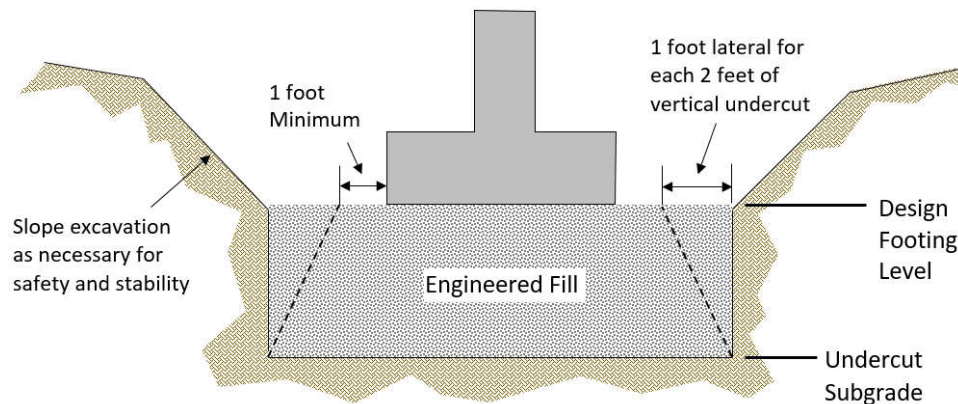
The maximum loose lift thickness depends upon the type of compaction equipment used and material being compacted. For isolated excavations around footing locations or within utility excavations, a hand tamper will likely be required. Listed below are generally recommended maximum loose lift thicknesses for compaction based on the utilized compaction equipment.

RECOMMENDED PRELIMINARY LOOSE LIFT THICKNESSES	
Equipment	Maximum Loose Lift Thickness (inches)
Large/Heavy, Self-Propelled Equipment	8
Small, Self-Propelled or Remote Controlled (Rammax, etc.)	6 to 8
Hand Operated (Plate Tamps, Jumping Jacks, Wacker-Packers)	4 to 6

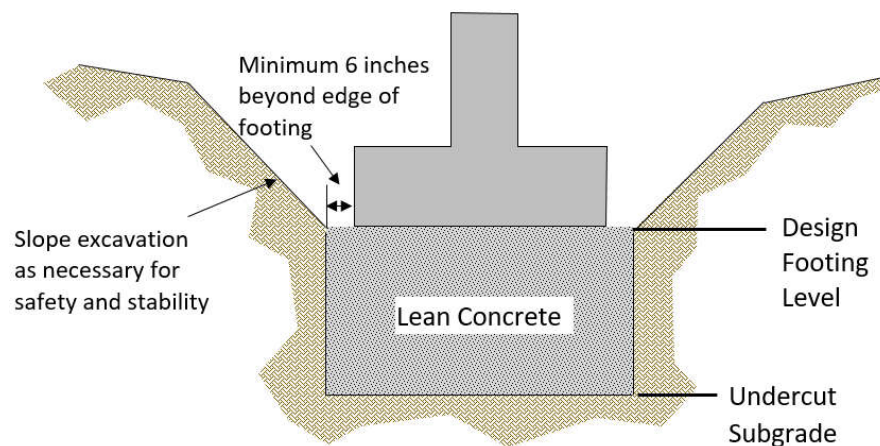
1. Density testing during fill placement is important to check and document that the specified compaction is being achieved. In some cases, thinner lifts than noted above and/or more compaction energy may be needed to achieve the required degree of compaction.

In confined areas such as utility trenches, portable compaction equipment and thin lifts of 4 inches or less may be required to achieve specified degrees of compaction.

Engineered Fill Below Foundations: Unsuitable bearing soils encountered at the proposed foundation bearing grade or within the foundation influence zone are recommended to be removed to a suitable bearing subgrade and to a lateral extent, as conceptually shown below. The zone of the engineered fill placed below the foundations is recommended to extend 1 foot beyond the outside edges of the footings and from that point, outward laterally 1 foot for every 2 feet of fill thickness below the footing.



Alternatively, backfill undercuts with lean concrete ($f'_c \geq 1,000$ psi at 28 days) up to the original design bottom of footing elevation. The original footing is recommended to be constructed on top of the hardened lean concrete. If lean concrete is utilized the excavation is recommended to be 1 foot wider than the footing (6 inches on each side), as conceptually shown below, and the lean concrete should be allowed to sufficiently harden prior to placement of the foundation concrete. Use of lean mix concrete to limit lateral over-excavation may not be effective due to caving of excavation sidewalls where excavations extend into the granular soil.



Fill Placement Considerations: Fill materials should not be placed on frozen soils, on frost-heaved soils, on excessively wet soils, or soils that are otherwise unstable. Borrow fill materials should not contain frozen materials at the time of placement, and frozen or frost-heaved soils should be removed prior to placement of engineered fill or other fill soils and aggregates. Excessively wet soils or aggregates should be scarified, aerated, and moisture conditioned.

5.2.3 Difficult Excavation

Excavation difficulties are expected to occur due to dense granular soils and likely shallow bedrock but will depend on the final site grades. These materials can often be more easily penetrated by drilling than can be excavated. The degree of excavation difficulty generally depends upon the depth of excavation and capabilities of the excavation equipment. The rip-ability of extremely dense material and bedrock depends on several factors, including the nature of the soils/rock, moisture content, strength, degree of weathering, and the type of excavation equipment. Based on historical data and conversations with excavation contractors, it is our opinion that standard penetration test (SPT) N-values should be used only as a general indicator of the rip-ability of extremely dense soil/weathered rock. Soils having SPT N-values less than 50 bpf can usually be excavated with standard construction techniques. Soils with N-values above 50 bpf, and where auger refusal has not yet been met, can usually be excavated with larger machinery equipped for ripping rock. Some of the likely attachments would include heavy shanks (ripping teeth), shank protectors, and narrow track shoes. Extremely dense soils where auger refusal has been met will likely need blasting to remove the rock. Therefore, in our opinion excavation contractors should assume special excavation equipment will be necessary and the excavation rates will be slow. The boundary between soil and rock may not be sharply defined due to variations in weathering and potential presence of cobbles and/or boulders in the till above the bedrock. ***Consider test pits to better evaluate the most cost-effective excavation methods, and to confirm the material types and depth of bedrock.*** Any test pits performed are recommended to be backfilled with engineered fill properly benched out into the surrounding soil.

Difficult excavation is anticipated at a depth of approximately 5 feet below grade at the test boring locations. However, the depth and elevation of difficult excavation outside the test boring locations may be shallower or deeper.

Excavation and removal problems should be expected and budgeted for this project. Geophysical testing could be done to further estimate the ripability of the bedrock for a given piece of equipment. The anticipated depths and elevations of difficult excavation should be taken into consideration when establishing site grades. To help reduce excavation difficulties, site grades should be kept as high as practical.

If blasting is performed, it should be done so carefully by a qualified specialty contractor so that any nearby construction is not damaged. Pre- and post-blast video surveys of the surrounding properties are recommended to be performed in the presence of the adjacent property owners or representatives to help reduce the potential for fraudulent post-blast liability claims. A maximum peak particle velocity of less than 2 inches per second is typically considered the threshold for building damage, but the human annoyance threshold is less. Therefore, control of blasting vibrations and vibration monitoring is recommended. Additionally, blasting of bedrock has a potential to cause carbon monoxide gas to develop and migrate through utility trenches or fractures in the bedrock. Appropriate precautions should be taken to prevent migration of gases and nearby property owners should be notified.

Blasting frequently results in over-break (rock breakage exceeding that required for excavation to design grade), or fractures and disturbance to a greater depth than desired. If it is necessary to blast, any over-break should be removed and replaced with structural compacted fill. Disturbed or loosened rock that is left in-place could cause excessive structural settlement. The distinction between soil and rock excavation should be clearly delineated in the construction documents; otherwise, costly contract disputes and change orders could result.

It is recommended the specifications call out excavation as being either classified and/or unclassified. Unclassified excavation meaning it is left up to the contractor to determine his own means and methods to excavate material and one unit price is used for excavation regardless of the material that is present on the site. Classified excavation is typically used on sites where excavation problems are expected either due to difficult excavation from shallow bedrock or granular (caving) soil. On sites with shallow bedrock, such as this site, specifications typically read that any material that can be excavated with a given piece of equipment with a given amount of torque (foot-pounds) will be considered “normal” excavation and any excavation requiring equipment with a greater amount of torque (foot-pounds) will be considered “special” excavation. Contractors are then required to provide unit rates for “normal” excavation and a separate rate for “special” excavation.

Excavation Safety: Make and maintain excavations and slopes in accordance with OSHA excavation safety standards. The Contractor is solely responsible for designing and constructing stable, temporary excavations and slopes and should shore, slope, or bench the sides of the excavations and slopes as required to maintain stability of both the excavation sides and bottom. The Contractor’s responsible person, as defined in 29 CFR Part 1926, should evaluate the soil exposed in the excavations as part of the contractor’s safety procedures. In no case should slope height, slope inclination, or excavation depth, including utility trench excavation depth, exceed those specified in local, state, and federal safety regulations. In some cases, the use of shoring, bracing, or trench boxes may be required. ECS is providing this information solely as a service to our client. ECS is not assuming responsibility for construction site safety or the contractor’s activities; such responsibility is not being implied and should not be inferred.

Excavation Instability: Excavation instability problems are expected to occur where granular soil is present or perched water is encountered. The instability problems will generally depend upon the excavation depth, length of time the excavations remain open, inclination of excavation side-walls, magnitude and location of surcharges near the excavations, groundwater levels, and the suitability of the dewatering system.

Bidding/Estimating Considerations: Contractors bidding or undertaking any work at the site should examine the results of the subsurface exploration, satisfy themselves as to the adequacy of the information for bidding and construction, make their own interpretation of the data, and consider the effect it may have on their cost proposal, construction techniques, schedule, and equipment capabilities. Furthermore, contractors should complete any additional fieldwork and exploration they deem necessary to properly prepare a cost proposal for the site work. Soil borings do not provide the same wide-scale view of the subsurface conditions that is obtained during site grading, excavation or other aspects of earthwork construction. Additional scope may be required to obtain more detailed subsurface information needed for earthwork bid preparation, which could include test pits to better understand the lateral and vertical extents of the subsurface materials of concern such as existing undocumented fill. Even with this additional information, budget contingencies should be carried in construction to help cover potential variations in subsurface conditions.

5.3 FOUNDATION AND SLAB OBSERVATIONS

Protection of Foundation Excavations: Exposure to the environment may weaken the soils at the footing bearing level if the foundation excavations remain open for too long a time. Foundation concrete should be placed the same day that excavations are made. If the bearing soils are softened by surface water intrusion or exposure, the softened soils must be removed from the foundation excavation bottom immediately prior to placement of concrete. If the foundation concrete will not be placed soon after excavation and observation and testing of bearing grade, or if rainfall becomes imminent while the bearing soils are exposed, consider placement of a 2 to 3-inch thick “mud mat” of “lean” concrete on the bearing soils before the placement of reinforcing steel to help protect the bearing material otherwise a recheck of the bearing grade may be needed.

Footing Subgrade Observations: The recommendations of this report are predicated upon ECS checking the suitability of the in-situ foundation support soils during construction. The suitability of the actual bearing grade is recommended to be observed and tested to check that the soils are as indicated by the borings and are suitable to support the recommended maximum net allowable bearing pressure.

Slab Subgrade Observation and Testing: Call on ECS to observe and test exposed subgrade within the expanded building limits prior to engineered fill placement and slab construction to check that adequate subgrade preparation has been achieved as recommended in the **Subgrade Preparation** section.

5.4 UTILITY INSTALLATIONS

Utility Subgrades: The soils encountered in our exploration are expected to be generally suitable for support of utility pipes. The subgrade should be observed and tested by ECS to check the suitability of the materials encountered at the time of construction. Soft, loose or otherwise unsuitable materials encountered at the utility pipe subgrade elevation should be removed and replaced with suitable compacted engineered fill or pipe bedding material.

Utility Backfilling: The granular bedding material should be at least 4 inches thick, but not less than that specified by the project drawings and specifications. Fill placed for support of the utilities, as well as backfill over the utilities, should satisfy the recommendations for engineered fill given in this report. Compacted backfill should be free of topsoil, roots, ice, or any other material designated by ECS as unsuitable. The backfill should be moisture conditioned, placed, and compacted as recommended in this report.

6.0 CLOSING

ECS has prepared this report to guide geotechnical-related design and construction aspects of the project. We performed these services in accordance with the standard of care expected of professionals in the industry performing similar services on projects of like size and complexity at this time in the region. No other representation, express or implied, and no warranty or guarantee is included or intended in this report.

The description of the proposed project is based on information provided to ECS. If this information is inaccurate, either because of our interpretation of the documents provided, or site or design changes that may occur later, ECS should be contacted so that we can review our recommendations and provide additional or alternate recommendations as may be required to reflect the proposed construction.

We recommend ECS review the project's plans and specifications so that we may evaluate consistency of those plans/specifications with the intent of the geotechnical report recommendations.

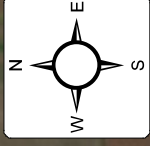
Field observations and quality assurance testing during earthwork and foundation installation are an extension of, and integral to, the geotechnical design. We recommend that ECS be retained to apply our expertise throughout the geotechnical phases of construction, and to provide consultation and recommendations should issues arise.

ECS is not responsible for the conclusions, opinions, or recommendations of others based on the data in this report.

APPENDIX A - Drawings & Reports

Site Location Diagram
Boring Location Diagram

Service Layer Credits: Esri, HERE, Garmin, (c) OpenStreetMap contributors



Rock Run Dr

JJC U-
Building

JJC T-
Building

JJC S-
Building

JJC G-
Building

JJC E-
Building

JJC O-
Building

JJC A-
Building

Joliet
Junior
College

Centennial Dr

Rock Run Greenway Trail

0 600 1200 Feet

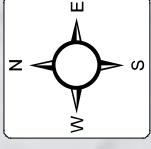


SITE LOCATION DIAGRAM



JJC CAMPUS POLICE VEHICLE STORAGE ADDITION

1215 HOUBOLT ROAD, JOLIET, ILLINOIS
LEGAT ARCHITECTS

ENGINEER	KSC
SCALE	AS NOTED
PROJECT NO.	16:13614-A
SHEET	1 OF 1
DATE	6/24/2021



Legend

-  Approximate boring locations - Building
-  Approximate boring locations - Pavement



BORING LOCATION DIAGRAM

JJC CAMPUS POLICE VEHICLE STORAGE ADDITION

1215 HOUBOLT ROAD, JOLIET, ILLINOIS
LEGAT ARCHITECTS

ENGINEER	KSC
SCALE	AS NOTED
PROJECT NO.	16:13614-A
SHEET	1 OF 1
DATE	6/24/2021

APPENDIX B - Field & Laboratory Operations

Reference Notes for Boring Logs

Boring Logs B-1, B-2, B-3, P-1 and P-2

Generalized Subsurface Soil Profile

Subsurface Exploration Procedures: SPT

Laboratory Testing Procedures: Index Testing



REFERENCE NOTES FOR BORING LOGS

MATERIAL^{1,2}

	ASPHALT
	CONCRETE
	GRAVEL
	TOPSOIL
	VOID
	BRICK
	AGGREGATE BASE COURSE
	GW WELL-GRADED GRAVEL gravel-sand mixtures, little or no fines
	GP POORLY-GRADED GRAVEL gravel-sand mixtures, little or no fines
	GM SILTY GRAVEL gravel-sand-silt mixtures
	GC CLAYEY GRAVEL gravel-sand-clay mixtures
	SW WELL-GRADED SAND gravelly sand, little or no fines
	SP POORLY-GRADED SAND gravelly sand, little or no fines
	SM SILTY SAND sand-silt mixtures
	SC CLAYEY SAND sand-clay mixtures
	ML SILT non-plastic to medium plasticity
	MH ELASTIC SILT high plasticity
	CL LEAN CLAY low to medium plasticity
	CH FAT CLAY high plasticity
	OL ORGANIC SILT or CLAY non-plastic to low plasticity
	OH ORGANIC SILT or CLAY high plasticity
	PT PEAT highly organic soils

DRILLING SAMPLING SYMBOLS & ABBREVIATIONS

SS	Split Spoon Sampler	PM	Pressuremeter Test
ST	Shelby Tube Sampler	RD	Rock Bit Drilling
WS	Wash Sample	RC	Rock Core, NX, BX, AX
BS	Bulk Sample of Cuttings	REC	Rock Sample Recovery %
PA	Power Auger (no sample)	RQD	Rock Quality Designation %
HSA	Hollow Stem Auger		

PARTICLE SIZE IDENTIFICATION

DESIGNATION	PARTICLE SIZES
Boulders	12 inches (300 mm) or larger
Cobbles	3 inches to 12 inches (75 mm to 300 mm)
Gravel: Coarse	¾ inch to 3 inches (19 mm to 75 mm)
Fine	4.75 mm to 19 mm (No. 4 sieve to ¾ inch)
Sand: Coarse	2.00 mm to 4.75 mm (No. 10 to No. 4 sieve)
Medium	0.425 mm to 2.00 mm (No. 40 to No. 10 sieve)
Fine	0.074 mm to 0.425 mm (No. 200 to No. 40 sieve)
Silt & Clay ("Fines")	<0.074 mm (smaller than a No. 200 sieve)

COHESIVE SILTS & CLAYS

UNCONFINED COMPRESSIVE STRENGTH, QP ⁴	SPT ⁵ (BPF)	CONSISTENCY ⁷ (COHESIVE)
<0.25	<3	Very Soft
0.25 - <0.50	3 - 4	Soft
0.50 - <1.00	5 - 8	Firm
1.00 - <2.00	9 - 15	Stiff
2.00 - <4.00	16 - 30	Very Stiff
4.00 - 8.00	31 - 50	Hard
>8.00	>50	Very Hard

RELATIVE AMOUNT ⁷	COARSE GRAINED (%) ⁸	FINE GRAINED (%) ⁸
Trace	≤5	≤5
With	10 - 20	10 - 25
Adjective (ex: "Silty")	25 - 45	30 - 45

GRAVELS, SANDS & NON-COHESIVE SILTS

SPT ⁵	DENSITY
<5	Very Loose
5 - 10	Loose
11 - 30	Medium Dense
31 - 50	Dense
>50	Very Dense

WATER LEVELS⁶

	WL (First Encountered)
	WL (Completion)
	WL (Seasonal High Water)
	WL (Stabilized)

FILL AND ROCK

FILL	POSSIBLE FILL	PROBABLE FILL	ROCK

¹Classifications and symbols per ASTM D 2488-17 (Visual-Manual Procedure) unless noted otherwise.

²To be consistent with general practice, "POORLY GRADED" has been removed from GP, GP-GM, GP-GC, SP, SP-SM, SP-SC soil types on the boring logs.

³Non-ASTM designations are included in soil descriptions and symbols along with ASTM symbol [Ex: (SM-FILL)].




⁴Typically estimated via pocket penetrometer or Torvane shear test and expressed in tons per square foot (tsf).




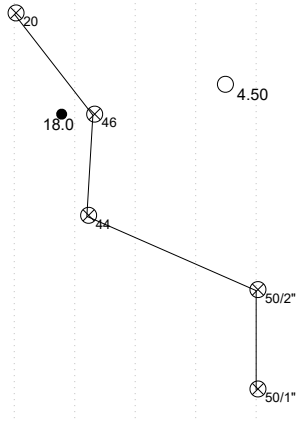
⁵Standard Penetration Test (SPT) refers to the number of hammer blows (blow count) of a 140 lb. hammer falling 30 inches on a 2 inch OD split spoon sampler required to drive the sampler 12 inches (ASTM D 1586). "N-value" is another term for "blow count" and is expressed in blows per foot (bpf). SPT correlations per 7.4.2 Method B and need to be corrected if using an auto hammer.






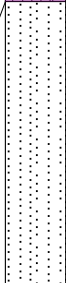
⁶The water levels are those levels actually measured in the borehole at the times indicated by the symbol. The measurements are relatively reliable when augering, without adding fluids, in granular soils. In clay and cohesive silts, the determination of water levels may require several days for the water level to stabilize. In such cases, additional methods of measurement are generally employed.




⁷Minor deviation from ASTM D 2488-17 Note 14.




⁸Percentages are estimated to the nearest 5% per ASTM D 2488-17.

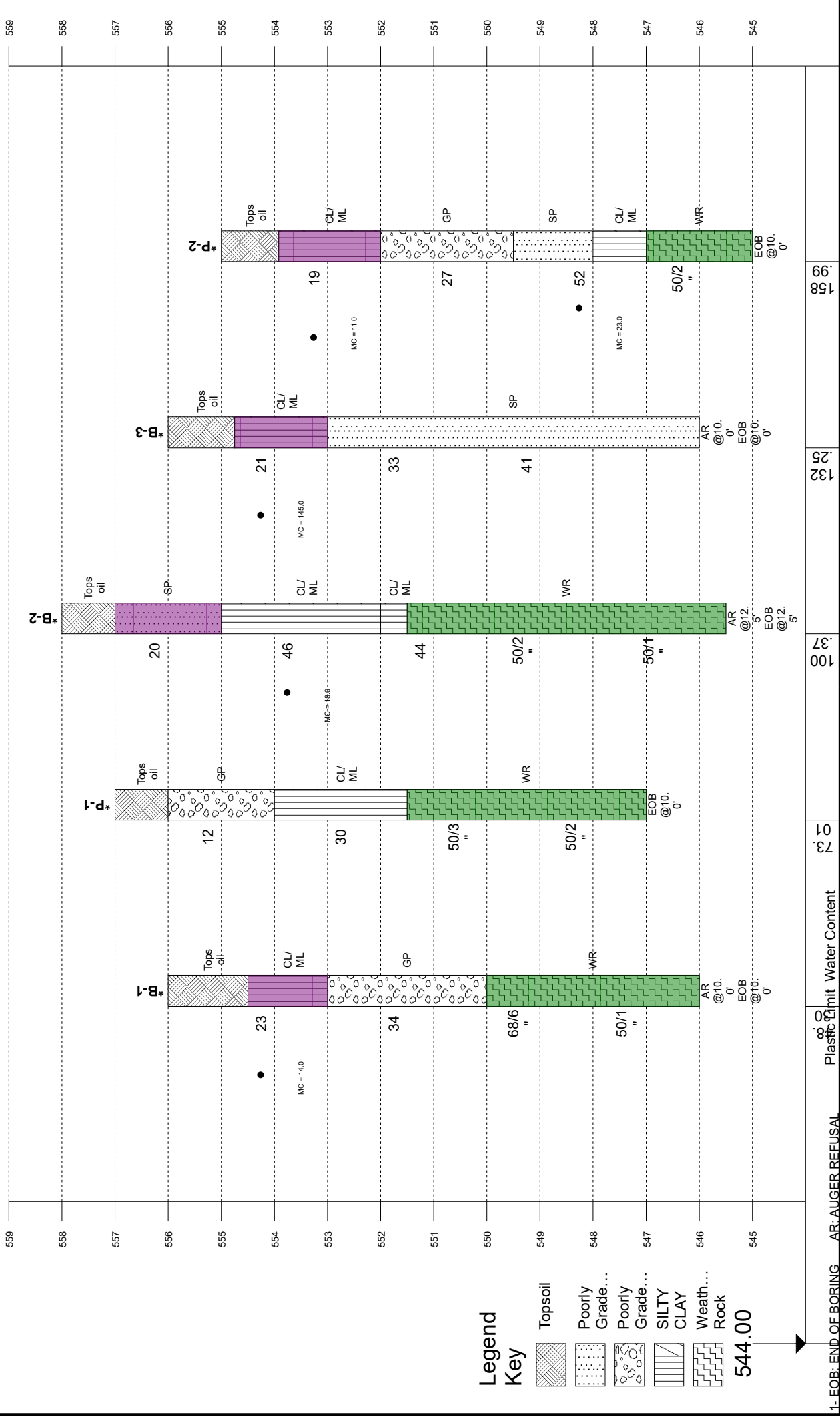
CLIENT: Legat Architects				PROJECT NO.: 16:13614-A		BORING NO.: B-1		SHEET: 1 of 1		
PROJECT NAME: JJC Campus Pedestrian Bridge				DRILLER/CONTRACTOR: ECS59 - Crew 1						
SITE LOCATION: 1215 Houbolt Road, Joliet, Illinois 60431										
NORTHING: 1766653.8				EASTING: 2839967.3		STATION:		SURFACE ELEVATION: 556.0		LOSS OF CIRCULATION 
								BOTTOM OF CASING 		
DEPTH (FT)	SAMPLE NUMBER	SAMPLE TYPE	SAMPLE DIST. (IN)	RECOVERY (IN)	DESCRIPTION OF MATERIAL	WATER LEVELS	ELEVATION (FT)	BLOWS/6"	Plastic Limit Water Content Liquid Limit X ————— ● ————— △	
									⊗ STANDARD PENETRATION BLOWS/FT ROCK QUALITY DESIGNATION & RECOVERY — RQD — REC	
									○ CALIBRATED PENETROMETER TON/SF [FINES CONTENT] %	
5	S-1	SS	18	16	Topsoil Thickness[18"]			5-9-14 (23)		
	S-2	SS	18	10	(CL/ML POSSIBLE FILL) POSSIBLE FILL, SILTY CLAY, trace gravel, contains slight roots, dark brown, hard			15-21-13 (34)		
	S-3	SS	12	12	(GP) GRAVEL WITH SAND, brown, dense to very dense		551	19-18-50/0" (68/6")		
10	S-4	SS	1	1	(WR) WEATHERED LIMESTONE SAMPLED AS [Weathered LIMESTONE]			50/1" (50/1")		
					Refusal encountered at 10.0 feet. END OF DRILLING AT 10.0 FT		546			
15										
20										
25										
30										
THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL TYPES. IN-SITU THE TRANSITION MAY BE GRADUAL										
▽ WL (First Encountered) Dry					BORING STARTED: Jun 15 2021		CAVE IN DEPTH: 7.00			
▼ WL (Completion) Dry					BORING COMPLETED: Jun 15 2021		HAMMER TYPE: Auto			
▽ WL (Seasonal High Water)					EQUIPMENT: ATV		LOGGED BY: EMT1		DRILLING METHOD: CFA	
▽ WL (Stabilized)										
GEOTECHNICAL BOREHOLE LOG										

CLIENT: Legat Architects				PROJECT NO.: 16:13614-A		BORING NO.: B-2		SHEET: 1 of 1		
PROJECT NAME: JJC Campus Pedestrian Bridge				DRILLER/CONTRACTOR: ECS59 - Crew 1						
SITE LOCATION: 1215 Houbolt Road, Joliet, Illinois 60431										
NORTHING: 1766688.4				EASTING: 2840013.6		STATION:		SURFACE ELEVATION: 558.0		LOSS OF CIRCULATION 
								BOTTOM OF CASING 		
DEPTH (FT)	SAMPLE NUMBER	SAMPLE TYPE	SAMPLE DIST. (IN)	RECOVERY (IN)	DESCRIPTION OF MATERIAL	WATER LEVELS	ELEVATION (FT)	BLOWS/6"	Plastic Limit Water Content Liquid Limit X ————— ● ————— △ ⊗ STANDARD PENETRATION BLOWS/FT ROCK QUALITY DESIGNATION & RECOVERY — RQD — REC ○ CALIBRATED PENETROMETER TON/SF [FINES CONTENT] %	
					Topsoil Thickness[12"]					
5	S-1	SS	18	18	(SP POSSIBLE FILL) POSSIBLE FILL, SAND WITH GRAVEL, trace clay, contains slight roots, brown, medium dense		553	7-11-9 (20)		
	S-2	SS	18	16	(CL/ML) SILTY CLAY, trace gravel, contains slight roots, brown, hard			5-31-15 (46)		
	S-3	SS	18	18	(CL/ML) SANDY SILTY CLAY, trace gravel, light gray and white			14-15-29 (44)		
10	S-4	SS	2	2	(WR) WEATHERED LIMESTONE SAMPLED AS [Weathered LIMESTONE]		548	50/2" (50/2")		
	S-5	SS	1	1				50/1" (50/1")		
15	Refusal encountered at 12.5 feet. END OF DRILLING AT 12.5 FT						543			
20							538			
25							533			
30							528			
THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL TYPES. IN-SITU THE TRANSITION MAY BE GRADUAL										
▽ WL (First Encountered) Dry					BORING STARTED: Jun 15 2021		CAVE IN DEPTH: 6.00			
▼ WL (Completion) Dry					BORING COMPLETED: Jun 15 2021		HAMMER TYPE: Auto			
▽ WL (Seasonal High Water)					EQUIPMENT: ATV		LOGGED BY: EMT1		DRILLING METHOD: CFA	
▽ WL (Stabilized)										
GEOTECHNICAL BOREHOLE LOG										

CLIENT: Legat Architects				PROJECT NO.: 16:13614-A		BORING NO.: B-3		SHEET: 1 of 1		
PROJECT NAME: JJC Campus Pedestrian Bridge				DRILLER/CONTRACTOR: ECS59 - Crew 1						
SITE LOCATION: 1215 Houbolt Road, Joliet, Illinois 60431										
NORTHING: 1766663.4				EASTING: 2840050.9		STATION:		SURFACE ELEVATION: 556.0		LOSS OF CIRCULATION 
								BOTTOM OF CASING 		
DEPTH (FT)	SAMPLE NUMBER	SAMPLE TYPE	SAMPLE DIST. (IN)	RECOVERY (IN)	DESCRIPTION OF MATERIAL	WATER LEVELS	ELEVATION (FT)	BLOWS/6"	Plastic Limit Water Content Liquid Limit X ————— ● ————— △ ⊗ STANDARD PENETRATION BLOWS/FT ROCK QUALITY DESIGNATION & RECOVERY — RQD — REC ○ CALIBRATED PENETROMETER TON/SF [FINES CONTENT] %	
					Topsoil Thickness[15"]					
	S-1	SS	18	12	(CL/ML POSSIBLE FILL) POSSIBLE FILL, SANDY SILTY CLAY, trace gravel, brown and brown, hard			7-10-11 (21)		⊗ 21 ○ 4.50
5	S-2	SS	18	16	(SP) SAND WITH GRAVEL, trace clay, trace silt, brown, dense to very dense		551	7-14-19 (33)		⊗ 33
	S-3	SS	18	18				14-17-24 (41)		⊗ 41
10	S-4	SS	6	3				50		
					Refusal encountered at 9.0 feet. END OF DRILLING AT 9.0 FT		546			
15							541			
20							536			
25							531			
30							526			
THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL TYPES. IN-SITU THE TRANSITION MAY BE GRADUAL										
▽ WL (First Encountered) Dry					BORING STARTED: Jun 15 2021		CAVE IN DEPTH: 6.00			
▼ WL (Completion) Dry					BORING COMPLETED: Jun 15 2021		HAMMER TYPE: Auto			
▽ WL (Seasonal High Water)					EQUIPMENT: ATV		LOGGED BY: EMT1		DRILLING METHOD: CFA	
▽ WL (Stabilized)										
GEOTECHNICAL BOREHOLE LOG										

CLIENT: Legat Architects				PROJECT NO.: 16:13614-A		BORING NO.: P-1		SHEET: 1 of 1		
PROJECT NAME: JJC Campus Pedestrian Bridge				DRILLER/CONTRACTOR: ECS59 - Crew 1						
SITE LOCATION: 1215 Houbolt Road, Joliet, Illinois 60431										
NORTHING: 1766577.8				EASTING: 2840007.1		STATION:		SURFACE ELEVATION: 557.0		LOSS OF CIRCULATION 
								BOTTOM OF CASING 		
DEPTH (FT)	SAMPLE NUMBER	SAMPLE TYPE	SAMPLE DIST. (IN)	RECOVERY (IN)	DESCRIPTION OF MATERIAL	WATER LEVELS	ELEVATION (FT)	BLOWS/6"	Plastic Limit Water Content Liquid Limit X ————— ● ————— △	
									⊗ STANDARD PENETRATION BLOWS/FT ROCK QUALITY DESIGNATION & RECOVERY — RQD — REC	
									○ CALIBRATED PENETROMETER TON/SF [FINES CONTENT] %	
					Topsoil Thickness[12"]					
	S-1	SS	18	16	(GP) GRAVEL WITH SAND, trace clay, gray and brown, medium dense			11-6-6 (12)		
5	S-2	SS	18	16	(CL/ML) SILTY CLAY, trace gravel, light gray and white		552	14-12-18 (30)		
	S-3	SS	9	9	(WR) WEATHERED LIMESTONE SAMPLED AS [Weathered LIMESTONE]			18-50/3" (50/3")		
	S-4	SS	2	2				50/2" (50/2")		
10	END OF DRILLING AT 10.0 FT						547			
15							542			
20							537			
25							532			
30							527			
THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL TYPES. IN-SITU THE TRANSITION MAY BE GRADUAL										
∇ WL (First Encountered) Dry					BORING STARTED: Jun 15 2021		CAVE IN DEPTH: 7.00			
▼ WL (Completion) Dry					BORING COMPLETED: Jun 15 2021		HAMMER TYPE: Auto			
∇ WL (Seasonal High Water)					EQUIPMENT: Truck		LOGGED BY: EMT1		DRILLING METHOD: CFA	
∇ WL (Stabilized)										
GEOTECHNICAL BOREHOLE LOG										

CLIENT: Legat Architects				PROJECT NO.: 16:13614-A		BORING NO.: P-2		SHEET: 1 of 1		
PROJECT NAME: JJC Campus Pedestrian Bridge				DRILLER/CONTRACTOR: ECS59 - Crew 1						
SITE LOCATION: 1215 Houbolt Road, Joliet, Illinois 60431										
NORTHING: 1766635.0				EASTING: 2840083.7		STATION:		SURFACE ELEVATION: 555.0		LOSS OF CIRCULATION 
								BOTTOM OF CASING 		
DEPTH (FT)	SAMPLE NUMBER	SAMPLE TYPE	SAMPLE DIST. (IN)	RECOVERY (IN)	DESCRIPTION OF MATERIAL	WATER LEVELS	ELEVATION (FT)	BLOWS/6"	Plastic Limit Water Content Liquid Limit X ————— ● ————— △ ⊗ STANDARD PENETRATION BLOWS/FT ROCK QUALITY DESIGNATION & RECOVERY — RQD — REC ○ CALIBRATED PENETROMETER TON/SF [FINES CONTENT] %	
					Topsoil Thickness[13"]					
	S-1	SS	18	16	(CL/ML POSSIBLE FILL) POSSIBLE FILL, SANDY SILTY CLAY, trace gravel, contains slight roots, dark brown, hard			7-11-8 (19)		
5	S-2	SS	18	1	(GP) GRAVEL, light brown, medium dense		550	9-9-18 (27)		
	S-3	SS	18	18	(SP) SAND WITH GRAVEL, trace clay, brown, very dense			17-21-31 (52)		
	S-4	SS	2	2	(CL/ML) SILTY CLAY, trace gravel, trace sand, light gray and white, very stiff			50/2" (50/2")		
10					(WR) WEATHERED LIMESTONE SAMPLED AS [Weathered LIMESTONE]		545			
					END OF DRILLING AT 10.0 FT					
15							540			
20							535			
25							530			
30							525			
THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL TYPES. IN-SITU THE TRANSITION MAY BE GRADUAL										
∇ WL (First Encountered) Dry					BORING STARTED: Jun 15 2021		CAVE IN DEPTH: 6.00			
▼ WL (Completion) Dry					BORING COMPLETED: Jun 15 2021		HAMMER TYPE: Auto			
∇ WL (Seasonal High Water)					EQUIPMENT: Truck		LOGGED BY: EMT1		DRILLING METHOD: CFA	
∇ WL (Stabilized)										
GEOTECHNICAL BOREHOLE LOG										



Legend
Key

- Topsoil
- Poorly Grade...
- Poorly Grade...
- SILTY CLAY
- Weather...
- Rock

544.00

1- EOB, END OF BORING

2- THE NUMBER BELOW THE STRIPS IS THE DISTANCE ALONG THE BASELINE.

3- SEE INDIVIDUAL BORING LOG AND GEOTECHNICAL INFORMATION

4- STANDARD PENETRATION TEST RESISTANCE (LEFT OF BORING) IN BLOWS PER FOOT (ASTM D1586)

AR: AUGER REFUSAL

PL: PLUG

WL: (First Encountered)

WL: (Completion)

WL: (Seasonal High Water)

WL: (Stabilized)

Plasticity Limit

Liquid Limit

IFINES-CONTENT%]

BOTTOM OF

TESTING

CIRCULATION

100

132

159

GENERALIZED SUBSURFACE SOIL PROFILE Section line 1

JJC Campus Pedestrian Bridge

Legat Architects

1215 Houboit Road, Joliet, Illinois 60431

Project No: 16-13614-A

Date: 06/25/2021



SUBSURFACE EXPLORATION PROCEDURE: STANDARD PENETRATION TESTING (SPT)

ASTM D 1586

Split-Barrel (Split-Spoon) Sampling

Standard Penetration Testing, or **SPT**, is the most frequently used subsurface exploration test performed worldwide. This test provides samples for identification purposes as well as a measure of penetration resistance, or N-Value. The N-Value, or blow counts, when corrected and correlated, can approximate engineering properties of soils used for geotechnical design and engineering purposes.

SPT Procedure:

- Involves driving a 2-inch outside diameter hollow tube (split-spoon) into the ground by dropping a 140-lb hammer a height of 30 inches at desired depth
- Recording the number of hammer blows required to drive the split-spoon a distance of 12 inches (in 3 or 4 Increments of 6 inches each)
- Auger is advanced* and an additional SPT is performed
- One SPT test is typically performed every 2½ to 5 feet.
- Obtain a 1⅜-inch diameter soil sample



**Drilling Methods May Vary – The predominate drilling methods used for SPT are open hole fluid rotary drilling and hollow-stem auger drilling.*



LABORATORY PROCEDURES:

Index Testing

Moisture content determination was performed on select fine-grained soil samples in accordance with ASTM D 2216.

Calibrated hand penetrometer tests (Qp) were performed on select cohesive soil samples. In the hand penetrometer test, the unconfined compressive strength of a soil sample is estimated, to a maximum of 4.5 or 6 tons per square foot (tsf), depending on the penetrometer model, by measuring the resistance of a soil sample to penetration by a small, calibrated, spring-loaded cylinder.

Atterberg limits determination was performed on select fine-grained soil samples in accordance with ASTM D 4319. The Atterberg limits are a basic measure of the critical water contents of a fine-grained soil: its **liquid limit**, **plastic limit**, and **shrinkage limit**. Depending on its water content, a soil may appear in one of four states: solid, semi-solid, plastic and liquid. In each state, the consistency and behavior of a soil is different and consequently so are its engineering properties. Atterberg limits can also be used to help distinguish between silt and clay, and to distinguish between different types of silts and clays.

Particle size distribution, also referred to as gradation or sieve analysis, refers to the proportions by dry mass of a soil particles distributed over specified particle-size ranges. The particle size distribution is used to help classify soils for engineering purposes. Particle size distribution determination was performed on select fine-grained soil samples in accordance with ASTM D 421, D 422 and/or D 1140.

A **loss on ignition (LOI)** test is used to estimate the organic content of the soil. In the LOI test a dry sample is heated to 440° C to burn off organic matter within the sample. The lost weight is compared to the initial dry weight to estimate the percentage of organics in the material. LOI determination was performed in accordance with ASTM D 2974.

APPENDIX C - Supplemental Report Documents

Important Information about This Geotechnical-Engineering Report

Important Information about This Geotechnical-Engineering Report

Subsurface problems are a principal cause of construction delays, cost overruns, claims, and disputes.

While you cannot eliminate all such risks, you can manage them. The following information is provided to help.

The Geoprofessional Business Association (GBA) has prepared this advisory to help you – assumedly a client representative – interpret and apply this geotechnical-engineering report as effectively as possible. In that way, you can benefit from a lowered exposure to problems associated with subsurface conditions at project sites and development of them that, for decades, have been a principal cause of construction delays, cost overruns, claims, and disputes. If you have questions or want more information about any of the issues discussed herein, contact your GBA-member geotechnical engineer. Active engagement in GBA exposes geotechnical engineers to a wide array of risk-confrontation techniques that can be of genuine benefit for everyone involved with a construction project.

Understand the Geotechnical-Engineering Services Provided for this Report

Geotechnical-engineering services typically include the planning, collection, interpretation, and analysis of exploratory data from widely spaced borings and/or test pits. Field data are combined with results from laboratory tests of soil and rock samples obtained from field exploration (if applicable), observations made during site reconnaissance, and historical information to form one or more models of the expected subsurface conditions beneath the site. Local geology and alterations of the site surface and subsurface by previous and proposed construction are also important considerations. Geotechnical engineers apply their engineering training, experience, and judgment to adapt the requirements of the prospective project to the subsurface model(s). Estimates are made of the subsurface conditions that will likely be exposed during construction as well as the expected performance of foundations and other structures being planned and/or affected by construction activities.

The culmination of these geotechnical-engineering services is typically a geotechnical-engineering report providing the data obtained, a discussion of the subsurface model(s), the engineering and geologic engineering assessments and analyses made, and the recommendations developed to satisfy the given requirements of the project. These reports may be titled investigations, explorations, studies, assessments, or evaluations. Regardless of the title used, the geotechnical-engineering report is an engineering interpretation of the subsurface conditions within the context of the project and does not represent a close examination, systematic inquiry, or thorough investigation of all site and subsurface conditions.

Geotechnical-Engineering Services are Performed for Specific Purposes, Persons, and Projects, and At Specific Times

Geotechnical engineers structure their services to meet the specific needs, goals, and risk management preferences of their clients. A geotechnical-engineering study conducted for a given civil engineer

will not likely meet the needs of a civil-works constructor or even a different civil engineer. Because each geotechnical-engineering study is unique, each geotechnical-engineering report is unique, prepared *solely* for the client.

Likewise, geotechnical-engineering services are performed for a specific project and purpose. For example, it is unlikely that a geotechnical-engineering study for a refrigerated warehouse will be the same as one prepared for a parking garage; and a few borings drilled during a preliminary study to evaluate site feasibility will not be adequate to develop geotechnical design recommendations for the project.

Do not rely on this report if your geotechnical engineer prepared it:

- for a different client;
- for a different project or purpose;
- for a different site (that may or may not include all or a portion of the original site); or
- before important events occurred at the site or adjacent to it; e.g., man-made events like construction or environmental remediation, or natural events like floods, droughts, earthquakes, or groundwater fluctuations.

Note, too, the reliability of a geotechnical-engineering report can be affected by the passage of time, because of factors like changed subsurface conditions; new or modified codes, standards, or regulations; or new techniques or tools. *If you are the least bit uncertain about the continued reliability of this report, contact your geotechnical engineer before applying the recommendations in it. A minor amount of additional testing or analysis after the passage of time – if any is required at all – could prevent major problems.*

Read this Report in Full

Costly problems have occurred because those relying on a geotechnical-engineering report did not read the report in its entirety. Do not rely on an executive summary. Do not read selective elements only. *Read and refer to the report in full.*

You Need to Inform Your Geotechnical Engineer About Change

Your geotechnical engineer considered unique, project-specific factors when developing the scope of study behind this report and developing the confirmation-dependent recommendations the report conveys. Typical changes that could erode the reliability of this report include those that affect:

- the site's size or shape;
- the elevation, configuration, location, orientation, function or weight of the proposed structure and the desired performance criteria;
- the composition of the design team; or
- project ownership.

As a general rule, *always* inform your geotechnical engineer of project or site changes – even minor ones – and request an assessment of their impact. *The geotechnical engineer who prepared this report cannot accept*

responsibility or liability for problems that arise because the geotechnical engineer was not informed about developments the engineer otherwise would have considered.

Most of the “Findings” Related in This Report Are Professional Opinions

Before construction begins, geotechnical engineers explore a site’s subsurface using various sampling and testing procedures. *Geotechnical engineers can observe actual subsurface conditions only at those specific locations where sampling and testing is performed.* The data derived from that sampling and testing were reviewed by your geotechnical engineer, who then applied professional judgement to form opinions about subsurface conditions throughout the site. Actual site-wide subsurface conditions may differ – maybe significantly – from those indicated in this report. Confront that risk by retaining your geotechnical engineer to serve on the design team through project completion to obtain informed guidance quickly, whenever needed.

This Report’s Recommendations Are Confirmation-Dependent

The recommendations included in this report – including any options or alternatives – are confirmation-dependent. In other words, they are not final, because the geotechnical engineer who developed them relied heavily on judgement and opinion to do so. Your geotechnical engineer can finalize the recommendations *only after observing actual subsurface conditions* exposed during construction. If through observation your geotechnical engineer confirms that the conditions assumed to exist actually do exist, the recommendations can be relied upon, assuming no other changes have occurred. *The geotechnical engineer who prepared this report cannot assume responsibility or liability for confirmation-dependent recommendations if you fail to retain that engineer to perform construction observation.*

This Report Could Be Misinterpreted

Other design professionals’ misinterpretation of geotechnical-engineering reports has resulted in costly problems. Confront that risk by having your geotechnical engineer serve as a continuing member of the design team, to:

- confer with other design-team members;
- help develop specifications;
- review pertinent elements of other design professionals’ plans and specifications; and
- be available whenever geotechnical-engineering guidance is needed.

You should also confront the risk of constructors misinterpreting this report. Do so by retaining your geotechnical engineer to participate in prebid and preconstruction conferences and to perform construction-phase observations.

Give Constructors a Complete Report and Guidance

Some owners and design professionals mistakenly believe they can shift unanticipated-subsurface-conditions liability to constructors by limiting the information they provide for bid preparation. To help prevent the costly, contentious problems this practice has caused, include the complete geotechnical-engineering report, along with any attachments or appendices, with your contract documents, *but be certain to note*

conspicuously that you’ve included the material for information purposes only. To avoid misunderstanding, you may also want to note that “informational purposes” means constructors have no right to rely on the interpretations, opinions, conclusions, or recommendations in the report. Be certain that constructors know they may learn about specific project requirements, including options selected from the report, *only* from the design drawings and specifications. Remind constructors that they may perform their own studies if they want to, and *be sure to allow enough time* to permit them to do so. Only then might you be in a position to give constructors the information available to you, while requiring them to at least share some of the financial responsibilities stemming from unanticipated conditions. Conducting prebid and preconstruction conferences can also be valuable in this respect.

Read Responsibility Provisions Closely

Some client representatives, design professionals, and constructors do not realize that geotechnical engineering is far less exact than other engineering disciplines. This happens in part because soil and rock on project sites are typically heterogeneous and not manufactured materials with well-defined engineering properties like steel and concrete. That lack of understanding has nurtured unrealistic expectations that have resulted in disappointments, delays, cost overruns, claims, and disputes. To confront that risk, geotechnical engineers commonly include explanatory provisions in their reports. Sometimes labeled “limitations,” many of these provisions indicate where geotechnical engineers’ responsibilities begin and end, to help others recognize their own responsibilities and risks. *Read these provisions closely.* Ask questions. Your geotechnical engineer should respond fully and frankly.

Geoenvironmental Concerns Are Not Covered

The personnel, equipment, and techniques used to perform an environmental study – e.g., a “phase-one” or “phase-two” environmental site assessment – differ significantly from those used to perform a geotechnical-engineering study. For that reason, a geotechnical-engineering report does not usually provide environmental findings, conclusions, or recommendations; e.g., about the likelihood of encountering underground storage tanks or regulated contaminants. *Unanticipated subsurface environmental problems have led to project failures.* If you have not obtained your own environmental information about the project site, ask your geotechnical consultant for a recommendation on how to find environmental risk-management guidance.

Obtain Professional Assistance to Deal with Moisture Infiltration and Mold

While your geotechnical engineer may have addressed groundwater, water infiltration, or similar issues in this report, the engineer’s services were not designed, conducted, or intended to prevent migration of moisture – including water vapor – from the soil through building slabs and walls and into the building interior, where it can cause mold growth and material-performance deficiencies. Accordingly, *proper implementation of the geotechnical engineer’s recommendations will not of itself be sufficient to prevent moisture infiltration.* Confront the risk of moisture infiltration by including building-envelope or mold specialists on the design team. *Geotechnical engineers are not building-envelope or mold specialists.*



GEOPROFESSIONAL
BUSINESS
ASSOCIATION

Telephone: 301/565-2733

e-mail: info@geoprofessional.org www.geoprofessional.org

SECTION 00 41 40

BID BOND

BID BOND

1.01 INFORMATION

A. KNOW ALL MEN BY THESE PRESENT, that we

(Firm name of Bidder)

as Principal, hereinafter called the Principal, and

(Bonding Agent)

a corporation duly organized under the laws of the State of Illinois as Surety, are held and firmly bound unto Joliet Junior College as Obligee, hereinafter called Obligee, in the sum of

_____ Dollars (\$ _____),

for the payment of which sum well and truly to be made, the said Principal and the said Surety, bind ourselves, our heirs, executors, administrators, successors and assigns, jointly and severally, firmly by these presents.

B. WHEREAS, the Principal has submitted a bid for:
Joliet Junior College: Campus Police Renovations project.

C. NOW, THEREFORE, if the Obligee shall accept the bid of the Principal and the Principal shall enter into a Contract with the Obligee in accordance with the terms of such bid, and give such bond or bonds as may be specified in the bidding or Contract Documents with good and sufficient surety for the faithful performance of such Contract and for the prompt payment of labor and material furnished in the prosecution thereof; or in the event of the failure of the Principal to enter such Contract and give such bond or bonds, if the Principal shall pay to the Obligee the difference not to exceed the penalty hereof between the amount specified in said bid and such larger amount for which the Obligee may in good faith contract with another party to perform the Work covered by said bid, then this obligation shall be null and void, otherwise to remain in full force and effect.

D. Signed and sealed this _____ day of _____.

E. _____
(Principal) (SEAL)

F. _____
(Witness) (Title)

G. _____
(Surety) (SEAL)

H. _____
(Witness) (Title)

END OF SECTION

SECTION 00 43 25
PROPOSED SUBSTITUTIONS

PROPOSED SUBSTITUTIONS

1.01 SUBSTITUTION INFORMATION

- A. Project: Joliet Junior College: Campus Police Renovations.
- B. All bids shall be based upon the provisions of the proposed Contract Documents and not upon substitutions proposed herein.
- C. Owner reserves the right to accept or reject all such substitutions at its sole discretion and in the best interest of Joliet Junior College.
- D. Bidders desiring to make substitutions for "proprietary brands" specified shall identify the brand, make, and model number of the specified product together with the brand, make, and model number of the product being proposed as a substitution and the dollar amount to be added or deducted from the base bid if the proposed substitution is accepted.
- E. Complete descriptions and technical data shall accompany all proposed substitutions and be attached herein.
- F. Manufacturer's names and materials approved by the Architect during the bidding period but not shown in addenda shall be listed below if said materials are to be considered.
- G. List of Proposed Substitutions:

1. _____
(Product Specified) (Proposed Product Substitution)

Amount to be ADDED or DEDUCTED: \$ _____

2. _____
(Product Specified) (Proposed Product Substitution)

Amount to be ADDED or DEDUCTED: \$ _____

3. _____
(Product Specified) (Proposed Product Substitution)

Amount to be ADDED or DEDUCTED: \$ _____

4. _____
(Product Specified) (Proposed Product Substitution)

Amount to be ADDED or DEDUCTED: \$ _____

H. Firm Name of Bidder: _____

I. Date: _____

END OF SECTION

SECTION 00 45 00

CERTIFICATE OF COMPLIANCE WITH ILLINOIS DRUG-FREE WORKPLACE ACT

CERTIFICATE OF COMPLIANCE WITH ILLINOIS DRUG-FREE WORKPLACE ACT

1.01 INFORMATION

A. Project: Joliet Junior College: Campus Police Renovations.

B. _____, Contractor,
(Firm name of Bidder)

having 25 employees, does hereby certify pursuant to Section 3 of the Illinois Drug-Free Workplace Act (Ill. Rev. Stat. ch. 127 par. 132.313) that [he, she, it] shall provide a drug free workplace for all employees engaged in the performance of work under the contract by complying with the requirements of the Illinois Drug Free Workplace Act 30 ILCS 580.1 et seq. and further certify that [he, she, it] is not ineligible for award of this contract by reason of debarment for a violation of the Illinois Drug-Free Workplace Act.

C. Name of Bidder: _____
(Printed/Typed Name of Authorized Agent of Contractor)

D. Name of Bidder: _____
(Signature of Authorized Agent of Contractor)

E. Date: _____

SECTION 00 45 10
CERTIFICATE OF COMPLIANCE WITH ILLINOIS HUMAN RIGHTS ACT

CERTIFICATE OF COMPLIANCE WITH ILLINOIS HUMAN RIGHTS ACT

1.01 INFORMATION

A. Project: Joliet Junior College: Campus Police Renovations.

B. _____, Contractor,
(Firm name of Bidder)

shall comply with the terms and procedures of the Illinois Human Rights Act, 775 ILCS 10/0.01 et seq and does hereby certify pursuant to P.A. 87-1257, the Illinois Human Rights Act, that(he, she, it) has adopted a written sexual harassment policy which minimally includes the following information:

- (i) the illegality of sexual harassment;
- (ii) the definition of sexual harassment under Illinois law;
- (iii) a description of sexual harassment, utilizing examples;
- (iv) an employer's internal complaint process, including penalty;
- (v) the legal recourse, investigative and complaint process available through the Department of Human Rights Commission;
- (vi) directions on how to contact the Department and Commission; and
- (vii) protection against retaliation as provided by Section 6-101 of the Illinois Human Rights Act.

C. Name of Bidder: _____
(Printed/Typed Name of Authorized Agent of Contractor)

D. Name of Bidder: _____
(Signature of Authorized Agent of Contractor)

E. Date: _____

SECTION 00 45 20
CERTIFICATE REGARDING CRIMINAL BACKGROUND INVESTIGATIONS

CERTIFICATION REGARDING CRIMINAL BACKGROUND INVESTIGATIONS

1.01 INFORMATION

A. Project: Joliet Junior College: Campus Police Renovations.

B. _____, Contractor,
(Firm name of Bidder)

hereby represents, warrants, and certifies that no officer or director thereof has any knowledge that any employee thereof has been convicted of committing or attempting to commit "Criminal Code of 1961," 720 ILCS, Sections 5/11-6 (Indecent solicitation of a child), 5/11-9 (Public indecency), 5/11-14 (Prostitution), 5/11-15 (Soliciting for a prostitute), 5/11-15.1 (Soliciting for a juvenile prostitute), 5/11-19 (Pimping), 5/11-19.1 (Juvenile pimping), 5/11-19.2 (Exploitation of a child), 5/11-20 (Obscenity), 5/11-20.1 (Sexual assault), 5/12-14 (Aggravated criminal sexual assault), 5/12-15 (Criminal sexual abuse), and 5/12-16 (Aggravated criminal sexual abuse), and/or those offenses defined in the "Cannabis Control Act," 720 ILCS, 550/I et. seq. (except the "Illinois Controlled Substances Act," 720 ILCS 570/100 et. seq.) and/or any offense committed or attempted in any other state or against the laws of the United States, which if committed or attempted in this State, would have been punishable as one or more of the foregoing offenses.

Contractor further agrees that it shall not employ any person who have or may have direct, daily contact with the pupils of any school in the district, and for whom a criminal background investigation has not been conducted pursuant hereto, and further represents and agrees that all applicants for any such employment shall furnish with their applications the attached written "Authorization for Criminal Background Information" form authorizing the Board of Education to request a criminal background investigation of said applicant pursuant to Section 5/10-21.9 of the School Code of Illinois and to receive criminal history record information pursuant thereto to determine if the applicant has been convicted of committing or attempting to commit any of the criminal or drug offenses enumerated above. Contractor further agrees to submit with said authorization payment for any costs and expenses associated with the criminal background investigation Contractor further represents, warrants, and certifies that no applicant for employment with respect to whom the criminal investigation reveals any conviction for committing and/or attempting to commit any of the above enumerated offenses, shall be employed thereby in any position that involves or may involve contact with the students of the school district. This certification is executed on the date hereinafter indicated by the designated contractor by its duly authorized officer.

C. Name of Bidder: _____
(Printed/Typed Name of Authorized Agent of Contractor)

D. Name of Bidder: _____
(Signature of Authorized Agent of Contractor)

E. Date: _____

SECTION 00 45 30
AUTHORIZATION FOR CRIMINAL BACKGROUND INVESTIGATION

AUTHORIZATION FOR CRIMINAL BACKGROUND INVESTIGATION

1.01 INFORMATION

A. The undersigned hereby authorizes the Board of Trustees, Joliet Junior College, Will County, Illinois to request a criminal background investigation from the Illinois State Police, pursuant to Section 5/1--21.9 of the School Code of Illinois, 105 ILCS 5/10-21.9 and to receive criminal history record information pursuant thereto.

B. By: _____
(Printed/Typed Name of Applicant Employee)

C. By: _____
(Signature of Applicant or Employee)

D. Name of Bidder: _____
(Printed/Typed Name of Authorized Agent of Contractor/Employer)

E. Name of Bidder: _____
(Signature of Authorized Agent of Contractor/Employer)

F. Date: _____

G. **NOTE:** **SIGNATURE ON THIS FORM NOT REQUIRED FOR SUBMITTAL WITH BID.**
This form is referred to by Document 00 45 20 for use with employment applications.

SECTION 00 45 40
BIDDER ELIGIBILITY CERTIFICATION AND NON-COLLUSION AFFIDAVIT

BIDDER ELIGIBILITY CERTIFICATION AND NON-COLLUSION AFFIDAVIT

1.01 INFORMATION

- A. Public Act 85-1295 (Illinois Revised Statutes, 1987, ch. 38, art. 33E) requires that all contractors bidding for public agencies in the State of Illinois certify that they are not barred from bidding on public contracts for bid rigging or bid rotation.
- B. The following certification must be signed and submitted with bidder's bid proposal.
FAILURE TO EXECUTE THIS FORM WILL RESULT IN DISQUALIFICATION OF THE BIDDER.

1. _____, Contractor,
(Firm name of Bidder)

as part of its bid for the Joliet Junior College: Campus Police Renovations project hereby certifies that said Contractor is not barred from bidding on the aforementioned contract as a result of a violation of either Section 33E 3 or 33E-4 of Article 33E of Chapter 38 of the Illinois Revised Statutes.

- 2. The undersigned further certifies and affirms that this proposal was prepared independently for this project and that it contains no fees or amounts other than for legitimate execution of this work as specified and that it includes no understandings or agreements in restraint of trade.

C. Refer to Document 00 72 00 - General Conditions for additional information.

D. Name of Bidder: _____
(Printed/Typed Name of Authorized Agent of Contractor)

E. Name of Bidder: _____
(Signature of Authorized Agent of Contractor)

F. Subscribe and sworn to before me this ____ day of _____.

G. Witness: _____
(Notary Public)

SECTION 00 82 00
PREVAILING WAGE REQUIREMENTS

PART 1 GENERAL

1.01 REQUIREMENTS

- A. Each Contractor shall comply with requirements of Illinois Prevailing Wage Act, 820 ILCS Section 130/0.01.
- B. Please refer to the Illinois Department of Labor's website at <http://www.illinois.gov/idol/Pages/default.aspx> for the requirements and prerequisites of this Act as well as the text of the Act and all related regulations. Please refer questions concerning the Illinois Prevailing Wage Act or the Department of Labor's enforcement of this law, contact the Illinois Department of Labor's Prevailing Wage Division at (217) 782-1710.
- C. A partial list of the requirements of the Illinois Prevailing Wage Act is listed below and is not intended to be a complete listing or official guide to the Illinois Prevailing Wage Act, but is provided herein to assist the Contractor in understanding some of the basic requirements:
 - 1. All laborers, workers and mechanics employed by or on behalf of a public body in the construction of public works shall be paid the general prevailing rate of hourly wages for work of a similar character in the locality in which the work is performed. See 820 ILCS § 130/3.
 - a. A copy of Illinois Department of Labor Prevailing Wages for Will County effective January 13, 2021 is included herein.
 - 2. If, during the course of work under this contract, the Department of Labor revises the prevailing rate hourly wages to be paid under this contract for any trade or occupation, Owner, will notify Contractor and each Subcontractor of the changes in the prevailing rate of hourly wages. Contractor shall have the sole responsibility and duty to ensure that the revised prevailing rate of hourly wages is paid by Contractor and all Subcontractors to each worker to whom a revised rate is applicable. Revisions to the prevailing wage as set forth above shall not result in an increase in the Contract Sum. See 820 ILCS § 130/4(a), (d).
 - 3. Contractors and subcontractors must insert a provision or stipulation regarding the payment of the prevailing wage rate into their subcontracts and contractor's bond. See 820 ILCS § 130/4(b), (c).
 - 4. Contractors who have been awarded public works contracts must post the relevant prevailing wage rate(s) at a location on the project site that is easily accessible by workers. See 820 ILCS §130/4(f).
 - 5. All contractors and subcontractors must create, and keep for at least three years, records of all laborers, mechanics, and other workers employed by them on a public works project. See 820 ILCS § 130/5(a)(1), (b).
 - 6. A contractor or subcontractor participating in a public works project must also submit a Certified Payroll to the public body every month. This Certified Payroll must consist of a complete copy of the records required to be kept under Section 5(a)(1) of the Act (with the exception of daily work starting and ending times). See 820 ILCS §130/5(a)(2).
 - 7. The monthly Certified Payroll shall also include a statement signed by the contractor or subcontractor submitting that: (1) the records are true and accurate; (2) the hourly rate paid to each worker is not less than the general prevailing wage rate required; and (3) the contractor or subcontractor is aware that filing a Certified Payroll that he or she knows to be false is a class B misdemeanor. See 820 ILCS §130/5(a)(2).

END OF SECTION

Will County Prevailing Wage Rates posted on 1/13/2021

Trade Title	Rg	Type	C	Base	Foreman	Overtime				H/W	Pension	Vac	Trng	Other Ins
						M-F	Sa	Su	Hol					
ASBESTOS ABT-GEN	All	ALL		44.40	45.40	1.5	1.5	2.0	2.0	16.10	14.21	0.00	0.90	
ASBESTOS ABT-MEC	All	BLD		38.44	41.51	1.5	1.5	2.0	2.0	14.07	12.51	0.00	0.77	
BOILERMAKER	All	BLD		51.56	56.20	2.0	2.0	2.0	2.0	6.97	21.58	0.00	1.20	
BRICK MASON	All	BLD		47.56	52.32	1.5	1.5	2.0	2.0	11.20	20.51	0.00	0.97	
CARPENTER	All	ALL		49.76	54.74	2.0	2.0	2.0	2.0	11.79	25.74	0.00	0.73	
CEMENT MASON	All	ALL		44.19	46.19	2.0	1.5	2.0	2.0	10.90	27.92	0.00	0.50	
CERAMIC TILE FINISHER	All	BLD		41.80	41.80	1.5	1.5	2.0	2.0	11.25	13.41	0.00	0.88	
COMMUNICATION TECHNICIAN	All	BLD		38.50	42.35	1.5	1.5	2.0	2.0	15.94	14.27	0.00	0.75	1.85
ELECTRIC PWR EQMT OP	All	ALL		54.90	59.90	1.5	1.5	2.0	2.0	12.72	18.42	0.00	3.40	
ELECTRIC PWR GRNDMAN	All	ALL		42.82	59.90	1.5	1.5	2.0	2.0	9.93	14.37	0.00	2.66	
ELECTRIC PWR LINEMAN	All	ALL		54.90	59.90	1.5	1.5	2.0	2.0	12.72	18.42	0.00	3.40	
ELECTRICIAN	All	BLD		47.00	51.23	1.5	1.5	2.0	2.0	16.39	19.26	0.00	1.23	4.21
ELEVATOR CONSTRUCTOR	All	BLD		58.47	65.78	2.0	2.0	2.0	2.0	15.73	18.41	4.68	0.63	
GLAZIER	All	BLD		46.35	47.85	1.5	2.0	2.0	2.0	14.79	22.67	0.00	1.26	
HEAT/FROST INSULATOR	All	BLD		51.25	54.33	1.5	1.5	2.0	2.0	14.07	14.26	0.00	0.77	
IRON WORKER	All	ALL		45.00	49.50	2.0	2.0	2.0	2.0	12.46	27.07	0.00	0.95	
LABORER	All	ALL		44.40	45.15	1.5	1.5	2.0	2.0	16.10	14.21	0.00	0.90	
LATHER	All	ALL		49.76	54.74	2.0	2.0	2.0	2.0	11.79	25.74	0.00	0.73	
MACHINIST	All	BLD		49.68	52.18	1.5	1.5	2.0	2.0	7.93	8.95	1.85	1.47	
MARBLE FINISHER	All	ALL		35.73	49.05	1.5	1.5	2.0	2.0	11.20	18.71	0.00	0.87	
MARBLE MASON	All	BLD		46.71	51.38	1.5	1.5	2.0	2.0	11.20	19.98	0.00	0.95	
MATERIAL TESTER I	All	ALL		34.40		1.5	1.5	2.0	2.0	16.10	14.21	0.00	0.90	
MATERIALS TESTER II	All	ALL		39.40		1.5	1.5	2.0	2.0	16.10	14.21	0.00	0.90	
MILLWRIGHT	All	ALL		49.76	54.74	2.0	2.0	2.0	2.0	11.79	25.74	0.00	0.73	
OPERATING ENGINEER	All	BLD	1	52.10	56.10	2.0	2.0	2.0	2.0	20.90	17.85	2.00	2.15	
OPERATING ENGINEER	All	BLD	2	50.80	56.10	2.0	2.0	2.0	2.0	20.90	17.85	2.00	2.15	
OPERATING ENGINEER	All	BLD	3	48.25	56.10	2.0	2.0	2.0	2.0	20.90	17.85	2.00	2.15	
OPERATING ENGINEER	All	BLD	4	46.50	56.10	2.0	2.0	2.0	2.0	20.90	17.85	2.00	2.15	
OPERATING ENGINEER	All	BLD	5	55.85	56.10	2.0	2.0	2.0	2.0	20.90	17.85	2.00	2.15	
OPERATING ENGINEER	All	BLD	6	53.10	56.10	2.0	2.0	2.0	2.0	20.90	17.85	2.00	2.15	
OPERATING ENGINEER	All	BLD	7	55.10	56.10	2.0	2.0	2.0	2.0	20.90	17.85	2.00	2.15	

OPERATING ENGINEER	All	FLT	1	58.20	58.20	1.5	1.5	2.0	2.0	20.50	16.85	2.00	1.65	
OPERATING ENGINEER	All	FLT	2	56.70	58.20	1.5	1.5	2.0	2.0	20.50	16.85	2.00	1.65	
OPERATING ENGINEER	All	FLT	3	50.45	58.20	1.5	1.5	2.0	2.0	20.50	16.85	2.00	1.65	
OPERATING ENGINEER	All	FLT	4	41.95	58.20	1.5	1.5	2.0	2.0	20.50	16.85	2.00	1.65	
OPERATING ENGINEER	All	FLT	5	59.70	58.20	1.5	1.5	2.0	2.0	20.50	16.85	2.00	1.65	
OPERATING ENGINEER	All	FLT	6	40.00	58.20	1.5	1.5	2.0	2.0	20.50	16.85	2.00	1.65	
OPERATING ENGINEER	All	HWY	1	50.30	54.30	1.5	1.5	2.0	2.0	20.90	17.85	2.00	2.15	
OPERATING ENGINEER	All	HWY	2	49.75	54.30	1.5	1.5	2.0	2.0	20.90	17.85	2.00	2.15	
OPERATING ENGINEER	All	HWY	3	47.70	54.30	1.5	1.5	2.0	2.0	20.90	17.85	2.00	2.15	
OPERATING ENGINEER	All	HWY	4	46.30	54.30	1.5	1.5	2.0	2.0	20.90	17.85	2.00	2.15	
OPERATING ENGINEER	All	HWY	5	45.10	54.30	1.5	1.5	2.0	2.0	20.90	17.85	2.00	2.15	
OPERATING ENGINEER	All	HWY	6	53.30	54.30	1.5	1.5	2.0	2.0	20.90	17.85	2.00	2.15	
OPERATING ENGINEER	All	HWY	7	51.30	54.30	1.5	1.5	2.0	2.0	20.90	17.85	2.00	2.15	
PAINTER	All	ALL		48.30	54.34	1.5	1.5	1.5	2.0	12.51	14.24	0.00	1.87	
PAINTER - SIGNS	All	BLD		39.84	44.74	1.5	1.5	2.0	2.0	2.73	3.39	0.00	0.00	
PILEDRIIVER	All	ALL		49.76	54.74	2.0	2.0	2.0	2.0	11.79	25.74	0.00	0.73	
PIPEFITTER	All	BLD		50.75	53.75	1.5	1.5	2.0	2.0	10.85	20.85	0.00	2.92	
PLASTERER	All	BLD		45.00	47.70	1.5	1.5	2.0	2.0	15.75	18.14	0.00	1.25	
PLUMBER	All	BLD		52.00	55.10	1.5	1.5	2.0	2.0	16.22	15.60	0.00	1.40	
ROOFER	All	BLD		45.75	49.75	1.5	1.5	2.0	2.0	11.23	13.61	0.00	0.91	
SHEETMETAL WORKER	All	BLD		50.33	52.85	1.5	1.5	2.0	2.0	11.00	18.46	0.00	1.29	2.39
SPRINKLER FITTER	All	BLD		50.95	53.45	1.5	1.5	2.0	2.0	13.50	16.80	0.00	0.75	
STONE MASON	All	BLD		47.56	52.32	1.5	1.5	2.0	2.0	11.20	20.51	0.00	0.97	
TERRAZZO FINISHER	All	BLD		43.54	43.54	1.5	1.5	2.0	2.0	11.25	15.61	0.00	0.90	
TERRAZZO MASON	All	BLD		47.38	50.88	1.5	1.5	2.0	2.0	11.25	17.07	0.00	0.94	
TILE MASON	All	BLD		48.75	52.75	1.5	1.5	2.0	2.0	11.25	16.90	0.00	0.95	
TRAFFIC SAFETY WORKER	All	HWY		36.75	38.35	1.5	1.5	2.0	2.0	7.95	8.20	0.00	0.75	
TRUCK DRIVER	All	ALL	1	40.70	41.25	1.5	1.5	2.0	2.0	9.90	10.64	0.00	0.15	
TRUCK DRIVER	All	ALL	2	40.85	41.25	1.5	1.5	2.0	2.0	9.90	10.64	0.00	0.15	
TRUCK DRIVER	All	ALL	3	41.05	41.25	1.5	1.5	2.0	2.0	9.90	10.64	0.00	0.15	
TRUCK DRIVER	All	ALL	4	41.25	41.25	1.5	1.5	2.0	2.0	9.90	10.64	0.00	0.15	
TUCKPOINTER	All	BLD		47.25	48.25	1.5	1.5	2.0	2.0	8.59	19.48	0.00	0.94	

Legend

Rg Region

Type Trade Type - All,Highway,Building,Floating,Oil & Chip,Rivers

C Class

Base Base Wage Rate

OT M-F Unless otherwise noted, OT pay is required for any hour greater than 8 worked each day, Mon through Fri. The number listed is the multiple of the base wage.

OT Sa Overtime pay required for every hour worked on Saturdays

OT Su Overtime pay required for every hour worked on Sundays

OT Hol Overtime pay required for every hour worked on Holidays

H/W Health/Welfare benefit

Vac Vacation

Trng Training

Other Ins Employer hourly cost for any other type(s) of insurance provided for benefit of worker.

Explanations WILL COUNTY

The following list is considered as those days for which holiday rates of wages for work performed apply: New Years Day, Memorial Day, Fourth of July, Labor Day, Thanksgiving Day, Christmas Day and Veterans Day in some classifications/counties. Generally, any of these holidays which fall on a Sunday is celebrated on the following Monday. This then makes work performed on that Monday payable at the appropriate overtime rate for holiday pay. Common practice in a given local may alter certain days of celebration. If in doubt, please check with IDOL.

EXPLANATION OF CLASSES

ASBESTOS - GENERAL - removal of asbestos material/mold and hazardous materials from any place in a building, including mechanical systems where those mechanical systems are to be removed. This includes the removal of asbestos materials/mold and hazardous materials from ductwork or pipes in a building when the building is to be demolished at the time or at some close future date.

ASBESTOS - MECHANICAL - removal of asbestos material from mechanical systems, such as pipes, ducts, and boilers, where the mechanical systems are to remain.

CERAMIC TILE FINISHER

The grouting, cleaning, and polishing of all classes of tile, whether for interior or exterior purposes, all burned, glazed or unglazed products; all composition materials, granite tiles, warning detectable tiles, cement tiles, epoxy composite materials, pavers, glass, mosaics, fiberglass, and all substitute materials, for tile made in tile-like units; all mixtures in tile like form of cement, metals, and other materials that are for and intended for use as a finished floor surface, stair treads, promenade roofs, walks, walls, ceilings, swimming pools, and all other places where tile is to form a finished interior or exterior. The mixing of all setting mortars including but not limited to thin-set mortars, epoxies, wall mud, and any other sand and cement mixtures or adhesives when used in the preparation, installation, repair, or maintenance of tile and/or similar materials. The handling and unloading of all sand, cement, lime, tile, fixtures, equipment, adhesives, or any other materials to be used in the preparation, installation, repair, or maintenance of tile and/or similar materials. Ceramic Tile Finishers shall fill all joints and voids regardless of method on all tile work, particularly and especially after installation of said tile work. Application of any and all protective coverings to all types of tile installations including, but not be limited to, all soap compounds, paper products, tapes, and all polyethylene coverings, plywood, masonite, cardboard, and any new type of products that may be used to protect tile installations, Blastrac equipment, and all floor scarifying equipment used in preparing floors to receive tile. The clean up and removal of all waste and materials. All demolition of existing tile floors and walls to be re-tiled.

COMMUNICATIONS TECHNICIAN

Installation, operation, inspection, maintenance, repair and service of radio, television, recording, voice, sound and vision production and reproduction, telephone and telephone interconnect, facsimile, equipment and appliances used for domestic, commercial, educational and entertainment purposes, pulling of wire through conduit but not the installation of conduit.

MARBLE FINISHER

Loading and unloading trucks, distribution of all materials (all stone, sand, etc.), stocking of floors with material, performing all rigging for heavy work, the handling of all material that may be needed for the installation of such materials, building of scaffolding, polishing if needed, patching, waxing of material if damaged, pointing up, caulking, grouting and cleaning of marble, holding water on diamond or Carborundum blade or saw for setters cutting, use of tub saw or any other saw needed for preparation of material, drilling of holes for wires that anchor material set by setters, mixing up of molding plaster for installation of material, mixing up thin set for the installation of material, mixing up of sand to cement for the installation of material and such other work as may be required in helping a Marble Setter in the handling of all material in the erection or installation of interior marble, slate, travertine, art marble, serpentine, alberene stone, blue stone, granite and other stones (meaning as to stone any foreign or domestic materials as are specified and used in building interiors and exteriors and customarily known as stone in the trade), carrara, sanionyx, vitrolite and similar opaque glass and the laying of all marble tile, terrazzo tile, slate tile and precast tile, steps, risers treads, base, or any other materials that may be used as substitutes for any of the aforementioned materials and which are used on interior and exterior which are installed in a similar manner.

MATERIAL TESTER I: Hand coring and drilling for testing of materials; field inspection of uncured concrete and asphalt.

MATERIAL TESTER II: Field inspection of welds, structural steel, fireproofing, masonry, soil, facade, reinforcing steel, formwork, cured concrete, and concrete and asphalt batch plants; adjusting proportions of bituminous mixtures.

OPERATING ENGINEER - BUILDING

Class 1. Asphalt Plant; Asphalt Spreader; Autograde; Backhoes with Caisson Attachment; Batch Plant; Benoto (requires Two Engineers); Boiler and Throttle Valve; Caisson Rigs; Central Redi-Mix Plant; Combination Back Hoe Front End-loader Machine; Compressor and Throttle Valve; Concrete Breaker (Truck Mounted); Concrete Conveyor; Concrete Conveyor (Truck Mounted); Concrete Paver Over 27E cu. ft; Concrete Paver 27E cu. ft. and Under; Concrete Placer; Concrete Placing Boom; Concrete Pump (Truck Mounted); Concrete Tower; Cranes, All; Cranes, Hammerhead; Cranes, (GCI and similar Type); Creter Crane; Spider Crane; Crusher, Stone, etc.; Derricks, All; Derricks, Traveling; Formless Curb and Gutter Machine; Grader, Elevating; Grouting Machines; Heavy Duty Self-Propelled Transporter or Prime Mover; Highlift Shovels or Front Endloader 2-1/4 yd. and over; Hoists, Elevators, outside type rack and pinion and similar machines; Hoists, One, Two and Three Drum; Hoists, Two Tugger One Floor; Hydraulic Backhoes; Hydraulic Boom Trucks; Hydro Vac (and similar equipment); Locomotives, All; Motor Patrol; Lubrication Technician; Manipulators; Pile Drivers and Skid Rig; Post Hole Digger; Pre-Stress Machine; Pump Cretes Dual Ram; Pump Cretes: Squeeze Cretes-Screw Type Pumps; Gypsum Bulker and Pump; Raised and Blind Hole Drill; Roto Mill Grinder; Scoops - Tractor Drawn; Slip-Form Paver; Straddle Buggies; Operation of Tie Back Machine; Tournapull; Tractor with Boom and Side Boom; Trenching Machines.

Class 2. Boilers; Broom, All Power Propelled; Bulldozers; Concrete Mixer (Two Bag and Over); Conveyor, Portable; Forklift Trucks; Highlift Shovels or Front Endloaders under 2-1/4 yd.; Hoists, Automatic; Hoists, Inside Elevators; Hoists, Sewer Dragging Machine; Hoists, Tugger Single Drum; Laser Screed; Rock Drill (Self-Propelled); Rock Drill (Truck Mounted); Rollers, All; Steam Generators; Tractors, All; Tractor Drawn Vibratory Roller; Winch Trucks with "A" Frame.

Class 3. Air Compressor; Combination Small Equipment Operator; Generators; Heaters, Mechanical; Hoists, Inside Elevators (remodeling or renovation work); Hydraulic Power Units (Pile Driving, Extracting, and Drilling); Pumps, over 3" (1 to 3 not to exceed a total of 300 ft.); Low Boys; Pumps, Well Points; Welding Machines (2 through 5); Winches, 4 Small Electric Drill Winches.

Class 4. Bobcats and/or other Skid Steer Loaders; Oilers; and Brick Forklift.

Class 5. Assistant Craft Foreman.

Class 6. Gradall.

Class 7. Mechanics; Welders.

OPERATING ENGINEERS - HIGHWAY CONSTRUCTION

Class 1. Asphalt Plant; Asphalt Heater and Planer Combination; Asphalt Heater Scarfire; Asphalt Spreader; Autograder/GOMACO or other similar type machines; ABG Paver; Backhoes with Caisson Attachment; Ballast Regulator; Belt Loader; Caisson Rigs; Car Dumper; Central Redi-Mix Plant; Combination Backhoe Front Endloader Machine, (1 cu. yd. Backhoe Bucket or over or with attachments); Concrete Breaker (Truck Mounted); Concrete Conveyor; Concrete Paver over 27E cu. ft.; Concrete Placer; Concrete Tube Float; Cranes, all attachments; Cranes, Tower Cranes of all types: Creter Crane: Spider Crane; Crusher, Stone, etc.; Derricks, All; Derrick Boats; Derricks, Traveling; Dredges; Elevators, Outside type Rack & Pinion and Similar Machines; Formless Curb and Gutter Machine; Grader, Elevating; Grader, Motor Grader, Motor Patrol, Auto Patrol, Form Grader, Pull Grader, Subgrader; Guard Rail Post Driver Truck Mounted; Hoists, One, Two and Three Drum; Heavy Duty Self-Propelled Transporter or Prime Mover; Hydraulic Backhoes; Backhoes with shear attachments up to 40' of boom reach; Lubrication Technician; Manipulators; Mucking Machine; Pile Drivers and Skid Rig; Pre-Stress Machine; Pump Cretes Dual Ram; Rock Drill - Crawler or Skid Rig; Rock Drill - Truck Mounted; Rock/Track Tamper; Roto Mill Grinder; Slip-Form Paver; Snow Melters; Soil Test Drill Rig (Truck Mounted); Straddle Buggies; Hydraulic Telescoping Form (Tunnel); Operation of Tieback Machine; Tractor Drawn Belt Loader; Tractor Drawn Belt Loader (with attached pusher - two engineers); Tractor with Boom; Tractaire with Attachments; Traffic Barrier Transfer Machine; Trenching; Truck Mounted Concrete Pump with Boom; Raised or Blind Hole Drills (Tunnel Shaft); Underground Boring and/or Mining Machines 5 ft. in diameter and over tunnel, etc; Underground Boring and/or Mining Machines under 5 ft. in diameter; Wheel Excavator; Widener (APSCO).

Class 2. Batch Plant; Bituminous Mixer; Boiler and Throttle Valve; Bulldozers; Car Loader Trailing Conveyors; Combination Backhoe Front Endloader Machine (Less than 1 cu. yd. Backhoe Bucket or over or with attachments); Compressor and Throttle Valve; Compressor, Common Receiver (3); Concrete Breaker or Hydro Hammer; Concrete Grinding Machine; Concrete Mixer or Paver 7S Series to and including 27 cu. ft.; Concrete Spreader; Concrete Curing Machine, Burlap Machine, Belting Machine and Sealing Machine; Concrete Wheel Saw; Conveyor Muck Cars (Haglund or Similar Type); Drills, All; Finishing Machine - Concrete; Highlift Shovels or Front Endloader; Hoist - Sewer Dragging Machine; Hydraulic Boom Trucks (All Attachments); Hydro-Blaster; Hydro Excavating (excluding hose work); Laser Screed; All Locomotives, Dinky; Off-Road Hauling Units (including articulating) Non Self-Loading Ejection Dump; Pump Cretes: Squeeze Cretes - Screw Type Pumps, Gypsum Bulker and Pump; Roller, Asphalt; Rotary Snow Plows; Rototiller, Seaman, etc., self-propelled; Self-Propelled Compactor; Spreader - Chip - Stone, etc.; Scraper - Single/Twin Engine/Push and Pull; Scraper - Prime Mover in Tandem (Regardless of Size); Tractors pulling attachments, Sheeps Foot, Disc, Compactor, etc.; Tug Boats.

Class 3. Boilers; Brooms, All Power Propelled; Cement Supply Tender; Compressor, Common Receiver (2); Concrete Mixer (Two Bag and Over); Conveyor, Portable; Farm-Type Tractors Used for Mowing, Seeding, etc.; Forklift Trucks; Grouting Machine; Hoists, Automatic; Hoists, All Elevators; Hoists, Tugger Single Drum; Jeep Diggers; Low Boys; Pipe Jacking Machines; Post-Hole Digger; Power Saw, Concrete Power Driven; Pug Mills; Rollers, other than Asphalt; Seed and Straw Blower; Steam Generators; Stump Machine; Winch Trucks with "A" Frame; Work Boats; Tamper-Form-Motor Driven.

Class 4. Air Compressor; Combination - Small Equipment Operator; Directional Boring Machine; Generators; Heaters, Mechanical; Hydraulic Power Unit (Pile Driving, Extracting, or Drilling); Light Plants, All (1 through 5); Pumps, over 3" (1 to 3 not to exceed a total of 300 ft.); Pumps, Well Points; Vacuum Trucks (excluding hose work); Welding Machines (2 through 5); Winches, 4 Small Electric Drill Winches.

Class 5. SkidSteer Loader (all); Brick Forklifts; Oilers.

Class 6. Field Mechanics and Field Welders

Class 7. Dowell Machine with Air Compressor; Gradall and machines of like nature.

OPERATING ENGINEER - FLOATING

Class 1. Craft Foreman; Master Mechanic; Diver/Wet Tender; Engineer; Engineer (Hydraulic Dredge).

Class 2. Crane/Backhoe Operator; Boat Operator with towing endorsement; Mechanic/Welder; Assistant Engineer (Hydraulic Dredge); Leverman (Hydraulic Dredge); Diver Tender.

Class 3. Deck Equipment Operator, Machineryman, Maintenance of Crane (over 50 ton capacity) or Backhoe (115,000 lbs. or more); Tug/Launch Operator; Loader/Dozer and like equipment on Barge, Breakwater Wall, Slip/Dock, or Scow, Deck Machinery, etc.

Class 4. Deck Equipment Operator, Machineryman/Fireman (4 Equipment Units or More); Off Road Trucks; Deck Hand, Tug Engineer, Crane Maintenance (50 Ton Capacity and Under) or Backhoe Weighing (115,000 pounds or less); Assistant Tug Operator.

Class 5. Friction or Lattice Boom Cranes.

Class 6. ROV Pilot, ROV Tender

TRAFFIC SAFETY - Effective November 30, 2018, the description of the traffic safety worker trade in this County is as follows:

Work associated with barricades, horses and drums used to reduce lane usage on highway work, the installation and removal of temporary, non-temporary or permanent lane, pavement or roadway markings, and the installation and removal of temporary road signs.

TRUCK DRIVER - BUILDING, HEAVY AND HIGHWAY CONSTRUCTION

Class 1. Two or three Axle Trucks. A-frame Truck when used for transportation purposes; Air Compressors and Welding Machines, including those pulled by cars, pick-up trucks and tractors; Ambulances; Batch Gate Lockers; Batch Hopperman; Car and Truck Washers; Carry-alls; Fork Lifts and Hoisters; Helpers; Mechanics Helpers and Greasers; Oil Distributors 2-man operation; Pavement Breakers; Pole Trailer, up to 40 feet; Power Mower Tractors; Self-propelled Chip Spreader; Skipman; Slurry Trucks, 2-man operation; Slurry Truck Conveyor Operation, 2 or 3 man; Teamsters; Unskilled Dumpman; and Truck Drivers hauling warning lights, barricades, and portable toilets on the job site.

Class 2. Four axle trucks; Dump Crets and Adgetors under 7 yards; Dumpsters, Track Trucks, Euclids, Hug Bottom Dump Turnapulls or Turnatrailers when pulling other than self-loading equipment or similar equipment under 16 cubic yards; Mixer Trucks under 7 yards; Ready-mix Plant Hopper Operator, and Winch Trucks, 2 Axles.

Class 3. Five axle trucks; Dump Crets and Adgetors 7 yards and over; Dumpsters, Track Trucks, Euclids, Hug Bottom Dump Turnatrailers or turnapulls when pulling other than self-loading equipment or similar equipment over 16 cubic yards; Explosives and/or Fission Material Trucks; Mixer Trucks 7 yards or over; Mobile Cranes while in transit; Oil Distributors, 1-man operation; Pole Trailer, over 40 feet; Pole and Expandable Trailers hauling material over 50 feet long; Slurry trucks, 1-man operation; Winch trucks, 3 axles or more; Mechanic--Truck Welder and Truck Painter.

Class 4. Six axle trucks; Dual-purpose vehicles, such as mounted crane trucks with hoist and accessories; Foreman; Master Mechanic; Self-loading equipment like P.B. and trucks with scoops on the front.

TERRAZZO FINISHER

The handling of sand, cement, marble chips, and all other materials that may be used by the Mosaic Terrazzo Mechanic, and the mixing, grinding, grouting, cleaning and sealing of all Marble, Mosaic, and Terrazzo work, floors, base, stairs, and wainscoting by hand or machine, and in addition, assisting and aiding Marble, Masonic, and Terrazzo Mechanics.

Other Classifications of Work:

For definitions of classifications not otherwise set out, the Department generally has on file such definitions which are available. If a task to be performed is not subject to one of the classifications of pay set out, the Department will upon being contacted state which neighboring county has such a classification and provide such rate, such rate being deemed to exist by reference in this document. If no neighboring county rate applies to the task, the Department shall undertake a special determination, such special determination being then deemed to have existed under this determination. If a project requires these, or any classification not listed, please contact IDOL at 217-782-1710 for wage rates or clarifications.

LANDSCAPING

Landscaping work falls under the existing classifications for laborer, operating engineer and truck driver. The work performed by landscape plantsman and landscape laborer is covered by the existing classification of laborer. The work performed by landscape operators (regardless of equipment used or its size) is covered by the classifications of operating engineer. The work performed by landscape truck drivers (regardless of size of truck driven) is covered by the classifications of truck driver.

MATERIAL TESTER & MATERIAL TESTER/INSPECTOR I AND II

Notwithstanding the difference in the classification title, the classification entitled "Material Tester I" involves the same job duties as the classification entitled "Material Tester/Inspector I". Likewise, the classification entitled "Material Tester II" involves the same job duties as the classification entitled "Material Tester/Inspector II".

SECTION 01 10 00

SUMMARY

PART 1 GENERAL

1.01 PROJECT

- A. Project Name Campus Police Renovations
- B. Project Locations: Joliet Junior College
 Building 'G'
 1215 Houbolt Road
 Joliet, Illinois 60431
- C. Owner's Name: Board of Trustees
 Joliet Junior College
 1215 Houbolt Road
 Joliet, Illinois 60431
- D. Architect's Name: Legat Architects, Inc..
 2015 Spring Road, Suite 175
 Oak Brook, Illinois 60523
- E. The Project is located in Building 'G' located at Joliet Junior College's main campus located at 1215 Houbolt Road, Joliet, Illinois 60431. The project includes the following program areas:
 - 1. +/-15,000 square foot remodeling of the first floor of Building 'G':
 - a. Campus Police Department including, but not limited to:
 - 1) Interview Rooms
 - 2) Administrative Offices
 - 3) Records Room
 - 4) 911 Dispatch
 - 5) Roll Call/Conference Room
 - 6) Break Room
 - 7) Squad Room
 - 8) Training Classroom
 - 9) Community Service Officer/Student Office
 - 10) Technology Work Room
 - 11) General Storage
 - 12) Amory Storage
 - 13) Men's Toilet/Locker Room
 - 14) Women's Toilet/Locker Room
 - 15) Evidence Processing Room
 - 16) Evidence Storage Room
 - 17) Prisoner Processing Room
 - 18) Temporary Holding Cell
 - 19) Detention Toilet
 - b. Fitness Support Areas including, but not limited to:
 - 1) Power Reception/Processing
 - 2) Power Testing Office
 - 3) Faculty Office
 - c. Fitness / Athletic Toilet Rooms and Locker Rooms including, but not limited to:
 - 1) Women's Toilet/Locker Room
 - 2) Men's Toilet/Locker Room
 - 3) Men's Wrestling Locker Area
 - 4) Laundry.
 - 2. Alternate Bid #1: +/-1,200 square foot new addition construction south of Building 'G' including, but not limited to:
 - a. Sally Port
 - b. Man Lock

- c. Vertical Wheelchair Lift
- d. Site Work including, but not limited to:
 - 1) Site Clearing
 - 2) Earth Moving
 - 3) Subgrade Preparation
 - 4) Dewatering
 - 5) Asphalt Drive and Parking Lot with Concrete Curbs
 - 6) Concrete Walks
 - 7) Landscaping
 - 8) Manholes and Structures
 - 9) Storm Utility Drainage Piping, Inlets, and Manholes
- 3. Alternate Bid #2: +/-6,400 square foot new addition construction south of Building 'G' including, but not limited to:
 - a. Sally Port
 - b. Man Lock
 - c. Vertical Wheelchair Lift
 - d. Storage
 - e. Water Service Room
 - f. Fleet Storage Parking for (7) Squad Cars/SUVs.
 - g. Site Work including, but not limited to:
 - 1) Site Clearing
 - 2) Earth Moving
 - 3) Subgrade Preparation
 - 4) Dewatering
 - 5) Asphalt Drive and Parking Lot with Concrete Curbs
 - 6) Concrete Walks
 - 7) Landscaping
 - 8) Manholes and Structures
 - 9) Storm Utility Drainage Piping, Inlets, and Manholes

1.02 CONTRACT DESCRIPTION

- A. Contract Type: Multiple prime contracts, each based on a Stipulated Price as described in Document 00 50 00 - Contracting Forms and Supplements.
- B. Contract Type: Multiple prime contracts, each based on a Stipulated Price.
 - 1. Bid Package #1 - General Trades/Coordinating Contractor
 - 2. Bid Package #2 - Mechanical/Temperature Controls Trades Contractor
 - 3. Bid Package #3 - Electrical/Fire Alarm Trades Contractor
 - 4. Bid Package #4 - Plumbing Trades Contractor

1.03 INSURANCE

- A. See Owner's Instructions to Bidders in Division 0.
 - 1. Include the cost of insurance in the Bid Amount and identify the costs on the Schedule of Values.

1.04 DOCUMENTS REQUIRED IMMEDIATELY AFTER CONTRACT AWARD:

- A. Insurance: Submit to the Owner executed Certificates of Insurance. Submit within five (5) business days after date established in Letter of Intent to Award a Construction Contract.
- B. Bonds: Submit to the Owner executed Performance and Payment Bond(s). Submit within five (5) business days after date established in Letter of Intent to Award a Construction Contract.
- C. Safety Certification: Submit written documentation certifying the Contractor is familiar with the Manual of Accident Prevention in Construction by the Associated General Contractors of America, current edition, and that the Contractor will strictly enforce the applicable requirements of this document. Submit within five (5) business days after date of Owner-Contractor Agreement.

- D. Schedule of Values: Submit a Schedule of Values within five (5) business days after date of Owner-Contractor Agreement. See Document 01 20 00 - Price and Payment Procedures.
- E. Project Schedule: Submit a Preliminary Project Schedule which encompasses the full duration of the Project and demonstrates the Bidder has an understanding of the scope of the Work and the complexity of the Project. Submit within fifteen (15) business days after date of Owner-Contractor Agreement. See Document 01 32 16 - Construction Progress Schedule.

1.05 SALES TAX:

- A. This Project is exempt from all State and Local Use taxes. Obtain sales tax exemption certificate number from Owner.
- B. Place exemption certificate number on invoices for materials incorporated in work.
- C. Furnish copies of invoices to Owner upon request.
- D. Upon completion of work, submit to the Owner a notarized statement that all purchases made under exemption certificate were entitled to be exempt.
- E. The Contractor shall pay legally assessed penalties and related legal fees for improper use of exemption certificate number.

1.06 DEFINITIONS

- A. 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.
- B. Fabricated: Items specifically assembled or made of selected materials or components to meet individual design requirements.
- C. Furnish: To supply, deliver, unload, and inspect for damage.
- D. Install: To unpack, assemble, erect, apply, place, finish, cure, protect, clean, start up, and make ready for use.
- E. Manufactured: Standard units, usually mass produced by an established manufacturer of the respective item.
- F. Product: Material, machinery, components, equipment, fixtures, and systems forming the work result. Not materials or equipment used for preparation, fabrication, conveying, or erection and not incorporated into the work result. Products may be new, never before used, or re-used materials or equipment.
- G. Project Manual: The book-sized volume that includes the procurement requirements (if any), the contracting requirements, and the specifications.
- H. Provide: To furnish and install.
- I. Shop fabricated or shop made: Shop fabricated or shop made refers to items made by a Contractor or Subcontractor in their own Shop.
- J. Supply: Same as Furnish.

1.07 HEIRARCHIES

- A. Where conflict exists within the Contract Documents the more stringent, the greater quality, or the greater quantity shall apply.
- B. Where conflict exists between the Contract Documents and applicable building codes, standards, or ordinances the more stringent, the greater quality, or the greater quantity shall apply.
- C. Contract Drawings:
 - 1. Large scale drawings take precedence over smaller scale drawings;
 - 2. nnotated dimensions take precedence over hand/machine scaled dimensions;
 - 3. Notes and annotations take precedence over graphic representations and symbols.

1.08 PRESENCE OF HAZARDOUS MATERIALS

- A. Asbestos containing building materials may be present in the facilities where the Work of this Contract is identified to be performed.
 - 1. An asbestos management plan is available for review from the Owner.
 - 2. The Owner will employ and pay for the services of an independent environmental consultant as required for the duration of the Work to identify and test for the presence of asbestos in the areas of Work.
 - 3. The Owner will provide for the abatement of asbestos containing materials, including monitoring, air sampling, and clearance testing, under separate contract.
 - 4. The Owner will provide a mandatory asbestos awareness training program to be attended by all on-site personnel of the Contractor, subcontractors, and sub-subcontractors prior to the start of Work.
 - 5. The Contractor is required to coordinate all Work with the Owner and the Owner's environmental consultant and notify the Owner if Contractor suspects existing materials to be affected by the Work may be asbestos containing.

1.09 PROJECT PHASING

- A. Phase 1:
 - 1. Install temporary partition in existing Fitness Center 1003 and any other required temporary partitions.
- B. Phase 2:
 - 1. Renovate all areas except for those areas north and east of Existing Mechanical 1023 and Existing Mechanical 1038 currently occupied by the existing 911 dispatch operations. These areas include the following rooms/areas:
 - a. Part of Corridor 1019.
 - b. Power Reception/Processing 1021.
 - c. Power Testing Office 1020.
 - d. Faculty Office 1013.
- C. Phase 3:
 - 1. Seamlessly transfer existing 911 dispatch operations into Dispatch 1028 and Records 1027.
 - 2. Renovate the following rooms/areas:
 - a. Part of Corridor 1019.
 - b. Power Reception/Processing 1021.
 - c. Power Testing Office 1020.
 - d. Faculty Office 1013.

1.10 WORK BY OWNER

- A. Removal of Small Items:
 - 1. Owner will remove the following:
 - a. Existing Furniture
 - b. Artwork
 - c. Other Miscellaneous Items.
- B. Asbestos Abatement Removal:
 - 1. Prior to the start of the Work, the Owner will be removing all asbestos containing material from within the Project Limits under a separate contract.
- C. Security/Door Access Control:
 - 1. Owner will furnish and contractor will install the following:
 - a. Proximity Card Readers
 - b. Electronic Strikes Door Hardware
 - c. Electrified Panic Door Hardware
 - 2. Owner will furnish and install the following:
 - a. Security Cameras

- D. Toilet Accessories:
 - 1. Owner will furnish and contractor will install the following:
 - a. Paper Towel Dispensors
 - b. Toilet Dispensors
 - c. Soap Dispensors
- E. Signage:
 - 1. Owner will furnish and install the following under a separate contract:
 - a. Room Identification Signage
 - b. Wayfinding Signage
 - c. Police Department Signage
- F. Audio/Visual Equipment:
 - 1. Owner will furnish and install the following equipment:
 - a. Projector in Squad Room 1037
 - b. Projection Screen in Squad Room 1037
 - c. All Computers, Desk Monitors, and VOIP Phones
- G. Furniture:
 - 1. Owner will furnish and install the following under a separate contract:
 - a. All Furniture
- H. Police Gear Lockers, Police Civilian Lockers, Evidence Lockers, Gun Lockers, and Ammo/Weapon Storage:
 - 1. Owner will furnish and install the following under a separate contract:
 - a. All Police Gear and Civilian Lockers in Men's Locker Room 1060
 - b. All Police Gear and Civilian Lockers in Women's Locker Room 1059
 - c. Evidence Lockers in Evidence Room 1048
 - d. All Gun Lockers
 - e. Ammo/Weapon Storage Components in Armory 1056.
- I. Appliances:
 - 1. Owner will furnish and the contractor will install the following:
 - a. Small Refrigerator in Evidence Room 1048
 - b. Refrigerator in Break Room 1036
 - c. Microwave in Break Room 1036
 - d. Ice Machine in Laundry 1075
 - e. Clothes Washer in Laundry 1075
 - f. Clothes Dryer in Laundry 1075

1.11 OWNER OCCUPANCY

- A. Owner intends to continue to occupy adjacent portions of the existing building during the entire construction period.
 - 1. Hours of Operations:
 - a. 7:00 a.m. to 10:00 p.m.
- B. Cooperate with Owner to minimize conflict and to facilitate Owner's operations.
- C. Schedule the Work to accommodate Owner occupancy.

1.12 CONTRACTOR USE OF SITE AND PREMISES

- A. Entrance into the Building 'G' building while Staff are on-site shall be prohibited without each person complying with the following:
 - 1. Display at all times of Owner-issue identification badge.
 - 2. Identification badge will be issued only after:
 - a. Minimum three days notification to the Owner.
- 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.
- 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.
- D. Existing building spaces may not be used for storage without prior approval by the Owner.
- E. Securing Building and Work Areas:
 1. Exterior doors of Building 'G' are to be kept closed, locked, and secured at all times.
 2. Provide necessary precautions such as barriers to protect Owner's personnel, Staff and the public, in the areas of Work.
 3. Close off and secure areas of Work after working hours to prevent entry to areas of Work by unauthorized persons.
- F. Time Restrictions:
 1. Limit conduct of Work between the hours of 6:00 a.m. and 4:00 p.m..
- G. Utility Outages and Shutdown:
 1. Limit disruption of utility services to hours the building is unoccupied or when scheduled by the Owner.
 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 other facilities.
- H. Roofing Work:
 1. Any work to be performed on the roof of Building 'G' shall be performed by the Owner's proprietary roofing contractor so as to maintain roof warranties currently in place. Contact:

1.13 CONTRACTOR OPERATIONS

- A. Contractor Staffing:
 1. The Contractor shall be required to have one Project Manager overseeing the project for the duration of the Work.
 2. The Contractor shall be required to have a minimum of one full-time, non-working, Site Superintendent on-site daily for the duration of the Work.
 - a. The Site Superintendent shall be on-site daily until the punch list work is 100% complete.
 3. Additional site supervision as necessitated by the project conditions shall be at the Contractor's discretion.
 4. The Contractor shall promote disciplined work and appropriate behavior among employees and expect Subcontractors to perform similarly. Do not employ on Project:
 - a. Unfit persons.
 - b. Persons not skilled in assigned task.
- B. Project Communications:
 1. Communications by all key project personnel shall be via voice (telephone and mobile phone), email (mobile smart phone and computer), and electronic document submittal service (mobile smart phone or computer).
- C. The Contractor shall provide and pay for the following to execute and complete the Work unless specifically noted otherwise:
 1. All labor, materials, and equipment necessary.
 2. All tools, construction equipment, and machinery.
 3. Other facilities and services.
- D. The Contractor shall secure and pay for the following to execute and complete the Work unless specifically noted otherwise:
 1. Government fees.
 2. Licenses.

3. Equipment Certifications/Inspections and related fees.
- E. The Contractor shall comply with codes, ordinances, rules, regulations, orders and other legal requirements of public authorities which bear on performance of work.
 1. The Contractor shall promptly submit written notice to Architect of known or observed variances of Contract Documents from legal requirements. Upon notification, the Architect will make appropriate modifications to Contract Documents.
 2. The Contractor assumes full responsibility for Work known to be contrary to such requirements.
- F. The General Trades/Coordinating Contractor shall provide comprehensive (final) cleaning. See Document 01 70 00 - Execution and Closeout Requirements.

1.14 MILESTONE DATES

- A. Refer to Owner's Project Schedule in Division 0.
- B. Coordinate construction schedule and operations with Owner.
 1. Give Owner minimum three (3) business days notice before starting Work in any area.

1.15 SCOPES OF WORK

- A. See Owner's Scope of Work documents in Division 0.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION

SECTION 01 20 00
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. Correlation of Contractor submittals based on changes.
- E. Procedures for preparation and submittal of application for final payment.

1.02 RELATED REQUIREMENTS

- A. Section 01 21 00 - Allowances.
- B. Section 01 23 00 - Alternates.

1.03 SCHEDULE OF VALUES

- A. Form to be used: AIA G703.
- 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 electronically within 3 business days after date Letter of Intent to Award a Construction Contract.
- E. Format: Utilize the Table of Contents of this Project Manual. Identify each line item with number and title of the specification Section. Identify bonds and insurance.
- F. Include separately from each line item, a direct proportional amount of Contractor's overhead and profit.
- G. Revise schedule to list approved Change Orders, with each Application For Payment.
- H. Preparation of Schedule of Values.
 - 1. Itemize separate line cost for each of following cost items:
 - a. Insurance.
 - b. Bonds.
 - c. General Conditions and overhead.
 - d. Profit and fees.
 - e. Construction allowance amounts.
 - f. Mobilization.
 - g. Dumpsters.
 - h. Daily clean-up.
 - i. Final cleaning.
 - j. Temporary barricades and fencing.
 - k. Hoisting and craning.
 - l. Warranties.
 - m. Operations and maintenance manuals
 - n. As-built drawings.
 - o. Owner demonstration and training.
 - p. Attic stock materials and equipment.
 - q. Any additional line items requested by the Owner, Construction Manager or Architect.
 - 2. Itemize separate line item cost for work specified in each section of the specifications. Identify work of:
 - a. Trade Contractor's own labor forces.
 - b. All subcontractors.
 - c. All major suppliers of products or equipment.

3. Break down installed costs into:
 - a. Delivered cost of product, with taxes paid.
 - b. Labor cost.
4. For each line item which has an installed value of more than \$10,000.00 break down costs to list amount of labor and amount of materials under each item.
 - a. Contractor, subcontractor or supplier.
 - b. Specification section number.
 - c. Description of work or material.
 - d. Quantity.
 - e. Unit Price.
 - f. Scheduled value.
 - g. Percentage (%) of Contract.
5. Round off figures to nearest one dollar.
6. Make sum of total costs of all items listed in Schedule equal to total contract sum.

1.04 APPLICATIONS FOR PROGRESS PAYMENTS

- A. Payment Period: Submit at intervals stipulated in the Agreement.
- B. Form to be used: AIA G702 and G703.
- 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. Scheduled Values.
 5. Scheduled Values.
 6. Previous Applications.
 7. Work in Place and Stored Materials under this Application.
 8. Authorized Change Orders.
 9. Total Completed and Stored to Date of Application.
 10. Percentage of Completion.
 11. Balance to Finish.
 12. 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 Allowance as separate line items consisting of the following.
 1. List each authorized Allowance Authorization Requests (AARs).
 2. List the amount of Allowance Dollars Remaining such that the sum of all Allowance Authorization Requests listed and the Allowance Dollars Remaining totals the Allowance amount specified in 01 21 00 - Allowances.
- I. List each authorized Change Order as a separate line item, listing Change Order number and dollar amount as for an original item of Work.
- J. Include the following with the application:
 1. Transmittal letter as specified for submittals in Section 01 30 00.
 2. Construction progress schedule, revised and current as specified in Section 01 30 00.
 3. Current construction photographs specified in Section 01 30 00.
 4. Partial release of liens from major subcontractors and vendors.
- 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 APPLICATION FOR PROGRESS PAYMENT SUBMISSION AND REVIEW PROCESS:

- A. Contractor is to submit one electronic copy of draft Application for Payment (pencil copy) to the Architect's Project Manager and the Owner's Representative for initial review.
- B. If the Architect and Owner have comments or corrections, Contractor shall address all issues and resubmit one revised electronic copy of draft Application for Payment (pencil copy) for final review.
- C. Upon approval of the draft Application for Payment (pencil copy), Contractor shall submit two original copies of the Application for Payment (final copy), waivers of lien, and all substantiating paperwork to Legat Architects' Corporate Studio at the following address:
 - 1. Attention: Cindy Hopkins.
 - 2. Address: 1125 Tri-State Parkway, Suite 730, Illinois 60031
 - 3. Phone: (847) 662-3535.
- D. Legat Architects' Corporate Studio will review the Application for Payment (final copy) and all supporting materials. A representative of the Legat Architects' Corporate Studio may contact the Contractor directly if supporting materials are missing or incorrect.
- E. Legat Architects' Corporate Studio will forward the original copies of the Application for Payment (final copy) to the Owner for approval and payment.
- F. The Owner's Representative will approve the Application for Payment (final copy) and authorize the Business Office to release payment on regularly scheduled monthly check release days.
- G. Attached following this document is a Payment Schedule with milestone dates corresponding to the Progress Payment Process. Failure by the Contractor to adhere to the Progress Payment Process and the Payment Schedule may result in payments not being made in a timely manner.

1.06 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 fixed price quotation within 3 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 60 00.
- 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 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. On request, 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. Adjustments to the Contract Sum, excluding those calculated using unit prices, shall calculate overhead, profit, and general conditions combined at the following percentages of the cost attributed to the change in the Work:
 - 1. For the Contractor, for Work performed by the Contractor's own forces, add ten percent (10%) of the cost of the Work.
 - 2. For the Contractor, for Work performed by the Contractor's Subcontractors, add five percent (5%) of the cost of the Work.
 - 3. For each Subcontractor or Sub-subcontractor involved, for Work performed by the Subcontractor or Sub-subcontractor own forces, add ten percent (10%) of the cost of the Work.
 - 4. For each Subcontractor, for Work performed by the Subcontractor's Sub-subcontractor, add five percent (5%) of the cost of the Work.
 - 5. When both additions and credits are involved in any one change, the allowance for overhead and profit shall be figured on the basis of the net increase, if any.
- I. Execution of Change Orders: Architect will issue Change Orders for signatures of parties as provided in the Conditions of the Contract.
- J. 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.
- K. 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.
- L. Promptly enter changes in Project Record Documents.

1.07 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 70 00.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION

**SECTION 01 21 00
ALLOWANCES**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Contingency allowance.

1.02 RELATED REQUIREMENTS

- A. Section 01 20 00 - Price and Payment Procedures: Additional payment and modification procedures.

1.03 CONTINGENCY ALLOWANCE

- A. Contractor's costs for products, delivery, installation, labor, insurance, payroll, taxes, bonding, equipment rental, overhead and profit will be included in Change Orders authorizing expenditure of funds from this Contingency Allowance.
- B. Funds will be drawn from the Contingency Allowance only by Change Order.
- C. At closeout of Contract, funds remaining in Contingency Allowance will be credited to Owner by Change Order.

1.04 ALLOWANCES SCHEDULE

- A. Bid Package #1 - General Trades/Coordinating Contractor
 - 1. Include the stipulated sum of **\$25,000.00** in the Base Bid.
- B. Bid Package #2 - Mechanical/Temperature Controls Trades Contractor
 - 1. Include the stipulated sum of **\$15,000.00** in the Base Bid.
- C. Bid Package #3 - Electrical/Fire Alarm Trades Contractor
 - 1. Include the stipulated sum of **\$15,000.00** in the Base Bid.
- D. Bid Package #4 - Plumbing Trades Contractor
 - 1. Include the stipulated sum of **\$10,000.00** in the Base Bid.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION

SECTION 01 23 00

ALTERNATES

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Description of Alternates.

1.02 RELATED REQUIREMENTS

- A. Document 00 21 13 - Instructions to Bidders: Instructions for preparation of pricing for Alternates.
- B. Division 0: Owner's Instruction to Bidders.
- C. Division 0: Owner's Bid Form.

1.03 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. Indicate bid price for Alternates listed on the Bid Form. Unless otherwise noted, indicate bid price for Alternates as adding to or deducting from the Base Bid price.
- C. Bids will be evaluated based on the total of the base bid price and the Alternates being considered.
- D. Coordinate related work and modify surrounding work to integrate the Work of each Alternate.

1.04 SCHEDULE OF ALTERNATES

A. Alternate #1:

- 1. State the amount to be **ADDED** to the Base Bid for all Work associated with the +/-1,200 square foot new Sally Port addition construction south of Building 'G' as indicated on the Drawings including the following:
 - a. Sally Port Addition 1068
 - b. Man Lock 1067
 - c. Vertical Wheelchair Lift
 - d. Site Work including, but not limited to:
 - 1) Site Clearing
 - 2) Earth Moving
 - 3) Subgrade Preparation
 - 4) Dewatering
 - 5) Asphalt Drive and Parking Lot with Concrete Curbs
 - 6) Concrete Walks
 - 7) Landscaping
 - 8) Manholes and Structures
 - 9) Storm Utility Drainage Piping, Inlets, and Manholes

B. Alternate #2:

- 1. State the amount to be **ADDED** to the Base Bid for all Work associated with the +/-1,200 square foot new Sally Port addition construction south of Building 'G' as indicated on the Drawings including the following:
 - a. Sally Port Addition 1068
 - b. Man Lock 1067
 - c. Vertical Wheelchair Lift
 - d. Storage 1071
 - e. Water Service Room 1072
 - f. Fleet Storage Addition 1070
 - g. Site Work including, but not limited to:
 - 1) Site Clearing
 - 2) Earth Moving

- 3) Subgrade Preparation
- 4) Dewatering
- 5) Asphalt Drive and Parking Lot with Concrete Curbs
- 6) Concrete Walks
- 7) Landscaping
- 8) Manholes and Structures
- 9) Storm Utility Drainage Piping, Inlets, and Manholes

2. NOTES:

- a. The east wall of Sally Port Addition 1068 changes from an exterior wall to an interior wall in Alternate #2.
- b. Alternate #1 and #2 are stand-alone alternate bids. Either Alternate #1 or #2 will be considered to be accepted.
- c. The asphalt parking lot and cast-in-place concrete curbs shown in the footprint of Fleet Storage Addition 1070 get eliminated in Alternate #2.
- d. Refer to Sheet C-200 Proposed Site Improvement Plan - Base Bid for site work associated with the Base Bid.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION

SECTION 01 30 00
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. Coordination drawings.
- F. Submittals for review, information, and project closeout.
- G. Number of copies of submittals.
- H. Requests for Information (RFI) procedures.
- I. Submittal procedures.

1.02 RELATED REQUIREMENTS

- A. Section 01 30 05 - Electronic File Waiver.
- B. Section 01 32 16 - Construction Progress Schedule.
- C. Section 01 35 53 - Security Procedures.
- D. Section 01 60 00 - Product Requirements: General product requirements.
- E. Section 01 70 00 - Execution and Closeout Requirements: Additional coordination requirements.
- F. Section 01 78 00 - Closeout Submittals: Project record documents; operation and maintenance data; warranties and bonds.

1.03 GENERAL ADMINISTRATIVE REQUIREMENTS

- A. Comply with requirements of Section 01 70 00 - Execution and Closeout Requirements for coordination of execution of administrative tasks with timing of construction activities.
- B. Make the following types of submittals to Architect:
 - 1. Requests for Information (RFI).
 - 2. Requests for substitution.
 - 3. Shop drawings, product data, and samples.
 - 4. Test and inspection reports.
 - 5. Design data.
 - 6. Manufacturer's instructions and field reports.
 - 7. Applications for payment and change order requests.
 - 8. Progress schedules.
 - 9. Coordination drawings.
 - 10. Correction Punch List and Final Correction Punch List for Substantial Completion.
 - 11. Closeout submittals.

1.04 PROJECT COORDINATOR

- A. Project Coordinator: Owner's Construction Supervisor.
- B. Cooperate with the Project Coordinator in allocation of mobilization areas of site, materials staging, construction traffic, deliveries, and parking.
- 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. Responsibility for providing temporary utilities and construction facilities is identified in Section 01 10 00 - Summary.
- F. Coordinate field engineering and layout work under instructions of the Project Coordinator.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.01 ELECTRONIC DOCUMENT SUBMITTAL SERVICE

- A. **Use of an electronic document submittal service is not required.**
However, the Contractor is encouraged to utilize this type of service for this project.
- B. 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. 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.
 - 2. Contractor and Architect are required to use this service.
 - 3. It is Contractor's responsibility to submit documents in allowable format.
 - 4. Subcontractors, suppliers, and Architect's consultants are to be permitted to use the service at no extra charge.
 - 5. 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.
 - 6. Paper document transmittals will not be reviewed; emailed electronic documents will not be reviewed.
 - 7. All other specified submittal and document transmission procedures apply, except that electronic document requirements do not apply to samples or color selection charts.
- C. Cost: The cost of the service is to be paid by Contractor; include the cost of the service in the Contract Sum.
- D. Training: One, one-hour, web-based training session will be arranged for all participants, with representatives of Architect and Contractor participating; further training is the responsibility of the user of the service.
 - 1. Representatives of Owner are scheduled and included in this training.
- E. 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. Project Engineer(s).
 - 4. Environmental Consultant.
 - 5. Contractor.
 - 6. Project Manager.
 - a. Field Superintendent.
 - b. Safety Representative.
 - c. Major Subcontractors.

- d. Major Equipment Suppliers.
 - e. Temperature Control Contractor.
- 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 and Architect.
 - 6. Procedures and processing of field decisions, submittals, substitutions, applications for payments, proposal request, Change Orders, and Contract closeout procedures.
 - 7. Scheduling.
- D. Record minutes and distribute copies within two days after meeting to participants, with two copies to Architect, Owner, participants, and those affected by decisions made.

3.03 PROGRESS MEETINGS

- A. General Trades/Coordinating Contractor will make arrangements for meetings, prepare agenda with copies for participants, preside at meetings.
- B. Attendance Required:
 - 1. Each Trade Contractor.
 - a. Project Manager.
 - b. Field Superintendent.
 - c. Safety Representative.
 - d. Major Subcontractors.
 - 2. Owner.
 - 3. Architect.
 - 4. Project Engineer(s).
- 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. General Trades/Coordinating Contractor to 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 CONSTRUCTION PROGRESS SCHEDULE

- A. Within 3 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 3 days.
- C. Within 3 days after joint review, submit complete schedule.
- D. Submit updated schedule with each Application for Payment.

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 INFORMATION (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 using an electronic version of the form appended to this section.
 - 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 60 00 - 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: Prepare and maintain a tabular log of RFIs for the duration of the project.
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 five 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.
- 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 78 00 - 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 78 00 - 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. Product Data: Submit electronic documents.
 - 2. Shop Drawings: Submit electronic documents.
 - 3. Color Charts for initial selection: Submit manufacturer's printed materials. Websites, printouts from websites, and digital scans are not acceptable and will be rejected.
 - 4. Samples for color and finish selection: Submit physical samples.
- B. Samples: Submit the number specified in individual specification sections; one of which will be retained by Architect.
 - 1. After review, produce duplicates.
 - 2. Retained samples will not be returned to Contractor unless specifically so stated.

3.12 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. Sequentially identify each item. For revised submittals use original number and a sequential numerical suffix.
 4. Identify: Project; Contractor; subcontractor or supplier; pertinent drawing and detail number; and specification section number and article/paragraph, as appropriate on each copy.
 5. Apply Contractor's stamp, signed or initialed certifying that review, approval, verification of products required, field dimensions, adjacent construction work, and coordination of information is in accordance with the requirements of the work and Contract Documents.
 - a. Submittals from sources other than the Contractor, or without Contractor's stamp will not be acknowledged, reviewed, or returned.
 6. 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.
 7. 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.
 8. Identify variations from Contract Documents and product or system limitations that may be detrimental to successful performance of the completed work.
 9. Provide space for Contractor and Architect review stamps.
 10. When revised for resubmission, identify all changes made since previous submission.
 11. Distribute reviewed submittals. Instruct parties to promptly report inability to comply with requirements.
 12. 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.
 13. 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. 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.
- E. General procedures applicable to all submittals:
- F. Contractor Responsibilities:
1. Review shop drawings, product data and samples prior to submission to the next level of authority.
 2. Verify:
 - a. Field dimensions and drawing dimensions.
 - b. Field construction criteria.

- c. Catalog numbers and similar data.
 - d. Compliance of items submitted with Contract Documents.
 - e. Dimensions and elevations requirements necessary to properly install product.
 - 3. Coordinate each submittal with requirements of:
 - a. The Work.
 - b. The Contract Documents.
 - c. The work of other subcontractors.
 - 4. Contractor's responsibility for errors and omissions in submittals is not relieved by Architect/Engineer's review of submittals.
 - 5. Notify Architect in writing prior to submission and specifically on the submittal, of proposed deviations in submittals from contract requirements.
 - 6. Trade Contractor's responsibility for notifying Architect of deviations and for correcting deviations not properly identified in submittals is not relieved by Architect's review of improperly documented submittals.
 - 7. Do not begin any work which requires submittals without having Architect's stamp and initials or signature indicating review.
 - 8. After Architect's review, make response required by Architect's stamp and distribute copies. Indicate by transmittal that copy of approved data has been distributed.
- G. Architect's Responsibilities
- 1. Review each submittal within ten (10) business days, excluding delivery time to and from the Contractor.
 - 2. Review for compliance to design concept of project.
 - 3. Review all requests for proposed deviations. Obtain Owner's concurrence and respond to Contractor's request.
 - 4. Review of separate item does not constitute review of an assembly in which item functions.
 - 5. Affix stamp, date, and initials or signature certifying to review of submittal, and with instructions for contractor response.
 - 6. Return submittals to Contractor for response or distribution.
 - 7. Select product colors upon receipt of all shop drawings and submittals requiring color selections.

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. "Approved", or language with same legal meaning.
 - b. "Approved as Noted, Resubmission not required", or language with same legal meaning.
 - 1) At Contractor's option, submit corrected item, with review notations acknowledged and incorporated.
 - c. "Approved as Noted, Resubmit for Record", or language with same legal meaning.
 - 2. Not Authorizing fabrication, delivery, and installation:
 - 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 30 05
ELECTRONIC FILE WAIVER

ELECTRONIC FILE WAIVER

1.01 PROJECT

- A. Project Name: Campus Police Renovations
- B. Project Location: Medinah Middle School
700 E. Granville Avenue, Roselle, IL 60172
- C. Owner: Joliet Junior College
1215 Houbolt Road
Houbolt Road
Joliet, Illinois 60431
- D. Architect's Name: Legat Architects, Inc

1.02 GENERAL

- A. Legat Architects, Inc. agrees to convey the requested electronic file(s) identified below to the organization identified by the undersigned upon receipt of this document with an original signature by an authorized representative of said organization.
- B. The electronic file(s) are a copyrighted product of Legat Architects, Inc. Sale or distribution of these electronic files or their printed content without consent from Legat Architects, Inc. is prohibited.
- C. The information provided in the electronic file(s) is provided in a good faith effort to expedite the Project and simplify the efforts of the Trade Contractor with no guarantee by the issuer as to the accuracy or correctness of the information provided. The Architect accepts no responsibility or liability for the use of these BIM documents by the undersigned.
- D. The undersigned agrees to hold harmless Legat Architects, Inc. for any field conditions that vary from the information represented within the electronic file(s).
- E. The undersigned agrees to notify Legat Architects, Inc. within five business days of receipt of the electronic files of any issues preventing the electronic files from being accessed.
- F. Electronic Drawing Files to be conveyed include the following: Requested File Format:
- | | | |
|----|-------|-------|
| 1. | _____ | _____ |
| 2. | _____ | _____ |
| 3. | _____ | _____ |
| 4. | _____ | _____ |
- G. Company Name: _____
- H. Name of Contractor: _____
(Printed/Typed Name of Authorized Agent of Contractor)
- I. Name of Contractor: _____
(Signature of Authorized Agent of Contractor)
- J. Date: _____

END OF SECTION

ELECTRONIC FILE WAIVER
01 30 05 - 1

SECTION 01 32 16
CONSTRUCTION PROGRESS SCHEDULE

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Preliminary schedule.
- B. Construction progress schedule, bar chart type.

1.02 RELATED SECTIONS

- A. Section 01 10 00 - Summary: Work sequence.

1.03 REFERENCE STANDARDS

- A. AGC (CPSM) - Construction Planning and Scheduling Manual; 2004.
- B. M-H (CPM) - CPM in Construction Management - Project Management with CPM; 2015.

1.04 SUBMITTALS

- A. General Trades Coordinating Contractor:
 - 1. Within ten (10) business days after date of the Letter of Intent to Award a Construction Contract, submit Preliminary Project Schedule which encompasses the full duration of the Project.
 - 2. Within seven (7) business days after date of the Pre-Construction Meeting, submit Final Project Schedule which encompasses the full duration of the Project.

1.05 QUALITY ASSURANCE

- A. Scheduler: Contractor's personnel or specialist Consultant specializing in CPM scheduling with one years minimum experience in scheduling construction work of a complexity comparable to this Project, and having use of computer facilities capable of delivering a detailed graphic printout within 48 hours of request.

1.06 SCHEDULE FORMAT

- A. Listings: In chronological order according to the start date for each activity. Identify each activity with the applicable specification section number.
- B. Sheet Size: Multiples of 8-1/2 x 11 inches.
- C. Scale and Spacing: To allow for notations and revisions.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.01 PRELIMINARY SCHEDULE

- A. Prepare preliminary schedule in the form of a horizontal bar chart.

3.02 CONTENT

- A. Show complete sequence of construction by activity, with dates for beginning and completion of each element of construction.
- B. Identify each item by specification section number.
- C. Identify work of separate phases and other logically grouped activities.
- D. Provide sub-schedules for each stage of Work identified in Section 01 10 00 - Summary.
- E. Provide sub-schedules to define critical portions of the entire schedule.
- F. Include conferences and meetings in schedule.
- G. Show accumulated percentage of completion of each item, and total percentage of Work completed, as of the first day of each month.
- H. Provide separate schedule of submittal dates for shop drawings, product data, and samples, owner-furnished products, products identified under Allowances, and dates reviewed submittals will be required from Architect. Indicate decision dates for selection of finishes.

- I. Indicate delivery dates for owner-furnished products.
- J. Coordinate content with schedule of values specified in Section 01 20 00 - Price and Payment Procedures.
- K. Provide legend for symbols and abbreviations used.

3.03 BAR CHARTS

- A. Include a separate bar for each major portion of Work or operation.
- B. Identify the first work day of each week.

3.04 REVIEW AND EVALUATION OF SCHEDULE

- A. Participate in joint review and evaluation of schedule with Architect at each submittal.
- B. Evaluate project status to determine work behind schedule and work ahead of schedule.
- C. After review, revise as necessary as result of review, and resubmit within seven (7) days.

3.05 UPDATING SCHEDULE

- A. Maintain schedules to record actual start and finish dates of completed activities.
- B. Indicate progress of each activity to date of revision, with projected completion date of each activity.
- C. Annotate diagrams to graphically depict current status of Work.
- D. Identify activities modified since previous submittal, major changes in Work, and other identifiable changes.
- E. Indicate changes required to maintain Date of Substantial Completion.
- F. Submit reports required to support recommended changes.

3.06 DISTRIBUTION OF SCHEDULE

- A. Distribute copies of updated schedules to Contractor's project site file, to subcontractors, suppliers, Architect, Owner, and other concerned parties.
- B. Instruct recipients to promptly report, in writing, problems anticipated by projections indicated in schedules.

END OF SECTION

SECTION 01 35 53
SECURITY PROCEDURES

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Security measures including formal security program, entry control, personnel identification, and miscellaneous restrictions.

1.02 RELATED REQUIREMENTS

- A. Section 01 10 00 - Summary: Use of premises and occupancy.
- B. Section 01 50 00 - Temporary Facilities and Controls: Temporary lighting.

1.03 SECURITY PROGRAM

- A. General Trades Contractor to maintain and control security procedures.
- B. Protect Work, existing premises and Owner's operations from theft, vandalism, and unauthorized entry.
- C. Initiate program in coordination with Owner's existing security system at project mobilization.
- D. Maintain program throughout construction period until Owner occupancy.

1.04 ENTRY CONTROL

- A. Restrict entrance of persons and vehicles into Project site and existing facilities.
- B. Allow entrance only to authorized persons with proper identification.
- C. Maintain log of workers and visitors, make available to Owner on request.
- D. Owner will control entrance of persons and vehicles related to Owner's operations.
- E. Contractor shall control entrance of persons and vehicles related to Owner's operations.
- F. Coordinate access of Owner's personnel to site in coordination with Owner's security forces.

1.05 PERSONNEL IDENTIFICATION

- A. Provide identification badge to each person authorized to enter premises.
- B. Badge To Include: Personal photograph, name, assigned number, expiration date and employer.
- C. Maintain a list of accredited persons, submit copy to Owner on request.
- D. Require return of badges at expiration of their employment on the Work.

1.06 RESTRICTIONS

- A. Do no work on Sundays.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION

SECTION 01 40 00
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. Control of installation.
- F. Mock-ups.
- G. Tolerances.
- H. Manufacturers' field services.
- I. Defect Assessment.

1.02 RELATED REQUIREMENTS

- A. Section 01 30 00 - Administrative Requirements: Submittal procedures.
- B. Section 01 42 16 - Definitions.
- C. Section 01 60 00 - 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; 2008 (Reapproved 2014).
- B. ASTM C1077 - Standard Practice for Agencies Testing Concrete and Concrete Aggregates for Use in Construction and Criteria for Testing Agency Evaluation; 2017.
- C. ASTM C1093 - Standard Practice for Accreditation of Testing Agencies for Masonry; 2019.
- D. ASTM D3740 - Standard Practice for Minimum Requirements for Agencies Engaged in the Testing and/or Inspection of Soil and Rock as Used in Engineering Design and Construction; 2019.
- E. ASTM E329 - Standard Specification for Agencies Engaged in Construction Inspection, Testing, or Special Inspection; 2020.
- F. ASTM E543 - Standard Specification for Agencies Performing Nondestructive Testing; 2015.
- G. ASTM E699 - Standard Specification for Agencies Involved in Testing, Quality Assurance, and Evaluating of Manufactured Building Components; 2016.
- H. IAS AC89 - Accreditation Criteria for Testing Laboratories; 2018.

1.04 DEFINITIONS

- A. Contractor's Quality Control Plan: Contractor's management plan for executing the Contract for Construction.
- B. 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 foundation underpinning.
5. Temporary stairs or steps required for construction access only.
6. Temporary hoist(s) and rigging.
7. Investigation of soil conditions to support construction equipment.

1.06 SUBMITTALS

- A. See Section 01 30 00 - 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.
- E. Manufacturer's Instructions: When specified in individual specification sections, submit printed instructions for delivery, storage, assembly, installation, start-up, adjusting, and finishing, for the Owner's information. Indicate special procedures, perimeter conditions requiring special attention, and special environmental criteria required for application or installation.
- F. Manufacturer's Field Reports: Submit reports for Architect's benefit as contract administrator or for Owner.
 1. Submit for information for the limited purpose of assessing compliance with information given and the design concept expressed in the Contract Documents.

1.07 QUALITY ASSURANCE

- A. Contractor's Quality Control (CQC) Plan:

1. Prior to start of work, submit a comprehensive plan describing how contract deliverables will be produced. Tailor CQC plan to specific requirements of the project. Include the following information:
 - a. Management Structure: Identify personnel responsible for quality. Include a chart showing lines of authority.
 - 1) Include qualifications (in resume form), duties, responsibilities of each person assigned to CQC function.
 - b. Management Approach: Define, describe, and include in the plan specific methodologies used in executing the work.
 - 1) Management and control of documents and records relating to quality.
 - 2) Communications.
 - 3) Coordination procedures.
 - 4) Resource management.
 - 5) Process control.
 - 6) Inspection and testing procedures and scheduling.
 - 7) Control of noncomplying work.
 - 8) Tracking deficiencies from identification, through acceptable corrective action, and verification.
 - 9) Control of testing and measuring equipment.
 - 10) Project materials certification.
 - 11) Managerial continuity and flexibility.

1.08 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.

1.09 TESTING AND INSPECTION AGENCIES AND SERVICES

- A. Owner will employ and pay for services of an independent testing agency to perform other specified testing.
- B. Employment of agency in no way relieves Contractor of obligation to perform Work in accordance with requirements of Contract Documents.

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, 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. Integrated Exterior Mock-ups: Construct integrated exterior mock-up as indicated on drawings. Coordinate installation of exterior envelope materials and products as required in individual Specification Sections. Provide adequate supporting structure for mock-up materials as necessary.
- D. Notify Architect seven (7) working days in advance of dates and times when mock-ups will be constructed.
- E. Provide supervisory personnel who will oversee mock-up construction. Provide workers that will be employed during the construction at Project.
- F. Tests shall be performed under provisions identified in this section and identified in the respective product specification sections.
- G. Assemble and erect specified items with specified attachment and anchorage devices, flashings, seals, and finishes.
- H. Obtain Architect's approval of mock-ups before starting work, fabrication, or construction.
 - 1. Architect will issue written comments within five (5) 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.
- I. Architect will use accepted mock-ups as a comparison standard for the remaining Work.
- J. 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.
- K. 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. 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 equipment as applicable, and to initiate instructions when necessary.
- B. Submit qualifications of observer to Architect 7 days in advance of required observations.
 1. Observer subject to approval of Architect.
- C. 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 41 00
REGULATORY REQUIREMENTS

PART 1 GENERAL

1.01 SUMMARY OF REGULATORY REQUIREMENTS APPLICABLE TO THIS PROJECT

- A. 29 CFR 1910 - Occupational Safety and Health Standards; current edition.
- B. Building Code: International Building Code, 2018 Edition (International Code Council, 4051 W. Flossmoor Rd., Country Club Hills, Illinois 60478-5795).
- C. Plumbing Code: Illinois Plumbing Code (77 Ill. Adm. Code 890).
- D. Mechanical Code: International Mechanical Code, 2018 Edition (International Code Council, 4051 W. Flossmoor Rd., Country Club Hills, Illinois 60478-5795).
- E. Electrical Code: National Electrical Code, NFPA 70, 2020 Edition (National Fire Protection Association, 1 Batterymarch Park, Quincy, Massachusetts 02169-7471).
- F. Fire Protection: National Fire Protection Association 101, Life Safety Code, 2018 Edition (National Fire Protection Association, 1 Batterymarch Park, Quincy, Massachusetts 02169-7471).
- G. Fire Prevention: Fire Prevention and Safety (41 Ill. Adm. Code 100).
- H. Energy Code: Illinois Energy Conservation Code (71 Ill. Adm. Code 600).
- I. Any local building codes that may be more restrictive than the codes listed above.
- J. Energy Code: Illinois Energy Conservation Code (71 Ill. Adm. Code 600).

1.02 RELATED REQUIREMENTS

- A. Section 01 40 00 - Quality Requirements.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION

SECTION 01 42 16
DEFINITIONS

PART 1 GENERAL

1.01 SUMMARY

- A. This section supplements the definitions contained in the General Conditions.
- B. Other definitions are included in individual specification sections.

1.02 DEFINITIONS

- A. Furnish: To supply, deliver, unload, and inspect for damage.
- B. Install: To unpack, assemble, erect, apply, place, finish, cure, protect, clean, start up, and make ready for use.
- C. Product: Material, machinery, components, equipment, fixtures, and systems forming the work result. Not materials or equipment used for preparation, fabrication, conveying, or erection and not incorporated into the work result. Products may be new, never before used, or re-used materials or equipment.
- D. Provide: To furnish and install.
- E. Supply: Same as Furnish.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION

SECTION 01 50 00
TEMPORARY FACILITIES AND CONTROLS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Dewatering
- B. Temporary utilities.
- C. Temporary telecommunications services.
- D. Temporary sanitary facilities.
- E. Temporary Controls: Barriers, enclosures, and fencing.
- F. Security requirements.
- G. Vehicular access and parking.
- H. Waste removal facilities and services.
- I. Field offices.

1.02 RELATED REQUIREMENTS

- A. Section 01 35 53 - Security Procedures

1.03 REFERENCE STANDARDS

- A. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2020.
- B. ASTM E90 - Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements; 2009 (Reapproved 2016).

1.04 DEWATERING

- A. Provide temporary means and methods for dewatering all temporary facilities and controls.
- B. See Section 31 23 19 - Dewatering, for additional requirements.

1.05 TEMPORARY UTILITIES

- A. Owner will provide the following:
 - 1. Electrical power, consisting of connection to existing facilities.
 - 2. Water supply, consisting of connection to existing facilities.
- B. Existing facilities may be used.
- C. New permanent facilities may be used upon written authorization by the Owner.
- D. Use trigger-operated nozzles for water hoses, to avoid waste of water.

1.06 TELECOMMUNICATIONS SERVICES

- A. Provide, maintain, and pay for telecommunications services to field office at time of project mobilization.
- B. Telecommunications services shall include:
 - 1. Windows-based personal computer dedicated to project telecommunications, with necessary software and laser printer.
 - 2. Project web site.

1.07 TEMPORARY SANITARY FACILITIES

- A. Provide and maintain required facilities and enclosures. Provide at time of project mobilization.
- B. Maintain daily in clean and sanitary condition.

1.08 BARRIERS

- A. Provide barriers to prevent unauthorized entry to construction areas, to prevent access to areas that could be hazardous to workers or the public to allow for Owner's use of site and to protect

existing facilities and adjacent properties from damage from construction operations and demolition.

- B. Provide barricades and covered walkways required by governing authorities for public rights-of-way and for public access to existing building.
- C. Provide protection for plants designated to remain. Replace damaged plants.
- D. Protect non-owned vehicular traffic, stored materials, site, and structures from damage.

1.09 FENCING

- A. Construction: Commercial grade chain link fence.
- B. If Alternate Bid(s) are accepted, provide 6 foot high fence around construction site; equip with vehicular and pedestrian gates with locks.

1.10 INTERIOR ENCLOSURES

- A. Provide temporary partitions and ceilings as indicated to separate work areas from Owner-occupied areas, to prevent penetration of dust and moisture into Owner-occupied areas, and to prevent damage to existing materials and equipment.
- B. Construction: Framing and gypsum board sheet materials with closed joints and sealed edges at intersections with existing surfaces:

1.11 SECURITY

- A. Provide security and facilities to protect Work, existing facilities, and Owner's operations from unauthorized entry, vandalism, or theft.
- B. Coordinate with Owner's security program.
- C. Refer to Section 01 35 53 - Security Procedures, for additional requirements.

1.12 VEHICULAR ACCESS AND PARKING

- A. Coordinate access and haul routes with governing authorities and Owner.
- B. Provide and maintain access to fire hydrants, free of obstructions.
- C. Provide means of removing mud from vehicle wheels before entering streets.
- D. Designated existing on-site roads may be used for construction traffic.
- E. Provide temporary parking areas to accommodate construction personnel. When site space is not adequate, provide additional off-site parking.

1.13 WASTE REMOVAL

- A. See Section 01 74 19 - Construction Waste Management and Disposal, for additional requirements.
- B. Provide waste removal facilities and services as required to maintain the site in clean and orderly condition.
- C. Provide containers with lids. Remove trash from site weekly.
- D. If materials to be recycled or re-used on the project must be stored on-site, provide suitable non-combustible containers; locate containers holding flammable material outside the structure unless otherwise approved by the authorities having jurisdiction.
- E. Open free-fall chutes are not permitted. Terminate closed chutes into appropriate containers with lids.

1.14 FIELD OFFICES

- A. Owner will provide a designated existing space adjacent to the project site that can be used as a construction field office.

1.15 REMOVAL OF UTILITIES, FACILITIES, AND CONTROLS

- A. Remove temporary utilities, equipment, facilities, materials, prior to Date of Substantial Completion inspection.
- B. Remove underground installations to a minimum depth of three feet. Grade site as indicated.

- C. Clean and repair damage caused by installation or use of temporary work.
- D. Restore existing facilities used during construction to original condition.
- E. Restore new permanent facilities used during construction to specified condition.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION

SECTION 01 57 13
TEMPORARY EROSION AND SEDIMENT CONTROL

PART 1 GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings of the Contract, including General and supplementary Conditions and Division 01 Specification Sections, apply to this Section.
 - 1. All temporary erosion and sediment control on the project site.

1.02 SUMMARY

- A. This Section includes:
 - 1. Prevention of erosion due to construction activities.
 - 2. Prevention of sedimentation of waterways, open drainage ways, and storm and sanitary sewers due to construction activities.
 - 3. Restoration of areas eroded due to insufficient preventive measures.
 - 4. Compensation of owner for fines levied by authorities having jurisdiction due to non-compliance by Contractor.

1.03 RELATED REQUIREMENTS

- A. Section 31 10 00 – Site Clearing: Limits on clearing: disposition of vegetative clearing debris.
- B. Section 31 20 00 – Earth Moving: Preparation and excavation of site for site construction.

1.04 REFERENCE STANDARDS

- A. Illinois Urban Manual, latest edition.
- B. Illinois Department of Transportation, Standard Specifications for Road and Bridge Construction, latest edition.
- C. ASTM D 4355 - Standard Test Method for Deterioration of Geotextiles by Exposure to Light, Moisture, and Heat in a Xenon Arc Type Apparatus.
- D. ASTM D 4491 - Standard Test Methods for Water Permeability of Geotextiles by Permittivity.
- E. ASTM D 4533 - Standard Test Method for Trapezoid Tearing Strength of Geotextiles.
- F. ASTM D 4632 - Standard Test Method for Grab Breaking Load and Elongation of Geotextiles.
- G. ASTM D 4751 - Standard Test Method for Determining Apparent Opening Size of a Geotextile.
- H. ASTM D 4873 - Standard Guide for Identification, Storage, and Handling of Geosynthetic Rolls and Samples.

1.05 PERFORMANCE REQUIREMENTS

- A. Review the drawings (erosion control notes).
- B. Conduct stormwater pre-construction meeting with General Trades Contractor, all ground-disturbing sub-contractors, site engineer of record or their representative who is familiar with the site and state and local agency personnel if available.
- C. Timing: Put preventive measures in place before disturbance of surface cover and before precipitation occurs.
- D. Storm Water Runoff: Control increased storm water runoff due to disturbance of surface cover due to construction activities for this project.
 - 1. Prevent runoff into storm and sanitary sewer systems, including open drainage channels, in excess of actual capacity or amount allowed by authorities having jurisdiction, whichever is less.
 - 2. Anticipate runoff volume due to the most extreme short term and 24-hour rainfall events that might occur in 25 years.
- E. Erosion On Site: Minimize wind, water, and vehicular erosion of soil on project site due to construction activities for this project.
 - 1. Control movement of sediment and soil from temporary stockpiles of soil.

2. Prevent development of ruts due to equipment and vehicular traffic.
 3. If erosion occurs due to non-compliance with these requirements, restore eroded areas at no cost to owner.
- F. Erosion Off Site: Prevent erosion of soil and deposition of sediment on other properties caused by water leaving the project site due to construction activities for this project.
1. Prevent windblown soil from leaving the project site.
 2. Prevent tracking of mud onto public roads outside site.
 3. Prevent mud and sediment from flowing onto sidewalks and pavements.
 4. If erosion occurs due to non-compliance with these requirements, restore eroded areas at no cost to owner.
- G. Sedimentation of Waterways On Site: Prevent sedimentation of waterways on the project site, including rivers, streams, lakes, ponds, open drainage ways, storm sewers, and sanitary sewers.
1. If sedimentation occurs, install or correct preventive measures immediately at no cost to owner; remove deposited sediments; comply with requirements of authorities having jurisdiction.
 2. If sediment basins are used as temporary preventive measures, pump dry and remove deposited sediment after each storm.
- H. Sedimentation of Waterways Off Site: Prevent sedimentation of waterways off the project site, including rivers, streams, lakes, ponds, open drainage ways, storm sewers, and sanitary sewers.
1. If sedimentation occurs, install or correct preventive measures immediately at no cost to owner; remove deposited sediments; comply with requirements of authorities having jurisdiction.
- I. Open Water: Prevent standing water that could become stagnant.
- J. Maintenance: Maintain temporary preventive measures until permanent measures have been established.

1.06 SUBMITTALS

- A. Contractor shall submit shop drawings or material certifications for all manufactured erosion and sediment control measures.
- B. Certificate: Mill certificate for silt fence fabric attesting that fabric and factory seams comply with specified requirements, signed by legally authorized official of manufacturer; indicate actual minimum average roll values; identify fabric by roll identification numbers.
- C. Inspection Reports: Submit report of each inspection; identify each preventive measure, indicate condition, and specify maintenance or repair required and accomplished.
- D. Maintenance Instructions: Provide instructions covering inspection and maintenance for temporary measures that must remain after Substantial Completion.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Silt Fence Fabric: Polypropylene geotextile resistant to common soil chemicals, mildew, and insects; non-biodegradable; in longest lengths possible; fabric including seams with the following minimum average roll lengths:
 1. Average Opening Size: 30 U.S. Std. Sieve, maximum, when tested in accordance with ASTM D 4751.
 2. Permittivity: 0.05 sec^{-1} , minimum, when tested in accordance with ASTM D 4491.
 3. Ultraviolet Resistance: Retaining at least 70 percent of tensile strength, when tested in accordance with ASTM D 4355 after 500 hours exposure.
 4. Tensile Strength: 100 lb-f, minimum, in cross-machine direction; 124 lb-f, minimum, in machine direction; when tested in accordance with ASTM D 4632.
 5. Elongation: 15 to 30 percent, when tested in accordance with ASTM D 4632.
 6. Tear Strength: 55 lb-f, minimum, when tested in accordance with ASTM D 4533.

7. Color: Manufacturer's standard, with embedment and fastener lines preprinted.
- B. Silt Fence Posts: One of the following, minimum 5 feet long:
 1. Steel U- or T-section, with minimum mass of 1.33 lb per linear foot.
 2. Softwood, 4 by 4 inches in cross section.
 3. Hardwood, 2 by 2 inches in cross section.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Examine site and identify existing features that contribute to erosion resistance; maintain such existing features to greatest extent possible.

3.02 PREPARATION

- A. Schedule work so that soil surfaces are left exposed for the minimum amount of time.

3.03 SCOPE OF PREVENTIVE MEASURES

- A. In all cases, if permanent erosion resistant measures have been installed temporary preventive measures are not required.
- B. Storm Drain Drop Inlet Sediment Traps: As detailed on drawings.
- C. Temporary Splash Pads: Stone aggregate over filter fabric; size to suit application; provide at downspout outlets and storm water outlets.
- D. Soil Stockpiles: Protect using one of the following measures:
 1. Cover with polyethylene film, secured by placing soil on outer edges.
 2. Cover with mulch at least 4 inches thickness of pine needles, sawdust, bark, wood chips, or shredded leaves, or 6 inches of straw or hay.

3.04 INSTALLATION

- A. Silt Fences:
 1. Store and handle fabric in accordance with ASTM D 4873.
 2. Where slope gradient is less than 3:1 or barriers will be in place less than 6 months, use nominal 16 inch high barriers with minimum 36 inch long posts spaced at 6 feet maximum, with fabric embedded at least 4 inches in ground.
 3. Where slope gradient is steeper than 3:1 or barriers will be in place over 6 months, use nominal 28 inch high barriers, minimum 48 inch long posts spaced at 6 feet maximum, with fabric embedded at least 6 inches in ground.
 4. Where slope gradient is steeper than 3:1 and vertical height of slope between barriers is more than 20 feet, use nominal 32 inch high barriers with woven wire reinforcement and steel posts spaced at 4 feet maximum, with fabric embedded at least 6 inches in ground.
 5. Install with top of fabric at nominal height and embedment as specified.
 6. Embed bottom of fabric in a trench on the upslope side of fence, with 2 inches of fabric laid flat on bottom of trench facing upslope; backfill trench and compact.
 7. Do not splice fabric width; minimize splices in fabric length; splice at post only, overlapping at least 18 inches, with extra post.
 8. Fasten fabric to wood posts using one of the following:
 - a. Four 3/4 inch diameter, 1 inch long, 14 gage nails.
 - b. Five 17-gage staples with 3/4 inch wide crown and 1/2 inch legs.
 9. Fasten fabric to steel posts using wire, nylon cord, or integral pockets.
 10. Wherever runoff will flow around end of barrier or over the top, provide temporary splash pad or other outlet protection; at such outlets in the run of the barrier, make barrier not more than 12 inches high with post spacing not more than 4 feet.

3.05 MAINTENANCE

- A. Inspect preventive measures weekly, within 24 hours after the end of any storm that produces 0.5 inches or more rainfall at the project site, and daily during prolonged rainfall.
- B. Repair deficiencies immediately.

- C. Clean out temporary sediment control structures weekly and relocate soil on site.
- D. Place sediment in appropriate locations on site; do not remove from site.

3.06 CLEAN UP

- A. Remove temporary measures after permanent measures have been installed, unless permitted to remain by General Trades Contractor.
- B. Clean out temporary sediment control structures that are to remain as permanent measures.
- C. Where removal of temporary measures would leave exposed soil, shape surface to an acceptable grade and finish to match adjacent ground surfaces.

END OF SECTION

SECTION 01 60 00
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 10 00 - Summary
- B. Section 01 40 00 - Quality Requirements: Product quality monitoring.
- C. Section 01 74 19 - Construction Waste Management and Disposal: Waste disposal requirements potentially affecting product selection, packaging and substitutions.

1.03 REFERENCE STANDARDS

- A. NEMA MG 1 - Motors and Generators; 2017.
- B. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

1.04 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. If reuse of other existing materials or equipment is desired, submit substitution request.

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. 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 61 16.
 - 2. If wet-applied, have lower VOC content, as defined in Section 01 61 16.
 - 3. Are made of recycled materials.
 - 4. If made of wood, are made of sustainably harvested wood, wood chips, or wood fiber.

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.

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 to Project site; obtain receipt prior to final payment.

PART 3 EXECUTION

3.01 SUBSTITUTION LIMITATIONS

- A. Where the Bid Documents stipulate a particular product, substitutions will be considered.
 - 1. Prior to Bid Closing: Substitute products will be considered up to seven (7) business days prior to bid closing. Requests received after this date will not be considered.
 - a. When a request to substitute a product is made, Architect may approve the substitution and, if approved, will document the approval by issuing an Addendum to known bidders.
 - b. Products approved by the Architect during the bidding period but not shown in addenda shall be identified in the bidding forms on Document 00 43 10 - Proposed Substitutions if said materials are to be considered.
 - 2. At Time of Bid Closing: Substitute products will be considered if submitted as an attachment to the bidding forms using Document 00 43 10 - Proposed Substitutions.
 - a. Such substitutions will not be used to determine the low bid.
 - b. The Owner reserves the right to accept or reject such substitutions at their sole discretion.
 - 3. After the Bid Closing: No substitutions will be considered unless one or more of the following conditions exist:
 - a. Product is discontinued.
 - b. Insufficient quantity of product except any of the following will not establish cause for substitution:
 - 1) Failure to award subcontract in sufficient time;
 - 2) Failure to place orders to ensure delivery without delaying work.
 - c. Delays beyond control such as labor strikes, lockouts, severe weather conditions, fires, or acts of God which may preclude the production and/or delivery of products for purposes of the Project.
- B. Substitutions may be considered when a product becomes unavailable through no fault of the Contractor.

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 74 19.
 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. For exterior storage of fabricated products, place on sloped supports above ground.
- E. Provide off-site storage and protection when site does not permit on-site storage or protection.
- F. Protect products from damage or deterioration due to construction operations, weather, precipitation, humidity, temperature, sunlight and ultraviolet light, dirt, dust, and other contaminants.
- G. Comply with manufacturer's warranty conditions, if any.
- H. Do not store products directly on the ground.
- I. Cover products subject to deterioration with impervious sheet covering. Provide ventilation to prevent condensation and degradation of products.
- J. Store loose granular materials on solid flat surfaces in a well-drained area. Prevent mixing with foreign matter.
- 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 70 00
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. Surveying for laying out the work.
- F. Cleaning and protection.
- G. Starting of systems and equipment.
- H. Demonstration and instruction of Owner personnel.
- I. Closeout procedures, including Contractor's Correction Punch List, except payment procedures.
- J. General requirements for maintenance service.

1.02 RELATED REQUIREMENTS

- A. Section 01 10 00 - Summary: Limitations on working in existing building; continued occupancy; work sequence; identification of salvaged and relocated materials.
- B. Section 01 30 00 - Administrative Requirements: Submittals procedures, Electronic document submittal service.
- C. Section 01 40 00 - Quality Requirements: Testing and inspection procedures.
- D. Section 01 50 00 - Temporary Facilities and Controls: Temporary exterior enclosures.
- E. Section 01 74 19 - Construction Waste Management and Disposal: Additional procedures for trash/waste removal, recycling, salvage, and reuse.
- F. Section 01 78 00 - Closeout Submittals: Project record documents, operation and maintenance data, warranties, and bonds.
- G. Section 01 79 00 - Demonstration and Training: Demonstration of products and systems to be commissioned and where indicated in specific specification sections
- H. Section 01 91 13 - General Commissioning Requirements: Contractor's responsibilities in regard to commissioning.
- I. Section 02 41 00 - Demolition

1.03 REFERENCE STANDARDS

- A. NFPA 241 - Standard for Safeguarding Construction, Alteration, and Demolition Operations; 2019.

1.04 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. 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.
- C. Project Record Documents: Accurately record actual locations of capped and active utilities.

1.05 QUALIFICATIONS

- A. For demolition work, employ a firm specializing in the type of work required.

- B. For field engineering, employ a professional engineer of the discipline required for specific service on Project, licensed in the State in which the Project is located. Employ only individual(s) trained and experienced in establishing and maintaining horizontal and vertical control points necessary for laying out construction work on project of similar size, scope and/or complexity.
- C. 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. Minimize amount of bare soil exposed at one time.
 - 2. Provide temporary measures such as berms, dikes, and drains, to prevent water flow.
 - 3. Construct fill and waste areas by selective placement to avoid erosive surface silts or clays.
 - 4. 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. At All Times: Excessively noisy tools and operations will not be tolerated inside the building at any time of day; excessively noisy includes jackhammers and air-operated nail guns.
 - 2. Outdoors: Limit conduct of especially noisy exterior work to the hours of 8 am to 5 pm.
 - 3. Indoors: Limit conduct of especially noisy interior work to the hours of 6 pm to 7 am.
- H. Pest and Rodent Control: Provide methods, means, and facilities to prevent pests and insects from damaging the work.
 - 1. Pest Control Service: Weekly treatments.
- I. Rodent Control: Provide methods, means, and facilities to prevent rodents from accessing or invading premises.
- J. 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 10 00 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 60 00 - 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. Require attendance of parties directly affecting, or affected by, work of the specific section.
- C. Notify Architect four days in advance of meeting date.
- D. Prepare agenda and preside at meeting:

1. Review conditions of examination, preparation and installation procedures.
 2. Review coordination with related work.
- E. 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. General Trades/Coordinating 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.
 4. Controlling lines and levels required for mechanical and electrical trades.
- K. Maintain a complete and accurate log of control and survey work as it progresses.

3.05 GENERAL INSTALLATION REQUIREMENTS

- A. 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.
- B. Make vertical elements plumb and horizontal elements level, unless otherwise indicated.
- C. Install equipment and fittings plumb and level, neatly aligned with adjacent vertical and horizontal lines, unless otherwise indicated.
- D. Make consistent texture on surfaces, with seamless transitions, unless otherwise indicated.
- E. 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. Keep areas in which alterations are being conducted separated from other areas that are still occupied.
 1. Provide, erect, and maintain temporary dustproof partitions of construction specified in Section 01 50 00 in locations indicated on drawings.
- C. 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.
- D. 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.
- E. Services (Including but not limited to HVAC, Plumbing, 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 10 00 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.
- F. 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.
- G. 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.
 4. Trim existing wood doors as necessary to clear new floor finish. Refinish trim as required.
- H. 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.
- I. 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.
- J. Clean existing systems and equipment.
- K. Remove demolition debris and abandoned items from alterations areas and dispose of off-site; do not burn or bury.
- L. Do not begin new construction in alterations areas before demolition is complete.
- M. 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 original condition.
- E. Employ original 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 air tight 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 , 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 periodically 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. 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.
- G. 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. Notify Architect and Owner seven days prior to start-up of each item.
- C. 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.
- D. Verify tests, meter readings, and specified electrical characteristics agree with those required by the equipment or system manufacturer.
- E. Verify that wiring and support components for equipment are complete and tested.
- F. Execute start-up under supervision of applicable Contractor personnel and manufacturer's representative in accordance with manufacturers' instructions.
- G. 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.
- H. Submit a written report that equipment or system has been properly installed and is functioning correctly.

3.11 DEMONSTRATION AND INSTRUCTION

- A. See Section 01 79 00 - Demonstration and Training.

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 05 93 - Testing, Adjusting, and Balancing for HVAC.

3.13 FINAL CLEANING

- A. Execute final cleaning prior to final project assessment.
 - 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. Clean filters of operating equipment.
- G. Clean debris from roofs, overflow drains, area drains, 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 Project Coordinator 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. Owner will occupy portions of the building as specified in Section 01 10 00.
- F. 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.
- G. Correct items of work listed in Final Correction Punch List and comply with requirements for access to Owner-occupied areas.
- H. Accompany Project Coordinator on Contractor's preliminary final inspection.
- I. Notify Architect when work is considered finally complete and ready for Architect's Substantial Completion final inspection.
- J. 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 74 19

CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL

PART 1 GENERAL

1.01 WASTE MANAGEMENT REQUIREMENTS

- A. Owner requires 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. 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.
 - 5. Land clearing debris, including brush, branches, logs, and stumps; see Section 31 10 00 - 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.
 - 7. Glass.
- E. Contractor shall develop and follow a Waste Management Plan designed to implement these requirements.
- F. 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.
- G. 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 30 00 - Administrative Requirements: Additional requirements for project meetings, reports, submittal procedures, and project documentation.
- B. Section 01 50 00 - Temporary Facilities and Controls: Additional requirements related to trash/waste collection and removal facilities and services.
- C. Section 01 60 00 - Product Requirements: Waste prevention requirements related to delivery, storage, and handling.
- D. Section 01 70 00 - Execution and Closeout Requirements: Trash/waste prevention procedures related to demolition, cutting and patching, installation, protection, and cleaning.
- E. Section 31 10 00 - Site Clearing: Handling and disposal of land clearing debris.

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., ignitability, 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 30 00 - Administrative Requirements, for submittal procedures.
- B. Landfill Alternatives Proposal: Within 10 calendar days after receipt of Notice of Award of Bid, 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 Price 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.
- 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.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.01 WASTE MANAGEMENT PROCEDURES

- A. See Section 01 30 00 for additional requirements for project meetings, reports, submittal procedures, and project documentation.
- B. See Section 01 50 00 for additional requirements related to trash/waste collection and removal facilities and services.
- C. See Section 01 60 00 for waste prevention requirements related to delivery, storage, and handling.
- D. See Section 01 70 00 for trash/waste prevention procedures related to demolition, cutting and patching, installation, protection, and cleaning.

3.02 WASTE MANAGEMENT PLAN IMPLEMENTATION

- A. 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.
- B. 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.
- C. Hazardous Wastes: Separate, store, and dispose of hazardous wastes according to applicable regulations.
- D. 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.
- E. Reuse of Materials On-Site: Set aside, sort, and protect separated products in preparation for reuse.
- F. Salvage: Set aside, sort, and protect products to be salvaged for reuse off-site.

END OF SECTION

SECTION 01 78 00
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 30 00 - Administrative Requirements: Submittals procedures, shop drawings, product data, and samples.
- B. Section 01 70 00 - 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 15 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 within 10 days after 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.

1.04 ELECTRONIC SUBMITTAL

- A. Final Closeout Documentation shall be submitted in .PDF format and burned to compact disks which utilizes the Owner's customizable document management viewing system.
 - 1. All closeout documents shall be created or scanned to be compatible with the electronic format identified.
 - 2. Include scanned copies of warranties and bonds with electronic submittal.
- B. Contents: The following documents shall be the minimum included on the final Closeout Documentation CD or USB portable drive.
 - 1. Chapter 1 - Project Directory:
 - a. Directory, listing names, addresses, telephone numbers, email addresses, and web site addresses of Architect, Engineer(s), Construction Manager, Trade Contractor(s), sub-contractors, and major equipment suppliers.
 - 2. Chapter 2 - Contract Documents:
 - a. Issued for Bidding Drawings.
 - b. Issued for Bidding Project Manual and Specifications.

- c. Addenda.
 - d. Issued for Construction Drawings.
 - e. Issued for Construction Project Manual and Specifications.
- 3. Chapter 3 - Submittals:
 - a. Approved Submittals for Review.
 - b. Reviewed Submittals for Information.
 - c. Documentation of selected finish samples.
 - d. Manufacturer's instructions for assembly, installation, adjusting, and maintenance.
- 4. Chapter 4 - Record Documents:
 - a. Field Sketches.
 - b. As-Built Drawings.
 - c. As-Built Project Manual and Specifications.
 - d. Change Orders and other documented modifications to the Contract.
- 5. Chapter 5 - Operations & Maintenance Data:
 - a. Refer to Part 3 - Execution of this Section.
- 6. Chapter 6 - Project Certifications and Warranties:
 - a. Refer to Part 3 - Execution of this Section.
- C. Organization: Use the following hierarchy for organizing the contents within each chapter:
 - 1. Construction discipline or Trade Contractor.
 - 2. Specification Divisions.
 - 3. Specification Sections.

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 Drawings and Shop Drawings: Legibly mark each item to record actual construction including:
 - 1. Measured depths of foundations in relation to finish first floor datum.
 - 2. Measured horizontal and vertical locations of underground utilities and appurtenances, referenced to permanent surface improvements.
 - 3. Measured locations of internal utilities and appurtenances concealed in construction, referenced to visible and accessible features of the Work.
 - 4. Field changes of dimension and detail.
 - 5. 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. Additional information as specified in individual product specification sections.
- D. 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. 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.
- E. 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.
- F. Provide servicing and lubrication schedule, and list of lubricants required.
- G. Include manufacturer's printed operation and maintenance instructions.
- H. Include sequence of operation by controls manufacturer.
- I. Provide original manufacturer's parts list, illustrations, assembly drawings, and diagrams required for maintenance.
- J. Provide control diagrams by controls manufacturer as installed.
- K. Provide charts of valve tag numbers, with location and function of each valve, keyed to flow and control diagrams.
- L. Provide list of original manufacturer's spare parts, current prices, and recommended quantities to be maintained in storage.

- 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.
- 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, Contractor and 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. Photocopies of 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 01 79 00
DEMONSTRATION AND TRAINING

PART 1 GENERAL

1.01 SUMMARY

- A. Demonstration of products and systems to be commissioned and where indicated in specific specification sections.
- B. Training of Owner personnel in operation and maintenance is required for:
 - 1. All software-operated systems.
 - 2. HVAC systems and equipment.
 - 3. Plumbing equipment.
 - 4. Electrical systems and equipment.
 - 5. Items specified in individual product Sections.
- C. Training of Owner personnel in care, cleaning, maintenance, and repair is required for:
 - 1. Roofing, waterproofing, and other weather-exposed or moisture protection products.
 - 2. Finishes, including flooring, wall finishes, ceiling finishes.
 - 3. Fixtures and fittings.
 - 4. Items specified in individual product Sections.

1.02 RELATED REQUIREMENTS

- A. Section 01 78 00 - Closeout Submittals: Operation and maintenance manuals.
- B. Section 01 91 13 - General Commissioning Requirements: Additional requirements applicable to demonstration and training.
- C. Other Specification Sections: Additional requirements for demonstration and training.

1.03 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures; except:
 - 1. Make all submittals specified in this section, and elsewhere where indicated for commissioning purposes, directly to the Commissioning Authority.
 - 2. Submit one copy to the Commissioning Authority, not to be returned.
 - 3. Make commissioning submittals on time schedule specified by Commissioning Authority.
 - 4. Submittals indicated as "Draft" are intended for the use of the Commissioning Authority in preparation of overall Training Plan; submit in editable electronic format, Microsoft Word preferred.
- B. Draft Training Plans: Owner will designate personnel to be trained; tailor training to needs and skill-level of attendees.
 - 1. Submit to Commissioning Authority for review and inclusion in overall training plan.
 - 2. Submit not less than four weeks prior to start of training.
 - 3. Revise and resubmit until acceptable.
 - 4. Provide an overall schedule showing all training sessions.
 - 5. Include at least the following for each training session:
 - a. Identification, date, time, and duration.
 - b. Description of products and/or systems to be covered.
 - c. Name of firm and person conducting training; include qualifications.
 - d. Intended audience, such as job description.
 - e. Objectives of training and suggested methods of ensuring adequate training.
 - f. Methods to be used, such as classroom lecture, live demonstrations, hands-on, etc.
 - g. Media to be used, such as slides, hand-outs, etc.
 - h. Training equipment required, such as projector, projection screen, etc. will be provided by the Owner.
- C. Training Manuals: Provide training manual for each attendee; allow for minimum of two attendees per training session.
 - 1. Include applicable portion of O&M manuals.

2. Include copies of all hand-outs, slides, overheads, video presentations, etc., that are not included in O&M manuals.
 3. Provide one extra copy of each training manual to be included with operation and maintenance data.
- D. Training Reports:
1. Identification of each training session, date, time, and duration.
 2. Sign-in sheet showing names and job titles of attendees.
 3. List of attendee questions and written answers given, including copies of and references to supporting documentation required for clarification; include answers to questions that could not be answered in original training session.
 4. Include Commissioning Authority's formal acceptance of training session.
- E. Video Recordings: Submit digital video recording of each demonstration and training session for Owner's subsequent use.
1. Format: DVD Disc or USB Drive.
 2. Label each DVD disc or USB drive and associated container with session identification and date.

1.04 QUALITY ASSURANCE

- A. Instructor Qualifications: Familiar with design, operation, maintenance and troubleshooting of the relevant products and systems.
1. Provide as instructors the most qualified trainer of those contractors and/or installers who actually supplied and installed the systems and equipment.
 2. Where a single person is not familiar with all aspects, provide specialists with necessary qualifications.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.01 DEMONSTRATION - GENERAL

- A. Demonstrations conducted during system start-up do not qualify as demonstrations for the purposes of this section, unless approved in advance by Owner.
- B. Demonstrations conducted during Functional Testing need not be repeated unless Owner personnel training is specified.
- C. Demonstration may be combined with Owner personnel training if applicable.
- D. Operating Equipment and Systems: Demonstrate operation in all modes, including start-up, shut-down, seasonal changeover, emergency conditions, and troubleshooting, and maintenance procedures, including scheduled and preventive maintenance.
1. Perform demonstrations not less than two weeks prior to Substantial Completion.
 2. For equipment or systems requiring seasonal operation, perform demonstration for other season within six months.
- E. Non-Operating Products: Demonstrate cleaning, scheduled and preventive maintenance, and repair procedures.
1. Perform demonstrations not less than two weeks prior to Substantial Completion.

3.02 TRAINING - GENERAL

- A. Commissioning Authority will prepare the Training Plan based on draft plans submitted.
- B. Conduct training on-site unless otherwise indicated.
- C. Owner will provide classroom and seating at no cost to Contractor.
- D. Do not start training until Functional Testing is complete, unless otherwise specified or approved by the Commissioning Authority.
- E. Provide training in minimum two hour segments.
- F. The Commissioning Authority is responsible for determining that the training was satisfactorily completed and will provide approval forms.

- G. Training schedule will be subject to availability of Owner's personnel to be trained; re-schedule training sessions as required by Owner; once schedule has been approved by Owner failure to conduct sessions according to schedule will be cause for Owner to charge Contractor for personnel "show-up" time.
- H. Review of Facility Policy on Operation and Maintenance Data: During training discuss:
 - 1. The location of the O&M manuals and procedures for use and preservation; backup copies.
 - 2. Typical contents and organization of all manuals, including explanatory information, system narratives, and product specific information.
 - 3. Typical uses of the O&M manuals.
- I. Product- and System-Specific Training:
 - 1. Review the applicable O&M manuals.
 - 2. For systems, provide an overview of system operation, design parameters and constraints, and operational strategies.
 - 3. Review instructions for proper operation in all modes, including start-up, shut-down, seasonal changeover and emergency procedures, and for maintenance, including preventative maintenance.
 - 4. Provide hands-on training on all operational modes possible and preventive maintenance.
 - 5. Emphasize safe and proper operating requirements; discuss relevant health and safety issues and emergency procedures.
 - 6. Discuss common troubleshooting problems and solutions.
 - 7. Discuss any peculiarities of equipment installation or operation.
 - 8. Discuss warranties and guarantees, including procedures necessary to avoid voiding coverage.
 - 9. Review recommended tools and spare parts inventory suggestions of manufacturers.
 - 10. Review spare parts and tools required to be furnished by Contractor.
 - 11. Review spare parts suppliers and sources and procurement procedures.
- J. Be prepared to answer questions raised by training attendees; if unable to answer during training session, provide written response within three days.

END OF SECTION

SECTION 01 91 13
GENERAL COMMISSIONING REQUIREMENTS

PART 1 - GENERAL

1.01 DESCRIPTION

- A. This Section identifies the requirements of the Commissioning Team. Its members include the Commissioning Provider (CxP), Owner, Architect/Engineer, General Trades/Coordinating Contractor, Installation Contractors, Equipment Suppliers and Vendors. A Commissioning Plan shall be provided by the Commissioning Provider to outline the Commissioning Process including the various roles and responsibilities of the Commissioning Team members. Schedules, meetings, communication methods, shall also be identified in the document.
- B. This Section shall define the requirements of the CM and Installation Contractors for the execution of the Commissioning Plan as required for the following tasks:
 - 1. Participation in Commissioning meetings
 - 2. Maintenance and Service Access requirements
 - 3. Submittal requirements
 - 4. Installation and Start-Up Checklists
 - 5. Functional Performance Testing
 - 6. Field observation deficiencies and test deficiencies
- C. The CM and Installation Contractors shall:
 - 1. Verify installations
 - 2. Schedule installation work to accommodate commissioning activities
 - 3. Execute Owner Training as required
 - 4. Perform equipment installation and start-up verification
 - 5. Verify and demonstrate the readiness of systems to be tested prior to scheduling functional performance testing
 - 6. Conduct functional performance testing
 - 7. Correct deficiencies
 - 8. Conduct functional performance re-testing as necessary
 - 9. Provide documentation as required by this Section and the Commissioning Plan
- D. The Owner, Architect/Engineer, and CxP are not responsible for construction means and methods, job safety, or management as related to commissioning on the job site.

1.02 RELATED REQUIREMENTS

- A. Division 0 – Procurement and Contracting Requirements
- B. Division 1 – General Requirements
- C. Division 21 – Fire Protection
- D. Division 22 – Plumbing
- E. Division 23 – Heating, Ventilation and Air Conditioning
- F. Division 26 – Electrical

1.03 COMMISSIONED SYSTEMS

- A. The following systems and equipment are included in the Commissioning Plan.
 - 1. Division 21 – Fire Protection
 - a. Wet sprinkler system
 - 2. Division 22 – Plumbing

- a. Plumbing fixtures
- 3. Division 23 – Heating, Ventilation and Air Conditioning
 - a. Hydronic air handling units
 - b. Direct-expansion split systems
 - c. Cabinet unit heaters and unit heaters
 - d. Exhaust fans
 - e. Variable volume terminal units
 - f. Hydronic pumps
 - g. Infrared heaters
- 4. Division 26 – Electrical
 - a. Lighting controls
 - b. Interior lighting
 - c. Exterior lighting
 - d. Emergency lighting system
 - e. Surge protection for low-voltage circuits

1.04 DEFINITIONS

- A. Acceptance Phase: Time period during which Functional Performance Testing, Systems Manual Review, and Owner Training occur.
- B. Basis of Design: Documentation of design criteria, systems, equipment, and materials used to meet the Owner's Project Requirements and its intent.
- C. Commissioning Plan (CP): Structured documentation defining the objectives, methods, and results of the Commissioning Process.
- D. Commissioning Authority (CxA): See Commissioning Provider.
- E. Commissioning Provider (CxP): The consultant responsible for facilitating the Commissioning Plan and directing commissioning tasks and activities. The CxP shall act as an objective advocate for the Owner.
- F. Commissioning Team: A group of individuals who include the Commissioning Provider (CxP), Owner, Architect/Engineer, General Trades/Coordinating Contractor, Installation Contractors, Equipment Suppliers and Vendors.
- G. Contractor Commissioning Coordinator: Each Contractor shall designate a Commissioning Coordinator to represent their organization at meetings and facilitate execution of the Commissioning Plan.
- H. General Trades/Coordinating Contractor: The primary contractor responsible for overall construction of the building and compliance with the contract documents. Responsible for oversight and coordination of all Installation Contractors and their efforts to execute the Commissioning Plan.
- I. Deferred Functional Test: Functional performance test performed after substantial completion due to conditions that preclude test from being performed in normal sequential order.
- J. Deficiency: Condition of a component, piece of equipment, or system that is not in compliance with Contract Documents. The CxP shall conduct a series of construction site visits to observe the progress of installation for Commissioned Systems. Deficiencies identified by the CxP shall be reviewed by Design Professionals to determine if the deficiency is a non-conformance issue. If the issue is a non-conformance issue, the Design Professionals shall include the issue in a report to the contractors.
- K. Design Professional: A member of the design team; the Architect, Engineer, or other consultant.

- L. Factory Testing: Testing of a component or piece of equipment by the manufacturer.
- M. Functional Performance Test: A test demonstrating complete function and operation of equipment and systems. Systems shall be tested under various modes, such as cooling and heating, high loads, component failures, unoccupied, varying outside air temperatures, fire alarm, power loss, etc. Systems shall be run through all specified sequences of operation. Components shall be verified to be performing in accordance with contract documents. Functional Performance Tests shall be witnessed by the CxP and executed by the responsible contractor after Installation and Start-Up Checklists and Pre-Functional Tests have been completed.
- N. Installation and Start-Up Checklist: Document used by the CM to certify that they have inspected the work of the installing contractors and determined that it is in full compliance with the contract requirements. This form is required on each piece of equipment or component prior to functionally testing the system. Parameters such as flow, current, status, pressure, etc. shall be measured and documented as required.
- O. Phased Commissioning: Commissioning that is completed in multiple stages due to the size, schedule, or availability of systems.
- P. Pre-Functional Testing: Testing performed by the respective Installation Contractor utilizing functional performance test procedures. This testing is a prerequisite to the Functional Performance Test and is witnessed and documented by the CxP.
- Q. Random Sampling: CxP shall make random and representative selections of equipment or systems for testing.
- R. Seasonal Performance Test: Functional Performance Test executed at the time of year such that system(s) experience conditions closer to design conditions.
- S. Start-Up: The initial activation and operation of equipment once installation is completed.
- T. Substantial Completion: A period of time during the Acceptance Phase where major construction has concluded and the Owner has begun to utilize the building.
- U. Installation Contractor (Sub-Contractor): Contractor who is under contract to General Trades/Coordinating Contractor and provides labor and materials related to a specific trade.
- V. Trending: The simultaneous monitoring of measurements and control points over a period of time.
- W. Vendor: A manufacturer or supplier of materials or equipment.

1.05 COORDINATION

- A. The CxP shall coordinate and manage the Commissioning Process.
- B. The Commissioning Team may include the following individuals:
 - 1. Commissioning Provider (CxP)
 - 2. Owner's Representative
 - 3. General Trades/Coordinating Contractor
 - 4. Design Professionals (Architect, Engineer, Consultant)
 - 5. Sustainability or Energy Consultant
 - 6. Code Consultant
 - 7. General Contractor
 - 8. Mechanical Contractor
 - 9. Electrical Contractor
 - 10. Plumbing Contractor
 - 11. Fire Protection Contractor
 - 12. Finishes Contractors

13. Specialty Equipment Installation Contractor
 14. Controls Contractor
 15. Test and Balance Contractor
 16. Insulation Contractor
 17. Roofing Contractor
 18. Equipment Suppliers and Vendors
- C. The CxP may witness test activities specified in Division 1 and the technical specifications including select construction tests (e.g. piping pressure tests, duct leakage test, etc.) and equipment start-up tests. The Owner shall witness commissioning activities as appropriate. Contractors shall provide a minimum five (5) working days advance notice when tests are scheduled.
- D. Contractor shall provide written notice to CM, Owner, and CxP of any changes in date, time, and location or anticipated duration of start-up and test activities. Written notice shall be received a minimum of 48 hours in advance.
- E. Tests that are not performed as scheduled shall be considered a failed test unless notification of cancellation or rescheduling was received by all parties. The notification shall be received 48 hours prior to the scheduled arrival of the CxP on site to witness functional testing. Contractor shall reimburse Owner for actual costs incurred by the Owner as the result of failure to provide timely notice, per preceding paragraph, of changes in date, time, location, or anticipated duration of start-up and test activities. The actual costs incurred by the Owner shall include costs associated with the CxP involvement.
- F. The CxP shall direct and coordinate commissioning activities and reports to the General Trades/Coordinating Contractor and keeps the Commissioning Team informed of the commissioning activities. All members' of the Commissioning Team work together to fulfill contractual responsibilities and objectives of the Contract Documents.
- G. Meetings:
1. At a minimum the following meeting shall be arranged by the CxP and attended by members of the Commissioning Team representing the various interests and parties involved:
 - i. Pre-Bid Meeting
 - ii. Pre-Construction Meeting
 - iii. Commissioning Meetings
 - iv. Lessons Learned Meeting
 2. Not all meetings shall require all members of the Commissioning Team to be present and will be determined by the Owner and CxP at their discretion.
 3. Discussions held in Commissioning Meetings shall include but not be limited to equipment start-up, systems, progress, schedules, testing, documentation, training, and problem resolution.
- H. Scheduling
1. Once a master construction schedule is issued, the CxP shall provide for incorporation to the schedule, commissioning milestone activities linked to specific predecessor construction activities. As construction progresses, more specific activities and milestones shall be incorporated into the master construction schedule.
 2. Approximately 6 to 8 weeks prior to the commencement of equipment start-ups, the CxP shall conduct a commissioning functional testing schedule workshop with all commissioning coordinator representatives. The purpose of this workshop is to establish a coordinated approach to the integration of the function testing activities with the master construction schedule to ensure substantial completion can be achieved as scheduled.

3. In cooperation with the CxP, the CM shall integrate commissioning activities into the master construction schedule.

1.06 SUBMITTALS

- A. Start-Up Plan: For each piece of equipment or system, the CM and Installation Contractors shall submit a start-up plan. The commissioning team reviews and approves contractor startup plan. Contractor develops start-up plan from manufacturer installation, start-up, and checkout data, including actual field checkout sheets used by field technicians. Contractors' start-up plan includes a signature line for each procedure. Contractor provides added detail and documenting format necessary for systems that may not have adequate manufacturer start-up and checkout procedures. Contractor transmits full "Start-up Plan" to commissioning team for review and approval. Commissioning team reviews and approves procedures and format. Contractor incorporates review comments into final Start-up Plan. The plan should include, but not be limited to, the following:
 1. Start-up schedule
 2. Names of firms/individuals required to participate
 3. Detailed manufacturer start-up procedures
 4. Manufacturer start-up data forms
- B. Installation and Start-Up Checklists: Construction Checklists developed during the design phase will be maintained by the general contractor and used by the general contractor and subcontractors. They will be tracked utilizing a procedure acceptable to the owner. The intent of construction checklists is to convey pertinent information to the installers regarding the owner's concerns on long-term operation of the facility and its systems. Checklists should focus only on items of key importance. Specific equipment (fans, pumps, panels, etc.) as well as common items (plumbing or light fixtures, receptacles, etc.) should be reviewed using this process. Construction Checklists are comprised of three parts:
 1. Delivery Book: Information to be verified upon delivery to the site.
 2. Pre-Installation Checks: Items to verify prior to rough-in, especially if item was in storage.
 3. Installation and Start-Up: Items to verify as the item is being installed and started.
- C. The checklists shall span the duration from when equipment is delivered to the job site until the system/component is started and operational. This also includes testing, adjusting, and balancing (TAB) as well as control system tuning. The CxP and contractors will coordinate to maximize the benefits of these checklists and to tailor them specifically for this project and the way it is managed. During each site visit the CxP will randomly verify 2-5% of the construction checklists completed since the previous site visit. Both positive and negative items from this review are shared with the project team and included in the Commissioning Plan appendices.
- D. Pre-Functional Performance Test Documentation: Responsible contractor shall execute the pre-functional performance test and document the satisfactory results of the testing. The completed test shall be provided to the CxP through the CM for review and approval. Final scheduling of the functional performance test on a building system shall not be established until the pre-functional performance test documentation is approved.
- E. Temporary Use of Permanent Equipment Operations and Maintenance Plan: Should the contractor receive authorization from the Owner to utilize permanent equipment per Section 019113-3.02, an Operations and Maintenance Plan shall be submitted for review and approval prior to temporary use of permanent equipment. The Plan shall include a temporary sequence of operations.
- F. Submit the final programming logic and as-built sequences used to control all systems included in the Commissioning Plan. As-built control sequences shall also include all system setpoints and reset schedules.
- G. The CxP shall review submittals for criteria as related to commissioning. Review is primarily intended to aid in development of functional testing procedures and secondarily to verify

compliance with equipment specifications. The CxP notifies the CM, Owner, and A/E of missing items or where issues may exist.

PART 2 - PRODUCTS

2.01 TEST AND MEASUREMENT EQUIPMENT

- A. Installation contractors shall provide all tools, test equipment, and instruments required to execute startup, checkout, field calibration and functional performance testing of equipment under their contract.
- B. Test equipment shall be of sufficient quality and accuracy (greater accuracy than specified for component) to test and/or measure system performance according to specified tolerances. Test equipment is to have been calibrated within the previous 12 months. Calibration shall be NIST traceable where applicable. Equipment shall be re-calibrated when dropped or damaged. Calibration tags shall be affixed or certificates are readily available for review by the CxP.

PART 3 - EXECUTION

3.01 COMMISSIONING PLAN

- A. The Commissioning Plan shall be considered a living document and shall receive continuous updates as the project progresses and key milestones are achieved. During the design phase, information on how the commissioning process will be implemented during subsequent phases becomes better defined. New and revised information shall be added to the Commissioning Plan and its appendices as it becomes available.
- B. Pre-Bid Meeting: The CxP will attend Pre-Bid Meeting(s) to explain the Commissioning Process as it relates to the construction phase and the contractor's role and responsibilities. At this point all Commissioning Activities and Requirements have been incorporated into the contract documents including the plans and specifications.
- C. Pre-Construction Meeting: This meeting occurs within the first 90 days after the contracts have been awarded. The CxP shall attend and explain the Commissioning Plan and communication structures the project team has developed for use. The CxP will discuss each segment of work to be commissioned and how the Commissioning Plan will be implemented.
- D. Submittal Review: The CxP shall review submittals for criteria as related to commissioning. Review is primarily intended to aid in development of functional testing procedures and secondarily to verify compliance with equipment specifications. The CxP notifies the CM, Owner, and A/E of missing items or where issues may exist.
- E. Pre-Functional Testing: After system components have been installed and started, the responsible contractor shall execute the pre-functional performance test and document the results of the testing. The completed test shall be provided to the CxP through the CM for review and approval. Final scheduling of the functional performance test on a building system shall not be established until the pre-functional performance test documentation is approved.
- F. Owner Training: The CxP assists the Owner in developing a Training Plan including agendas, format of training, and scheduling in cooperation with the CM and Sub-Contractors. The CxP shall attend a sampling of training sessions, make recommendations, and document observations during training. The CM and Sub-Contractors shall be responsible for providing training in accordance with the Training Plan.
- G. Functional Testing: The purpose of functional testing is to verify that the various components and systems within the building can work as a whole to meet the design and performance requirements. Before this testing can occur, the items in the construction checklists must be verified for proper operation by point-to-point review and testing, adjusting, and balancing (TAB). The CxP recommends acceptance of performance and functionality as well as issue resolution and re-testing as needed.
- H. Acceptance: Once construction activities are substantially complete, the Owner will begin to occupy the facility. This period may include the arrival of furniture, fixtures, and Owner-provided equipment also known as FF&E. It may be necessary to review security protocols and access control if the Owner has taken responsibility for the building. It is likely that the CxP and

members of the Commissioning Team will need to make arrangements for continued access to various equipment rooms and parts of the facility.

- I. On-going Training: The CxP will verify the completion of any on-going or regularly scheduled training provided by the contractors, including updating the Commissioning Plan.
- J. Warranty Reviews: After 10 months of occupancy, the CxP will conduct a site visit with the Owner to critically review the operation of the systems and assemblies commissioned and identify any items that should be repairs or replaced under warranty.
- K. Lessons Learned Meeting: The CxP will conduct a meeting to capture comments and suggestions related to continuous improvement. This meeting should be conducted after approximately one year of operation and involve the most if not all of the Commissioning Team members. To reduce bias, the CxP shall arrange for the meeting to be facilitated by an impartial third-party. Ideally this person would be someone from the Owner's team or CxP firm that was not directly involved in the project being discussed.
- L. Final Commissioning Report: Once all milestones have been completed and documented per the Commissioning Plan, the CxP will issue a final update that incorporates all remaining documentation and information necessary including any appendices, warranty information, site visits, training, or meeting notes. Electronic copies of the Final Commissioning Plan shall be distributed to the Owner.

3.02 TEMPORARY USE OF PERMANENT EQUIPMENT DURING CONSTRUCTION

- A. The temporary use of building systems shall be authorized by the Owner in coordination with the Design Team and CM.
- B. A Temporary Operations and Maintenance Plan shall be developed and submitted by the CM for review and approval by the Owner.
- C. The Temporary Operations and Maintenance Plan shall include a temporary sequence of operations and include all safeties to ensure equipment is protected against failure or damage.
- D. Architect/Engineer and CxP shall review and approve the Temporary Operations and Maintenance Plan prior to the contractor energizing and operating the system.
- E. Temporary operations shall not be fully functionally tested to the extent that efforts are repeated or needlessly duplicated prior to completion of construction.
- F. The Owner and Architect/Engineer may require the responsible contractor to demonstrate functionality of the temporary system at their discretion.
- G. The Owner and Architect/Engineer shall not bear any additional cost incurred as a result the required demonstration or any duplicated efforts.

3.03 RESPONSIBILITIES

- A. The following describes the role of each member of the Commissioning Team as well as their specific duties and contributions.
- B. Owner
 - 1. Retain design professionals, contractors, and consultants in an effort to facilitate the design and construction necessary to complete this project.
 - 2. Provide acceptable representation with the means and authority to prepare and coordinate implementation of the Commissioning Plan as detailed in contract documents.
 - 3. Assign facility operations and maintenance personnel to the project and schedule them to participate in the various meetings, training sessions, and functional tests as necessary.
 - 4. Provide qualified personnel for video recording and editing of training sessions.
 - 5. Review and approve any changes made to the construction documents.
 - 6. Review and comment on periodic Commissioning Plan Progress Reports and Issues Log.

7. Review and comment on Commissioning Process Verification Reports submitted by CxP.
 8. Review and accept the Final Commissioning Process Report submitted by CxP.
- C. Commissioning Provider (CxP)
1. Organize and lead the Commissioning Team.
 2. Verify that Commissioning Plan Activities are clearly stated in all scopes of work.
 3. Coordinate with others to integrate Commissioning Plan Activities into the project schedule.
 4. Prepare the Commissioning Plan.
 5. Update the Commissioning Plan during each phase of the project to incorporate changes and additional information.
 6. Review and comment on the ability of the plans and specifications to achieve the Owner's project requirements.
 7. Perform the prescribed Commissioning Plan Activities including writing reports, organizing Commissioning Team meetings, testing, and training as described in the contract documents and Commissioning Plan.
 8. Prepare meeting agendas, lists, minutes, logs, and notes as necessary.
 9. Prepare periodic Commissioning Plan Progress Reports.
 10. Review and comment on the ability of the plans and specifications with respect to their completeness in all areas relating to the Commissioning Plan.
 11. Verify adequate devices have been provided to adequately test the items to be commissioned and document the performance of each piece of equipment, system, or assembly.
 12. Schedule document reviews.
 13. Attend the project's Pre-Bid meeting to explain Commissioning Plan Activities and Requirements to prospective contractors.
 14. Schedule Pre-Construction Commissioning Plan Meeting with selected contractors and their subcontractors within 90 days of when their contract is awarded.
 15. Develop and maintain the Commissioning Issues Log for each phase of the project.
 16. Review proposed contractor-provided Training Plan to verify that the OPR is met.
 17. Attend a portion of the contractor-provided training sessions.
 18. Receive and review shop drawings and submittals to verify compliance.
 19. Complete functional testing for components, systems, and assemblies. Document results.
 20. Periodically review record drawings for accuracy with respect to installed systems. Request revisions when necessary to achieve accuracy.
 21. Repeat functional testing for seasonal requirements or to correct previously noted performance deficiencies. Document results.
 22. Prepare and submit final Commissioning Plan Report to the Owner for review and acceptance.
 23. Recommend acceptance of individual components, systems, and assemblies to the Owner.
- D. Design Professionals
1. Provide acceptable representation with the means and authority to prepare and coordinate implementation of the Commissioning Plan as detailed in contract documents.

2. Prepare contract documents, including the inclusion of Commissioning Plan requirements and activities as provided by the CxP.
3. Prepare contract documents that coordinate required interfaces between systems and assemblies.
4. Respond to Commissioning Team design review comments and other issues in a timely manner.
5. Attend the Pre-Bid and Pre-Construction Meetings.
6. Specify and verify that the operation and maintenance of systems and assemblies has been adequately detailed and documented in plans and specifications.
7. Review and incorporate CxP comments from shop drawing and submittal reviews.
8. Participate in initial operation and maintenance training by presenting the project BOD.
9. Participate in further operation and maintenance training as detailed in contract documents.
10. Review functional test procedures submitted by the contractor.
11. Review and comment on periodic Commissioning Plan Progress Reports and Issues Log.
12. Review and accept record documents from contractors as required by contract documents.
13. Review and comment on the final Commissioning Plan Report.
14. Recommend acceptance of individual components, systems, and assemblies to the Owner in accordance with the Commissioning Plan.

E. General Trades/Coordinating Contractor

1. Incorporate costs for Commissioning Plan Activities in the contract budget and schedule.
2. Include Commissioning Plan Activities and Requirements in all contractors' contracts.
3. Provide adequate accessibility as required to properly operate and maintain the facility.
4. Provide acceptable representation with the means and authority to prepare and coordinate implementation of the Commissioning Plan as detailed in contract documents.
5. Attend the Pre-Construction and Commissioning Plan Meetings.
6. Issue a statement certifying that all work has been completed and the facility is operational, in accordance with contract documents.
7. Issue the appropriate final reports to the design professionals for review and acceptance.
8. Remedy deficiencies identified by the CxP during verification of installation and testing.
9. Review and comment on the Final Commissioning Plan Report.

F. Contractors

1. Incorporate costs for Commissioning Plan Activities in the contract budget and schedule.
2. Include Commissioning Plan Activities and Requirements in all contractors' contracts.
3. Provide adequate accessibility as required to properly operate and maintain the facility.
4. Provide acceptable representation with the means and authority to prepare and coordinate implementation of the Commissioning Plan as detailed in contract documents.
5. Have representatives attend Pre-Construction and Commissioning Plan Meetings.
6. Implement the Training Plan as detailed in the contract documents.
7. Provide submittals to the owner, design professionals, and CxP.

8. Notify the CxP when systems and assemblies are ready for testing.
9. Demonstrate the performance of assemblies or operation of systems to the CxP.
10. Complete construction checklists as work is finished and provide them to the CxP.
11. Continuously maintain the record drawings and submit as detailed in the contract documents.

G. Vendors and Manufacturers

1. Provide all information required for the operation and maintenance of the system or assembly as part of the initial submittal.
2. Provide the requirements to maintain the warranty as part of the initial submittal.
3. Coordinate and accomplish factory tests as detailed in the contract documents.
4. Provide training as part of the Training Plan detailed in the contract documents.
5. Demonstrate operation and performance of the system or assembly as detailed in the contract documents.

3.04 COMMISSIONING MEETINGS

- A. Within 90 days after all installation contractors involved in the commissioning program have been awarded a contract for the project, the CxP shall plan, schedule, and conduct a Pre-Construction Meeting with designated project team commissioning representatives in attendance. Responsibilities of the commissioning team shall be clarified at this meeting. The CxP shall distribute meeting minutes to all parties.
- B. Commissioning meetings shall be held on a monthly basis at a minimum during the construction installation phase of work. The frequency of these meetings shall increase as construction and acceptance activities require. Designated contractor commissioning coordinator shall attend the meetings as appropriate based upon the agenda topics to be discussed.
- C. Commissioning meetings may be held weekly during the functional performance testing phase to review status of testing discrepancies, resolutions, and scheduling of retests.

3.05 COORDINATION AND SERVICE ACCESS REQUIREMENTS

- A. Each Sub-Contractor shall ensure that unobstructed access to the maintenance point is maintained from floor level up to the point of service. Unobstructed access shall include full body access to the service point should that be required for maintenance activities.
- B. The GC and CM shall be responsible for leading Sub-Contractors in a pre-construction coordination review effort. This effort may include but is not limited to 3-D modeling of building systems, the use of clash detection software, or light-board overlays to identify and resolve potential conflicts prior to fabrication and construction.
- C. Each Sub-Contractor shall be responsible for clearly marking all maintenance points that are located above ceilings for other trades' reference in the field.
- D. Any trade that installs systems encroaching upon service access shall be required to relocate their material, systems and/or equipment at no additional cost to the Owner.

3.06 INSTALLATION AND START-UP CHECKLISTS

- A. These checklists shall be used to formally document the contractor's quality assurance effort as it relates to the installation and start-up of the equipment or system.
- B. The installing contractor responsible for the system shall be responsible for coordinating the completion of this form with the other trades supporting the installation and start-up.
- C. The individual completing this checklist shall have the authority to sign on behalf of the contractor and shall have direct personal knowledge of the equipment or system component installation.
- D. Any contractor start-up forms or manufacturer specified start-up procedures and documentation shall be attached to this checklist.

- E. The completed checklists shall be submitted to the CM for CxP review.
- F. At appropriate milestones, the CM or CxP shall review the status of the completion of the checklists with each contractor to ensure progress in completing this documentation does not delay the start of functional testing.
- G. When appropriate, the CxP shall review checklists to determine if outstanding items prevent scheduling of Functional Performance Testing. CxP shall perform random sampling of checklist items and make recommendations to the Owner to proceed with functional performance testing.

3.07 FUNCTIONAL PERFORMANCE TESTING

- A. The Owner, Architect/Engineer, or CxP shall reserve the right to witness any start-up, pre-tests, or functional performance tests.
- B. The CxP shall prepare the appropriate testing protocols and steps for Sub-Contractors to use in order to demonstrate complete function and operation of equipment and systems.
- C. Systems shall be tested under various modes, such as cooling and heating, high loads, component failures, unoccupied, varying outside air temperatures, fire alarm, power loss, etc. Systems shall be run through all specified sequences of operation. Components shall be verified to be performing in accordance with contract documents.
- D. Functional Performance Tests shall be witnessed by the CxP and executed by the responsible contractor after Installation and Start-Up Checklists and Pre-Functional Tests have been completed.
- E. Functional Performance Tests shall be considered successful when repeated, acceptable results are achieved.
- F. Systems that contain several identical devices may be tested based on a random sampling representative of the overall population.
- G. Deficiencies or non-conformance issues shall be noted on the Issues Log and reported to The Commissioning Team with specific direction and responsibility indicated.
- H. Corrections of minor deficiencies identified may be made during testing at discretion of the CxP. Deficiency and resolution shall be documented on the Issues Log as a resolved issue.
- I. Every effort shall be made to expedite testing and minimize unnecessary delays, while not compromising integrity of procedures.
- J. When there is no dispute on deficiency and Contractor accepts responsibility for remedial action:
 - 1. The CxP shall document the deficiency and the Contractor's response on the Issues Log.
 - 2. The Contractor shall address all items on the Issues Log by correcting deficiencies or by posting date for completion of resolution of deficiency.
 - 3. Once resolved, the CM shall reschedule tests with the CxP and contractor.
- K. When there is a dispute about a deficiency, regarding whether it is a deficiency or who is responsible:
 - 1. The CxP shall document the deficiency and the Contractor's response on the Issues Log, if provided.
 - 2. The CM shall facilitate the resolution by coordinating with GC and Sub-Contractors.
 - 3. The Architect/Engineer shall be responsible for review and interpretation of the resolution.
 - 4. The Owner shall be responsible for final acceptance of the resolution.
 - 5. The CxP shall document the resolution process and final decision.
 - 6. Once resolved, the CM shall reschedule tests with the CxP and contractor.
- L. Cost of Re-Testing:

1. The cost for a Contractor to complete new Installation and Start-Up Checklists, re-perform the Pre-Tests or Functional Performance Tests, if they are responsible for deficiency or failure, shall be theirs.
2. If a Contractor is not responsible, cost recovery for re-visitation shall be negotiated with the CM.
3. Final determination as to whether the Checklists, Pre-Test, or Functional Performance Test was properly executed as it relates to the project documents shall be that of the Architect/Engineer.
4. The time for CxP to witness and document any retesting required because a specific Installation and Start-Up Checklist, Pre-Test or Functional Performance Test reported to have been successfully completed, but determined during to be faulty, shall be back-charged to the Contractor.
5. Contractors shall be held responsible for expenses incurred by the Owner for retesting due to the contractor's state of reported readiness or lack thereof as represented on the completion of all commissioning documentation required prior to the Functional Performance Test. Expenses shall include, but not be limited to, retesting labor costs, travel expenses, and remobilization for Owner and Architect/Engineer, or CxP representatives.

3.08 DEFERRED TESTING

- A. Any testing that is not completed prior to substantial completion due to reasons beyond the control of the CM or at the request of the Owner shall be conducted as soon after substantial completion as possible so as not to disrupt the building occupants when the facility is fully occupied.
- B. Testing procedures shall be repeated and/or conducted as necessary during appropriate seasons. Opposite season testing is primarily for environmental systems and shall be required where scheduling prohibits thorough testing in all modes of operation.
- C. Opposite season testing may also be required when conditions have been simulated to observe the response of the system. The CxP shall schedule opposite season testing during the warranty period to coincide with a design day condition when possible.
- D. Should testing during the normal testing period demonstrate acceptable performance for the opposite season, then trending of the system operation during the opposite season is also an acceptable means of documenting operational performance.

END OF SECTION

SECTION 02 41 00
DEMOLITION

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Selective demolition of building elements for alteration purposes.

1.02 RELATED REQUIREMENTS

- A. Section 01 10 00 - Summary: Limitations on Contractor's use of site and premises.
- B. Section 01 50 00 - Temporary Facilities and Controls: Site fences, security, protective barriers, and waste removal.
- C. Section 01 60 00 - Product Requirements: Handling and storage of items removed for salvage and relocation.
- D. Section 01 70 00 - Execution and Closeout Requirements: Project conditions; protection of bench marks, survey control points, and existing construction to remain; reinstallation of removed products; temporary bracing and shoring.
- E. Section 01 74 19 - Construction Waste Management and Disposal: Limitations on disposal of removed materials; requirements for recycling.
- F. Section 31 10 00 - Site Clearing.
- G. Section 31 14 13 - Topsoil Excavation and Placement.
- H. Section 31 20 00 - Earth Moving.

1.03 REFERENCE STANDARDS

- A. 29 CFR 1926 - U.S. Occupational Safety and Health Standards; current edition.
- B. NFPA 241 - Standard for Safeguarding Construction, Alteration, and Demolition Operations; 2019.

1.04 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Site Plan: Showing:
 - 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 specified by OSHA and local authorities.
 - 1. Indicate extent of demolition, removal sequence, bracing and shoring, and location and construction of barricades and fences.
 - 2. Identify demolition firm and submit qualifications.
 - 3. Include a summary of safety procedures.
- D. Project Record Documents: Accurately record actual locations of capped and active utilities and subsurface construction.

1.05 QUALITY ASSURANCE

- A. Demolition Firm Qualifications: Company specializing in the type of work required.
 - 1. Minimum of five years of documented experience.

PART 2 PRODUCTS -- NOT USED

PART 3 EXECUTION

3.01 SCOPE

- A. Remove paving and curbs as required to accomplish new work.
- B. Remove concrete slabs and supporting walls as required to accomplish new work.

- C. Remove manholes and manhole covers, curb inlets and catch basins as required to accomplish new work.
- D. Remove all other components indicated on the demolition plan as required to accommodate new work.
- E. Fill excavations, open pits, and holes in ground areas generated as result of removals, using specified fill; compact fill as required so that required rough grade elevations do not subside within one year after completion.

3.02 GENERAL PROCEDURES AND PROJECT CONDITIONS

- A. Comply with applicable codes and regulations for demolition operations and safety of adjacent structures and the public.
 - 1. Obtain required permits.
 - 2. Comply with applicable requirements of NFPA 241.
 - 3. Use of explosives is not permitted.
 - 4. Take precautions to prevent catastrophic or uncontrolled collapse of structures to be removed; do not allow worker or public access within range of potential collapse of unstable structures.
 - 5. Provide, erect, and maintain temporary barriers and security devices.
 - 6. Use physical barriers to prevent access to areas that could be hazardous to workers or the public.
 - 7. Conduct operations to minimize effects on and interference with adjacent structures and occupants.
 - 8. Do not close or obstruct roadways or sidewalks without permit.
 - 9. Conduct operations to minimize obstruction of public and private entrances and exits; do not obstruct required exits at any time; protect persons using entrances and exits from removal operations.
 - 10. Obtain written permission from owners of adjacent properties when demolition equipment will traverse, infringe upon or limit access to their property.
- B. Do not begin removal until receipt of notification to proceed from Owner.
- C. Protect existing structures and other elements that are not to be removed.
 - 1. Provide bracing and shoring.
 - 2. Prevent movement or settlement of adjacent structures.
 - 3. Stop work immediately if adjacent structures appear to be in danger.
- D. Minimize production of dust due to demolition operations; do not use water if that will result in ice, flooding, sedimentation of public waterways or storm sewers, or other pollution.
- E. If hazardous materials are discovered during removal operations, stop work and notify Architect and Owner; hazardous materials include regulated asbestos containing materials, lead, PCB's, and mercury.
- F. Perform demolition in a manner that maximizes salvage and recycling of materials.
 - 1. Comply with requirements of Section 01 74 19 - Construction Waste Management and Disposal.
 - 2. Dismantle existing construction and separate materials.
 - 3. Set aside reusable, recyclable, and salvageable materials; store and deliver to collection point or point of reuse.
- G. Partial Removal of Paving and Curbs: Neatly saw cut at right angle to surface.

3.03 EXISTING UTILITIES

- A. Coordinate work with utility companies; notify before starting work and comply with their requirements; obtain required permits.
- B. Protect existing utilities to remain from damage.
- C. Do not disrupt public utilities without permit from authority having jurisdiction.

- D. Do not close, shut off, or disrupt existing life safety systems that are in use without at least 7 days prior written notification to 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 utilities to be subsequently reconnected, in same manner as other utilities to remain.

3.04 SELECTIVE DEMOLITION FOR ALTERATIONS

- A. Drawings showing existing construction 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 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 other areas that are still occupied.
 - 1. Provide, erect, and maintain temporary dustproof partitions of construction specified in Section 01 50 00 .
- C. Maintain weatherproof exterior building enclosure except for interruptions required for replacement or modifications; take care to prevent water and humidity damage.
- D. Remove existing work as indicated and as required to accomplish new work.
 - 1. Remove items indicated on drawings.
- E. 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 that are to remain in operation; 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 10 00 for other 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.
- F. Protect existing work to remain.
 - 1. Prevent movement of structure; provide shoring and bracing if necessary.
 - 2. Perform cutting to accomplish removals neatly and as specified for cutting new work.
 - 3. Repair adjacent construction and finishes damaged during removal work.
 - 4. Patch as specified for patching new work.

3.05 DEBRIS AND WASTE REMOVAL

- A. Remove debris, junk, and trash from site.
- B. Remove from site all materials not to be reused on site; comply with requirements of Section 01 74 19 - Construction Waste Management and Disposal.
- 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 10 00
CONCRETE FORMING AND ACCESSORIES

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Formwork for cast-in place concrete, with shoring, bracing and anchorage.
 - 1. Openings for other work.
 - 2. Form accessories.
 - 3. Form stripping.

1.02 RELATED REQUIREMENTS

- A. Section 03 20 00 - Concrete Reinforcing.
- B. Section 03 30 00 - Cast-in-Place Concrete.

1.03 REFERENCE STANDARDS

- A. ACI 117 - Specifications for Tolerances for Concrete Construction and Materials; 2010 (Reapproved 2015).
- B. ACI 301 - Specifications for Structural Concrete; 2016.
- C. ACI 318 - Building Code Requirements for Structural Concrete and Commentary; 2014 (Errata 2018).
- D. ACI 347R - Guide to Formwork for Concrete; 2014, with Errata (2017).
- E. PS 1 - Structural Plywood; 2009.

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 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 347R, ACI 301 and ACI 318.
- F. Use the following form types:
 - 1. Foundation Walls Not Exposed To View: Site fabricated plywood.

2.02 WOOD FORM MATERIALS

- A. Softwood Plywood: PS 1, B-B High Density Concrete Form Overlay, Class I.

2.03 FORMWORK ACCESSORIES

- A. Form Ties: Removable or Snap-off type; galvanized metal or plastic; 1 inch back break dimension, 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.
 - 1. Composition: Colorless; soy-based; vegetable-oil based or other bio-based material.
 - 2. Do not use materials containing diesel oil or petroleum-based compounds.
 - 3. VOC Content: In compliance with applicable local, State, and federal regulations
- C. Filler Strips for Chamfered Corners: Rigid plastic; 3/4 x 3/4 inch size; provided in maximum possible lengths.
- D. Nails, Spikes, Lag Bolts, Through Bolts, Anchorages: Sized as required, of sufficient strength and character to maintain formwork in place while placing concrete.

- E. Embedded Anchor Shapes, Plates, Angles and Bars: As specified in Section 05 50 00.

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 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. Align joints and make watertight. Keep form joints to a minimum.
- E. Obtain approval before framing openings in structural members that are not indicated on drawings.
- F. Coordinate this section with other sections of work that require attachment of components to formwork.
- G. 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 accessories in accordance with manufacturer's instructions, so they are straight, level, and plumb. Ensure items are not disturbed during concrete placement.
- E. Provide temporary ports or openings in formwork where required to facilitate cleaning and inspection. Locate openings at bottom of forms to allow flushing water to drain.
- F. Close temporary openings with tight fitting panels, flush with inside face of forms, and neatly fitted so joints will not be apparent in exposed concrete surfaces.

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. Flush with water or use compressed air to remove remaining foreign matter. Ensure that water and debris drain to exterior through clean-out ports.
 - 2. 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 117, unless otherwise indicated.

3.08 FIELD QUALITY CONTROL

- A. An independent testing agency will perform field quality control tests, as specified in Section 01 40 00 - 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.
- C. Clean and repair surfaces of forms to be reused in the Work. Split, frayed, delaminated, or otherwise damaged form-facing material will not be acceptable for exposed surfaces. Apply new form-release agent.
- D. When forms are reused, clean surfaces, remove fins and laitance, and tighten to close joints. Align and secure joints to avoid offsets.

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.
- C. Store removed forms to prevent damage to form materials or to fresh concrete. Discard damaged forms.

END OF SECTION

SECTION 03 20 00
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 10 00 - Concrete Forming and Accessories.
- B. Section 03 30 00 - Cast-in-Place Concrete.

1.03 REFERENCE STANDARDS

- A. ACI 301 - Specifications for Structural Concrete; 2016.
- B. ACI 318 - Building Code Requirements for Structural Concrete and Commentary; 2014 (Errata 2018).
- C. ACI SP-66 - ACI Detailing Manual; 2004.
- D. ASTM A615/A615M - Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement; 2018.
- E. ASTM A1064/A1064M - Standard Specification for Carbon-Steel Wire and Welded Wire Reinforcement, Plain and Deformed, for Concrete; 2018a.
- F. AWS D1.4/D1.4M - Structural Welding Code - Reinforcing Steel; 2018.
- G. CRSI (DA4) - Manual of Standard Practice; 2009.
- H. CRSI (P1) - Placing Reinforcing Bars; 2011.

1.04 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Shop Drawings: Comply with requirements of ACI SP-66. Include bar schedules, shapes of bent bars, spacing of bars, and location of splices.
- C. Reports: Submit certified copies of mill test report of reinforcement materials analysis.

1.05 QUALITY ASSURANCE

- A. Perform work of this section in accordance with CRSI (DA4) and CRSI (P1).
 - 1. Maintain one copy of each document on project site.

PART 2 PRODUCTS

2.01 REINFORCEMENT

- A. Reinforcing Steel: ASTM A615/A615M, Grade 60 (60,000 psi) (420 MPa);
 - 1. Deformed billet-steel bars.
 - 2. Unfinished.
- B. Steel Welded Wire Reinforcement (WWR): Plain type; ASTM A1064/A1064M.
 - 1. Form: Flat Sheets.
- C. Reinforcement Accessories:
 - 1. Tie Wire: Annealed, minimum 16 gage, 0.0508 inch (1.29 mm).
 - 2. Chairs, Bolsters, Bar Supports, Spacers: Sized and shaped for adequate support of reinforcement during concrete placement.
 - 3. Provide stainless steel or plastic components for placement within 1-1/2 inches of weathering surfaces.

2.02 FABRICATION

- A. Fabricate concrete reinforcing in accordance with CRSI (DA4) - Manual of Standard Practice.
 - 1. Welding of reinforcement is not permitted.

2. Welding of reinforcement is permitted only with the specific approval of Architect. Perform welding in accordance with AWS D1.4/D1.4M.
3. 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. Comply with ACI 318 for concrete cover over reinforcement.

3.02 FIELD QUALITY CONTROL

- A. An independent testing agency, as specified in Section 01 40 00 - Quality Requirements, will inspect installed reinforcement for compliance with contract documents before concrete placement.

END OF SECTION

SECTION 03 30 00
CAST-IN-PLACE CONCRETE

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Concrete slabs on grade.
- B. Concrete foundation walls and footings.
- C. Joint devices associated with concrete work.
- D. Concrete curing.

1.02 RELATED REQUIREMENTS

- A. Section 03 10 00 - Concrete Forming and Accessories: Forms and accessories for formwork.
- B. Section 03 20 00 - Concrete Reinforcing.
- C. Section 03 30 06 - Waterproofing Admixture for Cast-in-Place Concrete.
- D. Section 03 35 11 - Concrete Floor Finishes.
- E. Section 03 54 00 - Cast Underlayment.

1.03 REFERENCE STANDARDS

- A. ACI 117 - Specifications for Tolerances for Concrete Construction and Materials; 2010 (Reapproved 2015).
- B. ACI 211.1 - Standard Practice for Selecting Proportions for Normal, Heavyweight, and Mass Concrete; 1991 (Reapproved 2009).
- C. ACI 301 - Specifications for Structural Concrete; 2016.
- D. ACI 302.1R - Guide to Concrete Floor and Slab Construction; 2015.
- E. ACI 304R - Guide for Measuring, Mixing, Transporting, and Placing Concrete; 2000 (Reapproved 2009).
- F. ACI 305R - Guide to Hot Weather Concreting; 2010.
- G. ACI 306R - Guide to Cold Weather Concreting; 2016.
- H. ACI 318 - Building Code Requirements for Structural Concrete and Commentary; 2014 (Errata 2018).
- I. ASTM C33/C33M - Standard Specification for Concrete Aggregates; 2018.
- J. ASTM C39/C39M - Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens; 2018.
- K. ASTM C94/C94M - Standard Specification for Ready-Mixed Concrete; 2018.
- L. ASTM C150/C150M - Standard Specification for Portland Cement; 2018.
- M. ASTM C171 - Standard Specification for Sheet Materials for Curing Concrete; 2016
- N. ASTM C173/C173M - Standard Test Method for Air Content of Freshly Mixed Concrete by the Volumetric Method; 2016.
- O. ASTM C260/C260M - Standard Specification for Air-Entraining Admixtures for Concrete; 2010a (Reapproved 2016).
- P. ASTM C309 - Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete; 2011.
- Q. ASTM C494/C494M - Standard Specification for Chemical Admixtures for Concrete; 2017.
- R. ASTM C618 - Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use in Concrete; 2019.
- S. ASTM C685/C685M - Standard Specification for Concrete Made by Volumetric Batching and Continuous Mixing; 2017.

- T. ASTM C1107/C1107M - Standard Specification for Packaged Dry, Hydraulic-Cement Grout (Nonshrink); 2017.
- U. ASTM E154/E154M - Standard Test Methods for Water Vapor Retarders Used in Contact with Earth Under Concrete Slabs, on Walls, or as Ground Cover; 2008a, with Editorial Revision (2013).
- V. ASTM E1155 - Standard Test Method for Determining F(F) Floor Flatness and F(L) Floor Levelness Numbers; 2014.

1.04 SUBMITTALS

- A. See Section 01 30 00 - 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.
- C. Mix Design: Submit proposed concrete mix designs for each concrete mixture.
 - 1. Indicate proposed mix design complies with requirements of ACI 301, Section 4 - Concrete Mixtures.
- 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 301 and ACI 318.
 - 1. Maintain one copy of each document on site.
- B. Follow recommendations of ACI 305R when concreting during hot weather.
- C. Follow recommendations of ACI 306R when concreting during cold weather.
- D. Installer Qualifications:
 - 1. Employs project personnel on the finishing crew qualified as ACI Flatwork Finisher Technician, or equivalent. The supervisor shall be certified as an ACI Concrete Flatwork Finisher, or equivalent
 - 2. An experienced installer who has been continuously and regularly employed in the installation of Cast in Place Concrete work for a minimum period of at least the last five consecutive years; and which can show evidence of these materials being satisfactorily installed on at least six projects of similar size, scope and type within such a period.
- E. Manufacturer Qualifications: A firm experienced in manufacturing ready-mixed concrete products and that complies with ASTM C 94 requirements for production facilities and equipment.
- F. Testing Agency Qualifications: An independent agency qualified according to ASTM C 1077 and ASTM E 329 for testing indicated, as documented according to ASTM E 548.
 - 1. Personnel conducting field tests shall be qualified as ACI Concrete Field Testing Technician, Grade 1, according to ACI CP-01 or an equivalent certification program.
 - 2. Personnel performing laboratory tests shall be ACI-certified Concrete Strength Testing Technician and Concrete Laboratory Testing Technician - Grade I. Testing Agency laboratory supervisor shall be an ACI-certified Concrete Laboratory Testing Technician - Grade II.
- G. Source Limitations: Obtain each type or class of cementitious material of the same brand from the same manufacturer's plant, obtain aggregate from one source, and obtain admixtures through one source from a single manufacturer.

PART 2 PRODUCTS

2.01 FORMWORK

- A. Comply with requirements of Section 03 10 00.

2.02 REINFORCEMENT MATERIALS

- A. Comply with requirements of Section 03 20 00.

2.03 CONCRETE MATERIALS

- A. Cement: ASTM C150/C150M, Type I.
 - 1. Acquire cement for entire project from same source.
- B. Fine and Coarse Aggregates: ASTM C33/C33M.
 - 1. Acquire aggregates for entire project from same source.
- C. Fly Ash: ASTM C618, Class C or F.
 - 1. Acquire fly ash for entire project from same source.
- D. 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.

2.05 JOINTING PRODUCTS

- A. Slab Isolation Joint Filler: 1/2 inch (13 mm) thick, height equal to slab thickness, with removable top section that will form 1/2 inch (13 mm) inch deep sealant pocket after removal.
 - 1. Material: ASTM D1751, cellulose fiber.
- B. Slab Contraction Joint Device: Preformed linear strip intended for pressing into wet concrete to provide straight route for shrinkage cracking.

2.06 CURING MATERIALS

- A. Evaporation Reducer: Liquid thin-film-forming compound that reduces rapid moisture loss caused by high temperature, low humidity, and high winds; intended for application immediately after concrete placement.
- B. Curing Compound, Naturally Dissipating: Clear, water-based, liquid membrane-forming compound; complying with ASTM C309.
- C. Curing and Sealing Compound, Moisture Emission Reducing, Membrane-Forming: Liquid, membrane-forming, clear sealer, for application to newly-placed concrete; capable of providing adequate bond for flooring adhesives, initially and over the long term; with sufficient moisture vapor impermeability to prevent deterioration of flooring adhesives due to moisture emission.
- D. Curing and Sealing Compound, Low Gloss: Liquid, membrane-forming, clear, non-yellowing acrylic; complying with ASTM C1315 Type 1 Class A.
- E. Moisture-Retaining Sheet: ASTM C171.
 - 1. Polyethylene film, clear, minimum nominal thickness of 4 mil, 0.004 inch (0.102 mm).
 - 2. White-burlap-polyethylene sheet, weighing not less than 3.8 ounces per square yard.
- F. Water: Potable, not detrimental to concrete.

2.07 CONCRETE MIX DESIGN

- A. Proportioning Normal Weight Concrete: Comply with ACI 211.1 recommendations.
 - 1. Cementitious Materials: Limit percentage of Fly Ash, by weight, to a maximum of 20% of the total cementitious content of the proposed mix.

2. Limit water-soluble, chloride-ion content in hardened concrete to 0.05 percent by weight of cement.
- B. Concrete Strength: Establish required average strength for each type of concrete on the basis of field experience or trial mixtures, as specified in ACI 301.
 1. Use a qualified independent testing agency for preparing and reporting proposed mixture designs based on laboratory trial mixtures.
 - C. Admixtures: Add acceptable admixtures as recommended in ACI 211.1 and at rates recommended or required by manufacturer.
 - D. Footings and Foundations Walls: Proportion Normal Weight Concrete as follows:
 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 20 percent of cementitious materials by weight.
 3. Water-Cementitious Materials Ratio: Maximum 0.52 (non-air entrained), 0.48 (air-entrained).
 4. Total Air Content: Interior concrete: Non-Air Entrained. Exterior concrete: 6 percent +/- 1.5 percent at the point of delivery.
 5. Slump: 4 inches +/- 1 inch.
 6. Maximum Aggregate Size: 1 1/2 inch.
 - E. Interior Slabs on Grade: Proportion Normal Weight Concrete as follows:
 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 20 percent of cementitious materials by weight.
 3. Water-Cementitious Materials Ratio: Maximum 0.52 (non-air entrained).
 4. Total Air Content: Non-Air Entrained.
 5. Slump: 4 inches +/- 1 inch.
 6. Maximum Aggregate Size: 1 inch.
 - F. Exterior Slabs on Grade: Proportion Normal Weight Concrete as follows:
 1. Compressive Strength, when tested in accordance with ASTM C39/C39M at 28 days: 4,500 pounds per square inch.
 2. Fly Ash Content: 0 percent of cementitious materials by weight.
 3. Water-Cementitious Materials Ratio: Maximum 0.44 (air entrained).
 4. Total Air Content: 6 percent +/- 1.5 percent at the point of delivery.
 5. Slump: 4 inches +/- 1 inch.
 6. Maximum Aggregate Size: 1 inch.

2.08 MIXING

- A. Transit Mixers: Comply with ASTM C94/C94M and furnish batch ticket informaton.
 1. When air temperature is between 85 and 90 deg F, reduce mixing and delivery time from 1-1/2 hours to 75 minutes; when air temperature is above 90 deg F, reduce mixing and delivery time to 60 minutes.
 2. 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 PREPARATION

- A. Where new concrete is to be bonded to previously placed concrete, prepare existing surface by cleaning and applying bonding agent in according to bonding agent manufacturer's instructions.
 1. Use epoxy bonding system for bonding to damp surfaces, for structural load-bearing applications, and where curing under humid conditions is required.
 - a. Use latex bonding agent only for non-load-bearing applications.

- B. In locations where new concrete is doweled to existing work, drill holes in existing concrete, insert steel dowels and pack solid with non-shrink grout.
- C. Interior Slabs on Grade: Install vapor retarder under interior slabs on grade. Lap joints minimum 6 inches. Seal joints, seams and penetrations watertight with manufacturer's recommended products and follow manufacturer's written instructions. Repair damaged vapor retarder before covering.
 - 1. Vapor Retarder Over Granular Fill: Install compactible granular fill before placing vapor retarder as indicated on drawings. Do not use sand.
 - 2. Install composite vapor retarder sheet with non-woven geotextile surface facing concrete.

3.03 INSTALLING REINFORCEMENT AND OTHER EMBEDDED ITEMS

- A. Comply with requirements of ACI 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. Install welded wire reinforcement in maximum possible lengths, and offset end laps in both directions. Splice laps with tie wire.
- C. 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.

3.04 PLACING CONCRETE

- A. Place concrete in accordance with ACI 304R.
- B. Place concrete for floor slabs in accordance with ACI 302.1R.
- C. Notify Architect not less than 24 hours prior to commencement of placement operations.
- D. Maintain records of concrete placement. Record date, location, quantity, air temperature, and test samples taken.
- E. Ensure reinforcement and any other embedded parts will not be disturbed during concrete placement.
- F. 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.
- G. Finish floors level and flat, unless otherwise indicated, within the tolerances specified below.

3.05 SLAB JOINTING

- A. Anchor joint fillers and devices to prevent movement during concrete placement.
 - 1. 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.
- B. Install wherever necessary to separate slab from other building members, including columns, walls, equipment foundations, footings, stairs, manholes, sumps, and drains.
- C. Saw Cut Contraction Joints: Saw cut joints before concrete begins to cool, within 4 to 12 hours after placing; use 3/16 inch (5 mm) thick blade and cut at least 1 inch (25 mm) deep but not less than one quarter (1/4) the depth of the slab.
- D. Contraction Joint Devices: Use preformed joint device, with top set flush with top of slab.
- E. Construction Joints: Where not otherwise indicated, use metal combination screed and key form, with removable top section for joint sealant.

3.06 FLOOR FLATNESS AND LEVELNESS TOLERANCES

- A. An independent testing agency, as specified in Section 01 40 00, will inspect finished slabs for compliance with specified tolerances.
- B. Minimum F(F) Floor Flatness and F(L) Floor Levelness Values:

1. Slabs on grade except at areas with flooring applications that require otherwise - Specified overall values of flatness, F(F) 35; and of levelness, F(L) 30; with minimum local values of flatness, F(F) 24; and of levelness, F(L) 17.
- C. Measure F(F) Floor Flatness and F(L) Floor Levelness in accordance with ASTM E1155 (ASTM E1155M), within 48 hours after slab installation; report both composite overall values and local values for each measured section.
- D. 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.

3.07 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 (6 mm); 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.
 2. Grout Cleaned Finish: Wet areas to be cleaned and apply grout mixture by brush or spray; scrub immediately to remove excess grout. After drying, rub vigorously with clean burlap, and keep moist for 36 hours.
 3. Cork Floated Finish: Immediately after form removal, apply grout with trowel or firm rubber float; compress grout with low-speed grinder, and apply final texture with cork float.
- D. Concrete Slabs: Finish to requirements of ACI 302.1R, and as follows:
 1. Surfaces to Receive Thick Floor Coverings: "Wood float" as described in ACI 302.1R.
 2. Surfaces to Receive Thin Floor Coverings: "Steel trowel" as described in ACI 302.1R.
 3. Exposed Surfaces: Trowel as described in ACI 302.1R; take measures necessary to avoid black-burnish marks and other appearance defects.
- E. In areas with floor drains, maintain floor elevation at walls; pitch surfaces uniformly to drains.

3.08 CURING AND PROTECTION

- A. Comply with requirements of ACI 308R. 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.
 1. Normal concrete: Not less than seven days.
 2. High early strength concrete: Not less than four days.
- C. Formed Surfaces: Cure by moist curing with forms in place for full curing period.
- D. 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 four days by water ponding, water-fog spray; or saturated burlap.
 - a. Ponding: Maintain 100 percent coverage of water over floor slab areas, continuously for 4 days.
 - b. Spraying: Spray water over floor slab areas and maintain wet.
 - c. Saturated Burlap: Saturate burlap-polyethylene and place burlap-side down over floor slab areas, lapping ends and sides; maintain in place.
 3. Final Curing: Begin after initial curing but before surface is dry.

- a. Moisture-Retaining Sheet: Lap strips not less than 3 inches and seal with waterproof tape or adhesive; secure at edges.
- b. Curing Compound: Apply in two coats at right angles, using application rate recommended by manufacturer.

3.09 FIELD QUALITY CONTROL

- A. An independent testing agency will perform field quality control tests, as specified in Section 01 40 00 - Quality Requirements.
- B. Provide free access to concrete operations at project site and cooperate with appointed firm.
- C. Submit proposed mix design of each class of concrete to inspection and testing firm for review prior to commencement of concrete operations.
- D. Tests of concrete and concrete materials may be performed at any time to ensure compliance with specified requirements.
- E. Compressive Strength Tests: ASTM C39/C39M, for each test, mold and cure four concrete test cylinders. Obtain test samples for every 50 cubic yards or less of each class; of concrete placed.
- F. Take one additional test cylinder during cold weather concreting, cured on job site under same conditions as concrete it represents.
- G. Perform one slump test for each set of test cylinders taken, following procedures of ASTM C143/C143M.
- H. Slab Testing: Cooperate with manufacturer of specified moisture vapor reduction admixture (MVRA) to allow access for sampling and testing concrete for compliance with warranty requirements.
- I. Permeability Test: Test concrete with waterproofing admixture according to COE CRD-C 48.

3.10 DEFECTIVE CONCRETE

- A. Test Results: The testing agency shall report test results in writing to Architect and Contractor within 24 hours of test.
- B. Defective Concrete: Concrete not complying with required lines, details, dimensions, tolerances or specified requirements.
- C. 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.
- D. Do not patch, fill, touch-up, repair, or replace exposed concrete except upon express direction of Architect for each individual area.

3.11 PROTECTION

- A. Do not permit traffic over unprotected concrete floor surface until fully cured.

END OF SECTION

SECTION 03 30 06

WATERPROOFING ADMIXTURE FOR CAST-IN-PLACE CONCRETE

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Waterproofing admixture for cast-in-place concrete.
- B. Accessory materials.

1.02 RELATED REQUIREMENTS

- A. Section 03 30 00 - Cast-in-Place Concrete: Finishing of concrete surface to tolerance; floating, troweling, and similar operations; curing.
- B. Section 3749 - 3749: Densifiers, hardeners, applied coatings, and polishing.

1.03 REFERENCE STANDARDS

- A. ACI 211.1 - Standard Practice for Selecting Proportions for Normal, Heavyweight, and Mass Concrete; 1991 (Reapproved 2009).
- B. ASTM C94/C94M - Standard Specification for Ready-Mixed Concrete; 2020.
- C. ASTM C685/C685M - Standard Specification for Concrete Made by Volumetric Batching and Continuous Mixing; 2017.
- D. ASTM E96/E96M - Standard Test Methods for Water Vapor Transmission of Materials; 2016.
- E. ASTM E1643 - Standard Practice for Selection, Design, Installation and Inspection of Water Vapor Retarders Used in Contact with Earth or Granular Fill Under Concrete Slabs; 2018a.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Preinstallation Meeting: Conduct a preinstallation meeting one week prior to the start of the work of this section; require attendance by all affected installers.

1.05 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Submit manufacturers' data on manufactured products showing compliance with specified requirements and installation instructions.
- C. Mix Design: Submit manufacturer approval of proposed concrete mix design.
- D. Material Certificate: Certify that products of this section meet or exceed specified requirements.
- E. Material Test Report: Document that products of this section comply with specified requirements.
- F. Field Quality Control Submittals: Include project name and number, date of admixture application, name of testing agency, location of concrete batch in work, mix proportions, materials, and test result.
- 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 products specified in this section, with not less than ten years of documented experience.
- B. Concrete Supplier Qualifications: Company certified by waterproofing admixture manufacturer with not less than five years of documented experience.
- C. Concrete Finisher Qualifications: Company certified by waterproofing admixture manufacturer with not less than five of documented experience, and approved by manufacturer.
- D. Moisture Testing: By waterproofing admixture manufacturer's representative.
- E. For slabs required to to have waterproofing admixture, do not proceed with placement unless manufacturer's representative is present for first day of placement.

- F. Obtain admixture from a single manufacturer.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials in original, undamaged containers with labels intact.
- B. Comply with manufacturer's written handling instructions prior to mixing.
- C. Comply with manufacturer's written storage instructions.

1.08 WARRANTY

- A. Slabs with Waterproofing Admixture: Provide admixture manufacturer's 15 year warranty against spalling and failure of waterproofing.
- B. Waterproofing Admixtures for Cast-in-Place Concrete: Provide non-prorated warranty to cover cost of flooring delamination failures for 15 years.
 - 1. Include cost of repair or removal of failed flooring, remediation with a moisture vapor impermeable surface coating, and replacement of flooring with comparable flooring system.

PART 2 PRODUCTS

2.01 WATER VAPOR REDUCING ADMIXTURE

- A. Do not use chemicals that will result in soluble chloride ions in excess of 0.1 percent by weight of cement.
- B. Waterproofing Admixture: Single component, liquid, inorganic admixture free of volatile organic compounds (VOCs); reacts with cementitious material to integrally and permanently close route of moisture transmission.
 - 1. Location: Provide admixture in all slabs.
 - 2. Capillary Break: Calcium silicate hydrate.
 - 3. Water Vapor Permeance: 0.0017 perms, maximum, when tested in accordance with ASTM E96/E96M.
 - 4. Toxicity: None.
 - 5. Solvent: Water.
 - 6. Hazardous Vapors: None.
 - 7. Products:
 - a. Concrete Moisture Solutions; Barrier One; www.barrierone.com.
 - b. ISE Logik Industries; MVRA 900; www.iselogik.com.
 - c. Specialty Products Group; Vapor Lock 20/21; www.spggogreen.com.
 - d. Substitutions: See Section 01 60 00 - Product Requirements.

2.02 ACCESSORY MATERIALS

- A. Underslab Vapor Retarder: See Section 03 30 00.

2.03 CONCRETE MIX DESIGN

- A. Admixtures: Add acceptable admixtures as recommended in ACI 211.1 and at rates required by manufacturer.

2.04 MIXING

- A. Mixers: See Section 03 30 00.

PART 3 EXECUTION

3.01 PREPARATION

- A. Where new concrete with admixture is to be bonded to previously placed concrete, prepare surfaces according to admixture manufacturer's instructions.
- B. Interior Slabs on Grade at Field and Track Jump Pits: Install vapor retarder under interior slabs on grade. Lap joints minimum 6 inches. Seal joints, seams and penetrations watertight with manufacturer's recommended products and follow manufacturer's written instructions. Repair damaged vapor retarder before covering.

1. Granular Fill Over Vapor Retarder: Cover vapor retarder with compactible granular fill as shown on the drawings. Do not use sand.

3.02 INSTALLATION

- A. Dispense admixture according to mix design and supplier's written instructions.
- B. Add admixture to concrete according to manufacturer's written instructions.
- C. Place and cure concrete as specified in Section 03 30 00.

3.03 FIELD QUALITY CONTROL

- A. An independent testing agency will perform field quality control tests, as specified in Section 39.
- B. Provide free access to concrete operations at project site and cooperate with appointed testing agency.
- C. Slab Testing: Cooperate with manufacturer of specified waterproofing admixture to allow access for sampling and testing concrete for compliance with warranty requirements.
- D. Maintain four concrete cylinders for one year from date of Substantial Completion.
- E. Test cylinders as required by admixture manufacturer.
- F. Demonstrate test cylinders comply with requirements specified in Part 2.
- G. Test one cylinder per project.
- H. Field Quality Control Reports:
 1. Submit test results to Architect, Contractor, and admixture manufacturer, within 48 hours of testing.
 2. Include project name, project number, date of admixture application, name of testing agency, location of concrete in the Work, concrete mix design, and waterproofing capability.

3.04 DEFECTIVE CONCRETE

- A. Test Results: The testing agency shall report test results in writing to Architect and Contractor within 48 hours of test.
- B. Defective Concrete: Concrete not complying with specified requirements.
- C. When test results indicate concrete does not comply with specified requirements, conducts additional tests as directed by Architect. The cost of additional testing shall be borne by Contractor when defective concrete is identified.
- D. Repair or replacement of defective concrete will be determined by the Architect.

END OF SECTION

SECTION 03 35 11
CONCRETE FLOOR FINISHES

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Surface treatments for concrete floors and slabs.
- B. Color coatings.

1.02 RELATED REQUIREMENTS

- A. Section 03 30 00 - Cast-in-Place Concrete.
- B. Section 03 30 06 - Waterproofing Admixture for Cast-in-Place Concrete.
- C. Section 03 54 00 - Cast Underlayment.

1.03 ADMINISTRATIVE REQUIREMENTS

- A. Coordinate the work with concrete floor placement and concrete floor curing.

1.04 SUBMITTALS

- A. See Section 01 30 00 - 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.
- D. Warranty Documentation: Manufacturer warranty; ensure that forms have been completed in Owner's name and registered with manufacturer.
- E. Specimen Warranty: Manufacturer warranty.

1.05 MOCK-UP

- A. For coatings, construct mock-up area under conditions similar to those that will exist during application, with coatings applied.
- B. Mock-Up Size: 10 feet square.
- C. Locate where directed.
- D. Mock-up may remain as part of the work.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials in manufacturer's sealed packaging, including application instructions.

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. Maintain ambient temperature of 50 degrees F minimum.

1.08 WARRANTY

- A. See Section 01 78 00 - Closeout Submittals for additional warranty requirements.
- B. Correct defective work within a two-year period commencing on the Date of Substantial Completion.
- C. Finish Warranty: Provide five-year manufacturer warranty against excessive degradation of finish. Include provision for replacement of units with excessive fading, chalking, or flaking.

PART 2 PRODUCTS

2.01 COATINGS

- A. Color Coating: Pigmented coating recommended by manufacturer for finishing concrete floors and slabs.
 - 1. Gloss: Matte.
 - 2. Color(s): As selected by Architect from manufacturer's standard range.

3. Thickness: 23-40 mils.
4. Slip Resistance: Provide additive slip resistance material to meet coefficient of friction to be 0.6.
5. Type: High solids epoxy; two-component.
 - a. Products:
 - 1) Allied Construction Technologies, Inc; AC Tech 2170: www.actechperforms.com.
 - 2) Euclid Chemical Company; DURALTEX: www.euclidchemical.com.
 - 3) Kaufman Products Inc; SurePoxy Protective Coating WD: www.kaufmanproducts.net.
 - 4) SureCrete Design Products; Colortec 500: www.surecretedesign.com.
 - 5) Substitutions: See Section 01 60 00 - 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.

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. Verify that water vapor emission from concrete and relative humidity in concrete are within limits established by coating manufacturer.
- C. Protect adjacent non-coated areas from drips, overflow, and overspray; immediately remove excess material.
- D. Apply coatings in accordance with manufacturer's instructions, matching approved mock-ups for color, special effects, sealing and workmanship.

END OF SECTION

SECTION 03 54 00
CAST UNDERLAYMENT

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Liquid-applied self-leveling floor underlayment.
 - 1. Use cementitious type at all locations.

1.02 RELATED REQUIREMENTS

- A. Section 01 70 00 - Execution and Closeout Requirements: Alteration project procedures; selective demolition for remodeling.

1.03 REFERENCE STANDARDS

- A. ASTM C109/C109M - Standard Test Method for Compressive Strength of Hydraulic Cement Mortars (Using 2-in. or (50-mm) Cube Specimens); 2020a.
- B. ASTM C1602/C1602M - Standard Specification for Mixing Water Used in the Production of Hydraulic Cement Concrete; 2012.
- C. ASTM C348 - Standard Test Method for Flexural Strength of Hydraulic-Cement Mortars; 2020.
- D. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2020.
- E. ICRI 310.2R - Selecting and Specifying Concrete Surface Preparation for Sealers, Coatings, Polymer Overlays, and Concrete Repair; 2013.

1.04 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide manufacturer's data sheets documenting physical characteristics and product limitations of underlayment materials. Include information on surface preparation, environmental limitations, and installation instructions.
- C. Manufacturer's Instructions.

1.05 QUALITY ASSURANCE

- A. Applicator Qualifications: Company specializing in performing the work of this section, and approved by manufacturer.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Store products in manufacturer's unopened packaging until ready for installation.
- B. Keep dry and protect from direct sun exposure, freezing, and ambient temperature greater than 105 degrees F.

1.07 FIELD CONDITIONS

- A. Do not install underlayment until floor penetrations and peripheral work are complete.
- B. Maintain minimum ambient temperatures of 50 degrees F 24 hours before, during and 72 hours after installation of underlayment.
- C. During the curing process, ventilate spaces to remove excess moisture.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Cementitious Underlayment:
 - 1. Basis of Design:
 - a. ARDEX Engineered Cements; ARDEX V 1200 with ARDEX P51 Primer: www.ardexamericas.com/#sle.
 - 2. Other Acceptable Manufacturers:
 - a. Custom Building Products: www.custombuildingproducts.com/#sle.
 - b. Dayton Superior Corporation: www.daytonsuperior.com/#sle.

- c. Dependable Chemical Co., Inc: www.floorprep.com/#sle.
- d. J.E. Tomes & Associates: www.hetomes.com
- e. LATICRETE Internations, Inc; www.laticrete.com.
- f. Substitutions: See Section 01 60 00 - Product Requirements.

2.02 MATERIALS

- A. Cast Underlayments, General:
 - 1. Comply with applicable code for combustibility or flame spread requirements.
 - 2. Provide certificate of compliance from authority having jurisdiction indicating approval of underlayment materials in the required fire rated assembly.
- B. Cementitious Underlayment: Blended cement mix, that when mixed with water in accordance with manufacturer's directions will produce self-leveling underlayment with the following properties:
 - 1. Compressive Strength: Minimum 4000 pounds per square inch after 28 days, tested per ASTM C109/C109M.
 - 2. Flexural Strength: Minimum 1000 psi after 28 days, tested per ASTM C348.
 - 3. Density: 125 pounds per cubic foot, nominal.
 - 4. Final Set Time: 1-1/2 to 2 hours, maximum.
 - 5. Thickness: Capable of thicknesses from feather edge to maximum 3-1/2 inch.
 - 6. Surface Burning Characteristics: Flame spread/Smoke developed index of 0/0 in accordance with ASTM E84.
- C. Water: ASTM C1602/C1602M; clean, potable, and not detrimental to underlayment mix materials.
- D. Primer: Manufacturer's recommended type.
- E. Joint and Crack Filler: Latex based filler, as recommended by manufacturer.

2.03 MIXING

- A. Site mix materials in accordance with manufacturer's instructions.
- B. Add aggregate for areas where thickness will exceed 1 inch. Mix underlayment and water for at least two minutes before adding aggregate, and continue mixing to assure that aggregate has been thoroughly coated.
- C. Mix to self-leveling consistency without over-watering.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that substrate surfaces are clean, dry, unfrozen, do not contain petroleum byproducts, or other compounds detrimental to underlayment material bond to substrate.

3.02 PREPARATION

- A. Concrete: Mechanically prepare steel troweled concrete to create a textured surface necessary to achieve the best bond; acceptable methods include bead blasting and scarifying. Do not use acid etching.
- B. Concrete: Prepare surfaces according to ICRI 310.2R.
- C. Remove substrate surface irregularities. Fill voids and deck joints with filler. Finish smooth.
- D. Vacuum clean surfaces.
- E. Prime substrate in accordance with manufacturer's instructions. Allow to dry.
- F. Close floor openings.

3.03 APPLICATION

- A. Install underlayment in accordance with manufacturer's instructions.
- B. Place to 5/16 inch thickness or as required to achieve level floor, with top surface level to 1/8 inch in 10 ft.

- C. For final thickness over 1-1/2 inches, place underlayment in layers. Allow initial layer to harden to the point where the material has lost its evaporative moisture. Immediately prime and begin application of the subsequent layer within 24 hours.
- D. If a fine, feathered edge is desired, steel trowel the edge after initial set, but before it is completely hard.

3.04 CURING

- A. Once underlayment starts to set, prohibit foot traffic until final set has been reached.
- B. Air cure in accordance with manufacturer's instructions.

3.05 PROTECTION

- A. Protect against direct sunlight, heat, and wind; prevent rapid drying to avoid shrinkage and cracking.
- B. Do not permit traffic over unprotected floor underlayment surfaces.

END OF SECTION

SECTION 04 05 11
MORTAR AND MASONRY GROUT

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Mortar for masonry.
- B. Grout for masonry.

1.02 RELATED REQUIREMENTS

- A. Section 04 26 00 - Single-Wythe Unit Masonry: Installation of mortar and grout.
- B. Section 08 11 13 - Hollow Metal Doors and Frames: Products and execution for grouting steel door frames installed in masonry.

1.03 REFERENCE STANDARDS

- A. TMS 402/602 - Building Code Requirements and Specification for Masonry Structures; 2016.
- B. ASTM C91/C91M - Standard Specification for Masonry Cement; 2018.
- C. ASTM C94/C94M - Standard Specification for Ready-Mixed Concrete; 2020.
- D. ASTM C144 - Standard Specification for Aggregate for Masonry Mortar; 2018.
- E. ASTM C150/C150M - Standard Specification for Portland Cement; 2020.
- F. ASTM C207 - Standard Specification for Hydrated Lime for Masonry Purposes; 2018.
- G. ASTM C270 - Standard Specification for Mortar for Unit Masonry; 2019.
- H. ASTM C387/C387M - Standard Specification for Packaged, Dry, Combined Materials for Concrete and High Strength Mortar; 2017.
- I. ASTM C404 - Standard Specification for Aggregates for Masonry Grout; 2018.
- J. ASTM C476 - Standard Specification for Grout for Masonry; 2020.
- K. ASTM C780 - Standard Test Method for Preconstruction and Construction Evaluation of Mortars for Plain and Reinforced Unit Masonry; 2019.
- L. ASTM C979/C979M - Standard Specification for Pigments for Integrally Colored Concrete; 2016.
- M. ASTM C1019 - Standard Test Method for Sampling and Testing Grout for Masonry; 2019.
- N. ASTM C1072 - Standard Test Methods for Measurement of Masonry Flexural Bond Strength; 2019.
- O. ASTM C1142 - Standard Specification for Extended Life Mortar for Unit Masonry; 1995 (Reapproved 2013).
- P. ASTM C1148 - Standard Test Method for Measuring the Drying Shrinkage of Masonry Mortar; 1992a (Reapproved 2014).
- Q. ASTM C1314 - Standard Test Method for Compressive Strength of Masonry Prisms; 2018.
- R. ASTM E514/E514M - Standard Test Method for Water Penetration and Leakage Through Masonry; 2014a.
- S. ASTM E518/E518M - Standard Test Methods for Flexural Bond Strength of Masonry; 2015.

1.04 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Include design mix and indicate whether the Proportion or Property specification of ASTM C270 is to be used. Also include required environmental conditions and admixture limitations.
- C. Samples: Submit two samples of mortar, illustrating mortar color and color range.

- D. Reports: Submit reports on mortar indicating compliance of mortar to property requirements of ASTM C270 and test and evaluation reports per ASTM C780.
- E. Reports: Submit reports on grout indicating compliance of component grout materials to requirements of ASTM C476 and test and evaluation reports to requirements of ASTM C1019.
- F. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.
- G. Manufacturer's Installation Instructions: Submit packaged dry mortar manufacturer's installation instructions.

1.05 QUALITY ASSURANCE

- A. Comply with provisions of TMS 402/602, except where exceeded by requirements of Contract Documents.
 - 1. Maintain one copy of each document on project site.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Maintain packaged materials clean, dry, and protected against dampness, freezing, and foreign matter.

1.07 FIELD CONDITIONS

- A. Cold and Hot Weather Requirements: Comply with requirements of TMS 402/602 or applicable building code, whichever is more stringent.

PART 2 PRODUCTS

2.01 MORTAR AND GROUT APPLICATIONS

- A. Use only factory premixed packaged dry materials for mortar and grout, with addition of water only at project site.
- B. Mortar Mix Designs: ASTM C270, Property Specification.
 - 1. Reinforced Masonry: Type S.
 - 2. Exterior, Loadbearing Masonry: Type S.
 - 3. Interior, Non-loadbearing Masonry: Type N.
- C. Grout Mix Designs:
 - 1. Bond Beams and Lintels: 3,000 psi strength at 28 days; 8-10 inches slump; provide premixed type in accordance with ASTM C 94/C 94M.
 - a. Fine grout for spaces with smallest horizontal dimension of 2 inches or less.
 - b. Coarse grout for spaces with smallest horizontal dimension greater than 2 inches.
 - 2. Engineered Masonry: 3,000 psi strength at 28 days; 8-10 inches slump; provide premixed type in accordance with ASTM C 94/C 94M.
 - a. Fine grout for spaces with smallest horizontal dimension of 2 inches or less.
 - b. Coarse grout for spaces with smallest horizontal dimension greater than 2 inches.

2.02 MATERIALS

- A. Packaged Dry Material for Mortar for Unit Masonry: Premixed Portland cement, hydrated lime, and sand; complying with ASTM C387/C387M and capable of producing mortar of the specified strength in accordance with ASTM C270 with the addition of water only.
 - 1. Type: Type S.
 - 2. Standard Concrete Masonry Units:
 - a. Color: Standard gray.
 - 3. Decorative Ground Face Masonry Units (GFMU):
 - a. Color: Mineral pigments added as required to produce approved color sample.
- B. Masonry Cement: ASTM C91/C91M.
 - 1. Type: Type N; ASTM C91/C91M.
- C. Hydrated Lime: ASTM C207, Type S.
- D. Mortar Aggregate: ASTM C144.
- E. Grout Aggregate: ASTM C404.

- F. Pigments for Colored Mortar: Pure, concentrated mineral pigments specifically intended for mixing into mortar and complying with ASTM C979/C979M.
 - 1. Color: X-Series White Cement, 94X as manufactured by Solomon Colors.
 - 2. Application: Use at all ground face masonry units (GFMU).
 - 3. Manufacturers:
 - a. Basis of Design Manufacturer:
 - 1) Solomon Colors; Solomon Colors Concentrated A, H, and X Series: www.solomoncolors.com.
 - b. Other Acceptable Manufacturers:
 - 1) Bonsal American: www.bonsalamerican.com.
 - 2) Davis Colors: www.daviscolors.com.
 - 3) Lambert Corporation: www.lambertusa.com.
 - 4) Substitutions: See Section 01 60 00 - Product Requirements.
- G. Water: Clean and potable.
- H. Bonding Agent: Latex type.

2.03 MORTAR MIXING

- A. Thoroughly mix mortar ingredients using mechanical batch mixer, in accordance with ASTM C270 and in quantities needed for immediate use.
- B. Maintain sand uniformly damp immediately before the mixing process.
- C. Colored Mortar: Proportion selected pigments and other ingredients to match Architect's sample, without exceeding manufacturer's recommended pigment-to-cement ratio; mix in accordance with manufacturer's instructions, uniform in coloration.
- D. Do not use anti-freeze compounds to lower the freezing point of mortar.
- E. If water is lost by evaporation, re-temper only within two hours of mixing.

2.04 GROUT MIXING

- A. Mix grout in accordance with ASTM C94/C94M.
- B. Thoroughly mix grout ingredients in quantities needed for immediate use in accordance with ASTM C476 for fine and coarse grout.
- C. Do not use anti-freeze compounds to lower the freezing point of grout.

PART 3 EXECUTION

3.01 PREPARATION

- A. Apply bonding agent to existing concrete surfaces.
- B. Plug clean-out holes for grouted masonry with block masonry units. Brace masonry to resist wet grout pressure.

3.02 INSTALLATION

- A. Install mortar and grout to requirements of section(s) in which masonry is specified.
- B. Do not install grout in lifts greater than 16 inches without consolidating grout by rodding.

3.03 GROUTING

- A. Perform all grouting by means of low-lift technique. Do not employ high-lift grouting.
- B. Low-Lift Grouting:
 - 1. Limit height of pours to 16 inches.
 - 2. Limit height of masonry to 16 inches above each pour.
 - 3. Pour grout only after vertical reinforcing is in place; place horizontal reinforcing as grout is poured. Prevent displacement of bars as grout is poured.
 - 4. Place grout for each pour continuously and consolidate immediately; do not interrupt pours for more than 1-1/2 hours.

3.04 FIELD QUALITY CONTROL

- A. An independent testing agency will perform field tests, in accordance with provisions of Section 01 40 00 - Quality Requirements.
- B. Test and evaluate mortar in accordance with ASTM C780 procedures.
 - 1. Test with same frequency as specified for masonry units.
- C. Test and evaluate grout in accordance with ASTM C1019 procedures.
 - 1. Test with same frequency as specified for masonry units.
- D. Prism Tests: Test masonry and mortar panels for compressive strength in accordance with ASTM C1314, and for flexural bond strength in accordance with ASTM C1072 or ASTM E518/E518M; perform tests and evaluate results as specified in individual masonry sections.

END OF SECTION

SECTION 04 26 00
SINGLE-WYTHE UNIT MASONRY

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Concrete masonry units.
- B. Decorative ground face masonry units.
- C. Reinforcement, anchorage, and accessories.

1.02 RELATED REQUIREMENTS

- A. Section 03 20 00 - Concrete Reinforcing: Reinforcing steel for grouted masonry.
- B. Section 04 05 11 - Mortar and Masonry Grout: Mortar and grout for single wythe unit masonry.
- C. Section 07 21 19 - Foamed-In-Place Insulation.
- D. Section 07 24 00 - Exterior Insulation and Finish Systems.
- E. Section 06 10 00 - Rough Carpentry: Nailing strips for installation in masonry.
- F. Section 07 62 00 - Sheet Metal Flashing and Trim: Cap flashings over masonry work.
- G. Section 07 84 00 - Firestopping: Firestopping at penetrations of masonry work.
- H. Section 07 90 05 - Joint Sealers: Sealing control and expansion joints.
- I. Section 07 92 00 - Joint Sealants: Sealing control and expansion joints.

1.03 REFERENCE STANDARDS

- A. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware; 2016a.
- B. ASTM A615/A615M - Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement; 2020.
- C. ASTM A641/A641M - Standard Specification for Zinc-Coated (Galvanized) Carbon Steel Wire; 2019.
- D. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2020.
- E. ASTM A951/A951M - Standard Specification for Steel Wire for Masonry Joint Reinforcement; 2016, with Editorial Revision (2018).
- F. ASTM A1064/A1064M - Standard Specification for Carbon-Steel Wire and Welded Wire Reinforcement, Plain and Deformed, for Concrete; 2018a.
- G. ASTM C90 - Standard Specification for Loadbearing Concrete Masonry Units; 2016a.
- H. ASTM C129 - Standard Specification for Nonloadbearing Concrete Masonry Units; 2017.
- I. ASTM C140/C140M - Standard Test Methods for Sampling and Testing Concrete Masonry Units and Related Units; 2020.
- J. ASTM D226/D226M - Standard Specification for Asphalt-Saturated Organic Felt Used in Roofing and Waterproofing; 2017.
- K. BIA Technical Notes No. 7 - Water Penetration Resistance – Design and Detailing; 2017.
- L. TMS 402/602 - Building Code Requirements and Specification for Masonry Structures; 2016.
- M. UL (FRD) - Fire Resistance Directory; Current Edition.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Preinstallation Meeting: Convene one week before starting work of this section.

1.05 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide data for decorative masonry units and fabricated wire reinforcement.

- C. Samples: Submit four samples of decorative block units to illustrate color, texture and extremes of color range.
- D. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.
- E. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
 - 1. See Section 01 60 00 - Product Requirements, for additional provisions.
 - 2. Extra Decorative Ground Face Masonry Units: 5 of each type, size, and color combination.

1.06 QUALITY ASSURANCE

- A. Comply with provisions of TMS 402/602, except where exceeded by requirements of Contract Documents.
- 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 with at least five years of documented experience.

1.07 MOCK-UP

- A. Decorative Ground Face Masonry Units Mock-Up:
 - 1. Construct a masonry wall as a mock-up panel sized 4 feet long by 6 feet high; include mortar and accessories in mock-up.
- B. Locate where directed.
- C. Mock-up may remain as part of the Work.

1.08 DELIVERY, STORAGE, AND HANDLING

- A. Deliver, handle, and store masonry units by means that will prevent mechanical damage and contamination by other materials.
- B. Handle and store decorative ground face masonry units in protective cartons or trays. Do not remove from protective packaging unit ready for installation.

1.09 FIELD CONDITIONS

- A. Cold and Hot Weather Requirements: Comply with requirements of TMS 402/602 or applicable building code, whichever is more stringent.

PART 2 PRODUCTS

2.01 CONCRETE MASONRY UNITS

- A. Concrete Block: Comply with referenced standards and as follows:
 - 1. Size: Standard units with nominal face dimensions of 16 x 8 inches and nominal depths as indicated on drawings for specific locations.
 - 2. Special Shapes: Provide non-standard blocks configured for corners, headers, control joint edges, bond beams, and other detailed conditions.
 - 3. Load-Bearing Units: ASTM C90, normal weight.
 - a. Hollow block.
 - b. Exposed Faces: Manufacturer's standard color and texture.
 - 4. Non-Loadbearing Units: ASTM C129.
 - a. Normal weight.
 - 5. Mortar: Standard gray.

2.02 DECORATIVE GROUND FACE MASONRY UNITS

- A. Concrete Block: Comply with referenced standards and as follows:
 - 1. Size: Standard units with nominal face dimensions of 16 x 8 inches and nominal depths as indicated on drawings for specific locations.
 - 2. Special Shapes: Provide non-standard blocks configured for corners, headers, control joint edges, bond beams, and other detailed conditions.
 - 3. Scoring Pattern: Single vertical score, tuckpoint joint with mortar.
 - 4. Load-Bearing Units: ASTM C90, normal weight.

- a. Hollow block.
 - b. Exposed Faces: Manufacturer's standard color and texture.
- 5. Non-Loadbearing Units: ASTM C129.
 - a. Normal weight.
- 6. Mortar: Mineral pigments added as required to produce approved color sample.
- 7. Manufacturers:
 - a. Basis of Design Manufacturer:
 - 1) Trenwyth Industries; Trendstone Plus:
www.echelonmasonry.com/trendwyth-masonry.
 - b. Other Acceptable Manufacturer:
 - 1) County Materials Corporation; Premier Block Ultra Burnished:
www.countymaterials.com.
 - 2) Substitutions: See Section 01 60 00 - Product Requirements.
- B. Color (GFMU): Trendstone Plus, Midwest White as manufactured by Trenwyth.

2.03 MORTAR AND GROUT MATERIALS

- A. Mortar and Grout: As specified in Section 04 05 11.

2.04 REINFORCEMENT AND ANCHORAGE

- A. Manufacturers:
 - 1. Blok-Lok Limited: www.blok-lok.com.
 - 2. Hohmann & Barnard, Inc: www.h-b.com.
 - 3. WIRE-BOND: www.wirebond.com.
 - 4. Substitutions: See Section 01 60 00 - Product Requirements.
- B. Reinforcing Steel: Type specified in Section 03 20 00; size as indicated on drawings; galvanized finish.
- C. Joint Reinforcement: Use ladder type joint reinforcement where vertical reinforcement is involved and truss type elsewhere, unless otherwise indicated.
- D. Single Wythe Joint Reinforcement: ASTM A951/A951M.
 - 1. Type: Truss.
 - 2. Material: ASTM A1064/A1064M steel wire, hot dip galvanized after fabrication to ASTM A153/A153M, Class B.
 - 3. Size: 0.1483 inch side rods with 0.1483 inch cross rods; width as required to provide not less than 5/8 inch of mortar coverage on each exposure.
- E. Strap Anchors: Bent steel shapes configured as required for specific situations, 1-1/4 in width, 0.105 in thick, lengths as required to provide not more than 1 inch and not less than 1/2 inch of mortar coverage from masonry face, corrugated for embedment in masonry joint, hot dip galvanized to ASTM A153/A153M, Class B.
- F. Flexible Anchors: 2-piece anchors that permit differential movement between masonry and building frame, sized to provide not more than 1 inch and not less than 1/2 inch of mortar coverage from masonry face.
 - 1. Concrete frame: Dovetail anchors of bent steel strap, nominal 1 inch width x 0.024 in thick, with trapezoidal wire ties 0.1875 inch thick, hot dip galvanized to ASTM A153/A153M, Class B.

2.05 ACCESSORIES

- A. Preformed Control Joints: Rubber material. Provide with corner and tee accessories, fused joints.
 - 1. Manufacturers:
 - a. Blok-Lok Limited: www.blok-lok.com.
 - b. Hohmann & Barnard, Inc: www.h-b.com.
 - c. WIRE-BOND: www.wirebond.com.
 - d. Substitutions: See Section 01 60 00 - Product Requirements.

- B. Joint Filler: Closed cell polyvinyl chloride; oversized 50 percent to joint width; self expanding; 1/2 inch wide x by maximum lengths available.
 - 1. Manufacturers:
 - a. Blok-Lok Limited: www.blok-lok.com.
 - b. Hohmann & Barnard, Inc: www.h-b.com.
 - c. WIRE-BOND: www.wirebond.com.
 - d. Substitutions: See Section 01 60 00 - Product Requirements.
- C. Building Paper: ASTM D226/D226M, Type I ("No. 15") asphalt felt.
- D. Cleaning Solution: Non-acidic, not harmful to masonry work or adjacent materials.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that field conditions are acceptable and are ready to receive masonry.
- B. Verify that related items provided under other sections are properly sized and located.
- C. Verify that built-in items are in proper location, and ready for roughing into masonry work.

3.02 PREPARATION

- A. Direct and coordinate placement of metal anchors supplied for installation under other sections.
- B. Provide temporary bracing during installation of masonry work. Maintain in place until building structure provides permanent bracing.

3.03 COURSING

- A. Establish lines, levels, and coursing indicated. Protect from displacement.
- B. Maintain masonry courses to uniform dimension. Form vertical and horizontal joints of uniform thickness.
- C. Concrete Masonry Units:
 - 1. Bond: Running.
 - 2. Coursing: One unit and one mortar joint to equal 8 inches.
 - 3. Mortar Joints: Concave.
- D. Decorative Ground Face Masonry Units:
 - 1. Bond: Running.
 - 2. Coursing: One unit and one mortar joint to equal 8 inches.
 - 3. Mortar Joints: Concave.
 - 4. Scoring Pattern: Single vertical score, tuckpoint joint with mortar.

3.04 PLACING AND BONDING

- A. Lay solid masonry units in full bed of mortar, with full head joints, uniformly jointed with other work.
- B. Lay hollow masonry units with face shell bedding on head and bed joints.
- C. Buttering corners of joints or excessive furrowing of mortar joints is not permitted.
- D. Remove excess mortar as work progresses.
- E. Interlock intersections and external corners.
- F. Do not shift or tap masonry units after mortar has achieved initial set. Where adjustment must be made, remove mortar and replace.
- G. Perform job site cutting of masonry units with proper tools to provide straight, clean, unchipped edges. Prevent broken masonry unit corners or edges.
- H. Cut mortar joints flush where wall tile is scheduled or resilient base is scheduled.
- I. Isolate masonry partitions from vertical structural framing members with a control joint.
- J. Isolate top joint of masonry partitions from horizontal structural framing members and slabs or decks with compressible joint filler.

3.05 REINFORCEMENT AND ANCHORAGE

- A. Install horizontal joint reinforcement 16 inches on center.
- B. Place masonry joint reinforcement in first and second horizontal joints above and below openings. Extend minimum 16 inches each side of opening.
- C. Place continuous joint reinforcement in first and second joint below top of walls.
- D. Lap joint reinforcement ends minimum 6 inches.
- E. Fasten anchors to structural framing and embed in masonry joints as masonry is laid. Space anchors at maximum of 24 inches horizontally and 16 inches vertically.
- F. Install anchors to structural framing at not more than 16 inches on center.

3.06 LINTELS

- A. Install loose steel lintels over openings.
- B. Install reinforced unit masonry lintels over openings where steel or precast concrete lintels are not scheduled.
 - 1. Openings to 42 inches: Place two, No. 3 reinforcing bars 1 inch from bottom web.
 - 2. Do not splice reinforcing bars.
 - 3. Support and secure reinforcing bars from displacement. Maintain position within 1/2 inch of dimensioned position.
 - 4. Place and consolidate grout fill without displacing reinforcing.
 - 5. Allow masonry lintels to attain specified strength before removing temporary supports.
- C. Maintain minimum 8 inch bearing on each side of opening.

3.07 GROUTED COMPONENTS

- A. Reinforce bond beams with 2, No. 3 bars, 1 inch from bottom web.
- B. Lap splices in reinforcing bars by minimum 24 bar diameters.
- C. Support and secure reinforcing bars from displacement. Maintain position within 1/2 inch of dimensioned position.
- D. Place and consolidate grout fill without displacing reinforcing.
- E. At bearing locations, fill masonry cores with grout for a minimum 12 inches either side of opening.

3.08 CONTROL AND EXPANSION JOINTS

- A. Do not continue horizontal joint reinforcement through control or expansion joints.
- B. Install preformed control joint device in continuous lengths. Seal butt and corner joints in accordance with manufacturer's instructions.
- C. Size control joints as indicated on drawings; if not shown, 3/4 inch wide and deep.

3.09 BUILT-IN WORK

- A. As work progresses, install built-in metal door frames and other items to be built into the work and furnished under other sections.
- B. Install built-in items plumb, level, and true to line.
- C. Bed anchors of metal door and glazed frames in adjacent mortar joints. Fill frame voids solid with grout.
 - 1. Fill adjacent masonry cores with grout minimum 12 inches from framed openings.
- D. Do not build into masonry construction organic materials that are subject to deterioration.

3.10 TOLERANCES

- A. Install masonry within the site tolerances found in TMS 402/602.
- B. Maximum Variation from Alignment of Columns: 1/4 inch.
- C. Maximum Variation From Unit to Adjacent Unit: 1/16 inch.

- D. Maximum Variation from Plane of Wall: 1/4 inch in 10 ft and 1/2 inch in 20 ft or more.
- E. Maximum Variation from Plumb: 1/4 inch per story non-cumulative; 1/2 inch in two stories or more.
- F. Maximum Variation from Level Coursing: 1/8 inch in 3 ft and 1/4 inch in 10 ft; 1/2 inch in 30 ft.
- G. Maximum Variation of Joint Thickness: Head joint, minus 1/4 inch, plus 3/8 inch.
- H. Maximum Variation from Cross Sectional Thickness of Walls: 1/4 inch.

3.11 CUTTING AND FITTING

- A. Cut and fit for chases. Coordinate with other sections of work to provide correct size, shape, and location.
- B. Obtain approval prior to cutting or fitting masonry work not indicated or where appearance or strength of masonry work may be impaired.

3.12 FIELD QUALITY CONTROL

- A. An independent testing agency, as specified in Section 01 40 00 - Quality Requirements, will conduct field tests.
- B. Concrete Masonry Unit Tests: Test each variety of concrete unit masonry in accordance with ASTM C140/C140M for compliance with requirements of this specification.

3.13 CLEANING

- A. Remove excess mortar and mortar smears as work progresses.
- B. Replace defective mortar. Match adjacent work.
- C. Clean soiled surfaces with cleaning solution.
- D. Use non-metallic tools in cleaning operations.

3.14 SEALING DECORATIVE GROUND FACE MASONRY UNITS

- A. Provide (2) two coats of manufacturer's recommended acrylic clear sealer to decorative ground faced masonry unit walls after they have been cleaned and accepted by the Architect.
 - 1. Apply sealer coats evenly to cover the entire surface without forming drips or runs.
 - 2. Apply with airless spray equipment only; rolling application will not be acceptable.

3.15 PROTECTION

- A. Without damaging completed work, provide protective boards at exposed external corners that are subject to damage by construction activities.

END OF SECTION

SECTION 05 12 00
STRUCTURAL STEEL FRAMING

GENERAL

1.01 SECTION INCLUDES

- A. Structural steel beams.
- B. Structural steel accessories.
- C. Miscellaneous steel items of structural function and specifically called for under other headings.
- D. Accessory items required for erection of structural steel and for attachment of other materials to steel.

1.02 WORK BY OTHER SECTIONS

- A. Section 05 21 00 - Steel Joist Framing.
- B. Section 05 30 00 - Metal Decking.
- C. Section 05 50 00 - Metal Fabrications.
- D. Section 05 51 00 - Metal Stairs and Handrails.

1.03 QUALITY ASSURANCE

- A. Qualifications of Suppliers and Personnel:
 - 1. Steel fabricator shall have not less than five years continuous experience in fabrication of structural steel.
 - 2. Steel erector shall have not less than five years continuous experience in erection of structural steel.
 - 3. All welding shall be in compliance with "Standard Code for Arc and Gas Welding" of American Welding Society.
 - 4. Testing for qualification of welders shall be performed in accordance with American Welding Society Structural Welding Code, latest edition, for process, position and thickness range that will be required for fabrication and erection of structural steel.
- B. Codes and Standards:
 - 1. In addition to complying with all applicable codes and regulations, comply with recommendations contained in "Specification for Structural Steel Buildings" of the American Institute of Steel Construction.
 - 2. Comply with recommendations of "Code for Welding in Building Construction" AWS D1.0, and Structural Welding Code" AWS D1.1.
 - 3. Comply with recommendations of "Specifications for Architecturally Exposed Steel" or the American Institute of Steel Construction, Manual of Steel Construction latest edition.

1.04 TESTING LABORATORY

- A. Testing of structural metal framing will be performed by a Testing Laboratory as indicated in Section 01 40 00. See Part 3.2 of this Section for testing required.

1.05 SUBMITTALS

- A. Provide completely dimensioned Shop Drawings and erection drawings showing size and arrangement of principal and auxiliary members, types of connections, types of welds, setting and grouting arrangements, and locations and materials utilized.
- B. Provide signed and sealed calculations prepared by an Illinois Licensed Structural Engineer for all connections. Submit calculations with the shop drawings to which they correspond. Shop drawings that are received without the associated calculations shall be returned unreviewed.
- C. Show all shop and erection details including cuts, copes, connections, holes, threaded fasteners, rivets and welds.
- D. Show welds, both shop and field, by currently recommended symbols of the American Welding Society.
- E. Mill Test Reports shall be submitted for steel to be used in fabrication of structure.

- F. Shop Primer: Provide manufacturer's literature.

1.06 CONNECTIONS

- A. Responsibility: Contractor shall be responsible for the design of all connections unless noted otherwise in Drawings.
- B. Design:
 - 1. Work shall be in accordance with AISC's "Manual of Steel Construction, Allowable Stress Design" with connections designed to withstand the following reactions at a minimum:
 - a. For non-composite framing: Select, design and detail all connections to resist one-half of the total allowable uniform load from the "Allowable Loads on Beams" tables in the latest edition of AISCs "Manual of Steel Construction, Allowable Stress Design" for the size and span of the member under consideration.

1.07 PRODUCT DELIVERY, STORAGE AND HANDLING

- A. Deliver materials to the site at such intervals to ensure uninterrupted progress of the work.
- B. Deliver anchorage devices, which are to be embedded in masonry, in ample time to not delay that work.
- C. Store materials to permit easy access for inspection and identification. Keep steel members off the ground, using pallets, platforms, or other supports. Protect steel members and packaged materials from corrosion and deterioration.
- D. Do not store materials on the structure in a manner that might cause distortion or damage to the members or the supporting structures. Repair or replace damaged materials or structures as directed.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Structural Steel:
 - 1. Steel W Shapes shall meet requirements of ASTM A992 ($F_y = 50$ KSI).
 - 2. Steel Channels, Angles, and Plates shall meet requirements of ASTM A-36.
 - 3. Steel pipe shall meet requirements of ASTM A-501, or ASTM A-53, Type E or S, Grade B.
 - 4. Rectangular tubing shall meet requirements of ASTM A-500 Grade B.
- B. Bolts and Nuts:
 - 1. Machine bolts and anchor bolts shall meet requirements of ASTM A-307.
 - 2. High strength bolts shall meet requirements of ASTM A-325 or ASTM A-490.
- C. Primer Paint:
 - 1. Shop prime paint and field touch-up paint shall be manufacturer's standard primer.
 - 2. Anti-Corrosive Paint: Comply with GS-03.
- D. Painting:
 - 1. Shop prime steel except:
 - a. Steel to be encased in concrete.
 - b. Surfaces to be welded.
 - c. Galvanized steel.

2.02 FABRICATION

- A. General:
 - 1. Fabricate structural steel in strict accordance with reviewed Shop Drawings and referenced standards.
 - 2. Steel shall be completely shop fabricated; field work will consist only of erection, unless indicated otherwise on the Drawings.
 - 3. Material shall be clearly marked and match-marked for field assembly. Sequence of shipments shall be such as to expedite and minimize field handling of the material.
 - 4. Fabrication shall be based on field measurements verified by Contractor before fabrication.
- B. Shop Cleaning and Priming:

1. Slag on welds and excess weld splatter shall be removed by chipping or grinding.
 2. Loose mill scale and rust shall be removed by brushing, grit or shot blasting.
 3. Oil and residues which would prevent adherence of paint to steel shall be removed with solvent.
 4. Steel encased in concrete shall be clean of foreign matter, but not painted.
 5. After erection, bolts, welds, shipping and erection damage shall be touched up with primer.
 6. Provide a uniform minimum dry thickness of 1.5 mils of primer paint on structural steel except steel scheduled to receive sprayed-on fireproofing.
- C. Fabrication Welding:
1. Fabrication welding and welding equipment shall comply with codes and standards described in "Codes and Standards" paragraph of this Section.
 2. Joint surfaces shall be tight, flush, in true planes, and free of fins and tears.
 3. Surfaces shall be free of scale, rust, grease, paint and other foreign materials prior to welding.
 4. Welds shall show uniform section, smoothness of weld metal, freedom from porosity and clinkers, and of adequate strength and durability.
 5. Welds not otherwise identified shall be continuous.
 6. Unless specifically called for, no welding of tension members shall be permitted.
 7. Members shall remain free of stretch, warp, or twist as a result of weld.
 8. No welding shall be attempted when base metal temperature is lower than 0° F.

PART 3 EXECUTION

3.01 ERECTION

- A. Temporary Bracing:
1. Furnish and install temporary bracing as required to maintain frame stability during erection and until masonry walls have been erected, roof beams have been installed and deck properly attached.
 2. Contractor shall be responsible for design of bracing for wind loads shown on the Drawings and per applicable codes and for other loads which may occur while the bracing is in place.
- B. Framing:
1. Align and adjust members forming a complete frame or structure before securely fastening by bolting and/or welding.
 2. High strength bolts used in conjunction with welded joints at moment connections must be tightened to specification requirements prior to welding of joints.
 3. Connections not noted for welding shall be bolted.
 4. Bolt holes shall be drilled or punched, not burned.
 5. Light drifting necessary to draw holes together will be permitted. Drifting to match misaligned holes will be prohibited.
 6. Anchorage to concrete, unless otherwise detailed, shall be with bolts and expansion anchors. Anchors shall be "Wej-it" by WEJ-IT Expansion Products or "Red Head" by Phillips Drill Company.
 7. Temporary Shoring and Bracing: Provide temporary shoring and bracing members with connections of sufficient strength to bear imposed loads. Remove temporary members and connections when permanent members are in place and final connections are made. Provide temporary guy lines to achieve proper alignments of the structures as erection proceeds.
- C. Welding:
1. A sequence of welding of moment joints shall be established to minimize distortion and stress of structure due to weld metal shrinkage.
 2. Welding slag, excessive weld splatter, rust and burned paint shall be removed from weld upon completion of welding of each joint.
 3. Temporary erection bracing which was welded to the structure for erection purposes shall be removed when structure is complete. Resulting burrs shall be removed by grinding.

- D. Field Painting:
 - 1. Structural steel shall be touched up with rust inhibitive primer paint to match shop coat where necessary to correct damage caused by shipping, erection or welding.

3.02 TESTING AND INSPECTION

- A. Fabricated Inspection and Testing:
 - 1. Visual Inspection and Testing:
 - a. Welds shall be subjected to a thorough visual inspection by a representative of an independent testing laboratory, for the purpose of determining compliance with the Specifications and reviewed Shop Drawings.
 - b. Welds found to be defective due to improper size, length, or profile, or to contain defects prohibited by the referenced code, are to be repaired by the fabricator to meet Specification and reviewed Shop Drawing requirements.
 - 2. Non-destructive Testing of Welds:
 - a. 25% of the designated full penetration welds shall be selected at random and subjected to radiograph testing by testing laboratory.
 - b. The technique for radiograph testing and interpretation of the results of the testing shall be in accordance with the applicable sections of the American Welding Society Structural Welding Code.
 - c. Defect levels above those allowed by the referenced code will be cause for additional radiograph testing of the full penetration welds.
 - d. Welds which are found to contain defects greater than the tolerances allowed by the referenced code shall be repaired by the fabricator.
 - e. Welds which have been repaired shall be re-tested by the original testing method with this Section assuming all costs involved with re-testing.
 - 3. Verification of Dimensions:
 - a. Members and components to members will be checked by a representative of an independent testing laboratory for proper dimensioning as detailed on the reviewed Shop Drawings.
 - b. Errors discovered during inspection shall be corrected by the fabricator to bring the member or component into compliance with the reviewed Shop Drawings and Specification requirements.
- B. Erection Inspection and Testing:
 - 1. Visual Inspection of Welds:
 - a. Field welding as indicated on the reviewed Shop Drawings shall be inspected visually for conformance to the Contract Documents by a representative of an independent testing laboratory.
 - b. Welds found to be non-conforming to the Contract Documents requirements shall be repaired.
 - c. Repairs made to the defective welds will be subjected to re-inspection by the original method used. Re-inspection costs shall be paid by this Section.
 - 2. Non-destructive Testing of Welds:
 - a. 25% of the field welded joints will be tested non-destructively by a representative of an independent testing laboratory.
 - b. The method of non-destructive testing employed in testing of the field welded joints will be any of the methods allowed by the Specifications, consideration being given to access to the joints, clearance around the joint and joint configuration.
 - c. Defects found in the welds by non-destructive testing methods, which do not meet Specification requirements, shall be repaired to bring the weld into conformance with the Specification requirements.
 - d. Re-testing of the defective welds which have been repaired will be by the original non-destructive testing method employed with costs of re-testing to be paid by this Section.
 - 3. Inspection of High Strength Bolted Connections:

- a. 10% of the bolts in each connection with a minimum of two bolts per connection will be tested for compliance with Specification tension requirements.
 - b. Testing of the bolts will be by the torque control method, utilizing a calibrated torque wrench.
 - c. Loose bolts in a connection or bolts encountered which do not meet Specification tension requirements by testing, will be cause for rejection of the connection.
 - d. Bolts will be inspected for proper grip length as indicated on the reviewed Shop Drawings; improper grip length shall be cause for rejection.
 - e. Re-use of high strength bolts which have been tightened previously, or use of bolts which have suffered thread damage, shall not be permitted.
 - f. Correction of hole misalignment by burning or cutting with a torch will not be permitted; correction of misalignment of bolt holes shall be by reaming.
 - g. Over-sizing of the bolt holes or elongation of the bolt holes by reaming, beyond the tolerance allowed by the Specification requirements, shall require using the next larger diameter high strength bolt in the hole.
 - h. Tightening of the high strength bolted connections shall be such that contact surfaces are tight.
 - i. Re-tightening of high strength bolted connections which do not meet Specification requirements shall be performed in such a manner as to be non-injurious to the bolts or connections.
4. Access:
- a. Access shall be permitted to the fabricating shop or the project site for the Owner, Architect or authorized representative of an independent testing laboratory representing their interest for the purpose of inspection or testing of the materials or fabricated items at all times work is being performed on the project or Contract.
5. Responsibility Prior to Final Acceptance:
- a. Comply with the Contract Documents and reviewed Shop Drawings for the fabrication and erection of members, components and items to be incorporated into the final structure.
 - b. The Architect retains the right to reject materials, components or fabricated items prior to final acceptance of the completed portion of the Contract, which do not meet the project Specification and reviewed Shop Drawings or do not meet testing requirements.
 - c. Initial inspection and testing fees incurred will be the Owner's responsibility, for the limits established in Section 01 40 00. Re-inspection and re-testing fees shall be the responsibility of the Contractor.

END OF SECTION

SECTION 05 21 00
STEEL JOIST FRAMING

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. LH-series steel joists.

1.02 WORK BY OTHER SECTIONS

- A. Section 05 12 00 - Structural Steel Framing.
- B. Section 05 30 00 - Metal Decking.
- C. Section 05 50 00 - Metal Fabrications.

1.03 QUALITY ASSURANCE

- A. Qualifications of Suppliers and Personnel:
 - 1. Manufacturer Qualifications: A manufacturer certified by SJI to manufacture joists complying with applicable standard specifications and load tables of SJI "Specifications." MCRC Building and Site
 - a. Manufacturer's responsibilities include providing professional engineering services for designing special joists to comply with performance requirements.
 - 2. SJI Specifications: Comply with standard specifications in SJI's "Specifications" that are applicable to types of joists indicated.
 - 3. Welding: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."
 - 4. Steel joist erector shall have not less than five years continuous experience in erection of structural steel.
- B. Codes and Standards:
 - 1. In addition to complying with all applicable codes and regulations, comply with recommendations contained in "Specification for Structural Steel Buildings" of the American Institute of Steel Construction.
 - 2. Comply with recommendations of "Code for Welding in Building Construction" AWS D1.0, and Structural Welding Code" AWS D1.1.
 - 3. Comply with the requirements and recommendations of ASTM Standards: A36 - Carbon Structural Steel.
 - 4. Comply with the requirements and recommendations of SJI - Steel Joist Institute: Standard Specifications, Load Tables & Weight Tables for Steel Joists & Joist Girders.
 - 5. Comply with the recommendations of UL Fire Resistance Directory.

1.04 DEFINITIONS

- A. SJI "Specifications": Steel Joist Institute's "Standard Specifications, Load Tables and Weight Tables for Steel Joists and Joist Girders."
- B. Special Joists: Steel joists or joist girders requiring modification by manufacturer to support non-uniform, unequal, or special loading conditions that invalidate load tables in SJI's "Specifications."

1.05 PERFORMANCE REQUIREMENTS

- A. Structural Performance: Provide special joists and connections capable of withstanding design loads indicated.
- B. Design special joists to withstand design loads with live load deflections no greater than the following:
 - 1. Roof Joists: Vertical deflection due to live load of 1/360 of the span.

1.06 TESTING LABORATORY

- A. Testing of structural metal framing will be performed by a Testing Laboratory as indicated in Section 01 40 00. See Part 3.2 this Section for testing required.

1.07 SUBMITTALS

- A. Product Data: For each type of joist, accessory, and product indicated.
- B. Shop Drawings: Show layout, designation, number, type, location, and spacings of joists. Include joining and anchorage details, bracing, bridging, joist accessories; splice and connection locations and details; and attachments to other construction.
 - 1. Indicate locations and details of bearing plates to be embedded in other construction.
 - 2. Comprehensive engineering analysis of special joists signed and sealed by the qualified Illinois Licensed Structural Engineer responsible for its preparation. Shop drawings that are received without the associated calculations shall be returned unreviewed.
- C. Welding certificates.
- D. Manufacturer Certificates: Signed by manufacturers certifying that joists comply with requirements.
- E. Mill Certificates: Signed by bolt manufacturers certifying that bolts comply with requirements.
- F. Qualification Data: For manufacturer.
- G. Field quality-control test and inspection reports.
- H. Research/Evaluation Reports: For joists.
- I. Show all shop and erection details including cuts, copes, connections, holes, threaded fasteners, rivets and welds.
- J. Show welds, both shop and field, by currently recommended symbols of the American Welding Society.
- K. Submit in advance of other drawings, anchor bolt and setting plate layouts, and other miscellaneous steel to be embedded in concrete.
- L. Shop Primer: Provide manufacturer's literature.

1.08 PRODUCT DELIVERY, STORAGE AND HANDLING

- A. Deliver, store, and handle joists as recommended in SJI's "Specifications."
- B. Deliver materials to the site at such intervals to ensure uninterrupted progress of the work.
- C. Deliver anchor bolts, bearing plates, and anchorage devices, which are to be embedded in cast-in-place concrete or masonry, in ample time to not delay that work.
- D. Store materials to permit easy access for inspection and identification. Keep steel members off the ground, using pallets, platforms, or other supports. Protect steel members and packaged materials from corrosion and deterioration.
- E. Do not store materials on the structure in a manner that might cause corrosion, distortion or damage to the members or the supporting structures. Repair or replace damaged materials or structures as directed.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Steel: Comply with SJI's "Specifications" for web and steel-angle chord members.
- B. Steel Bearing Plates: ASTM A 36.
- C. Welding Electrodes: Comply with AWS standards.

2.02 PRIMER PAINT

- A. Primer: SSPC-Paint 15, or manufacturer's standard shop primer complying with performance requirements in SSPC-Paint 15.
- B. Toxicity: Solvent coating systems are not permitted. Electroplated coating systems are not permitted.

2.03 LH-SERIES STEEL JOISTS

- A. Manufacture steel joists of type indicated according to "Standard Specifications for Open Web Steel Joists, LH-Series" in SJI's "Specifications," with steel-angle top- and bottom-chord members, underslung ends, and parallel top chord.
 - 1. Joist Type: LH-series steel joists.
- B. Comply with AWS requirements and procedures for shop welding, appearance, quality of welds, and methods used in correcting welding work.
- C. Provide holes in chord members for connecting and securing other construction to joists.
- D. Top-Chord Extensions: Extend top chords of joists with SJI's Type S top-chord extensions where indicated, complying with SJI's "Specifications."
- E. Extended Ends: Extend bearing ends of joists with SJI's Type R extended ends where indicated, complying with SJI's "Specifications."
- F. Camber joists according to SJI's "Specifications".
- G. Equip bearing ends of joists with manufacturer's standard beveled ends or sloped shoes if joist slope exceeds 1/4 inch per 12 inches (1:48).

2.04 JOIST ACCESSORIES

- A. Bridging: Provide bridging anchors and number of rows of horizontal or diagonal bridging of material, size, and type required by SJI's "Specifications" for type of joist, chord size, spacing, and span. Furnish additional erection bridging if required for stability.
- B. Steel bearing plates with integral anchorages are specified in Division 05 Section "Metal Fabrications."
- C. Supply miscellaneous accessories, including splice plates and bolts required by joist manufacturer to complete joist installation.

2.05 SHOP CLEANING AND PRIMING

- A. Clean and remove loose scale, heavy rust, and other foreign materials from fabricated joists and accessories by power-tool cleaning, SSPC-SP 3.
- B. Apply 1 coat of shop primer to joists and joist accessories to be primed to provide a continuous, dry paint film not less than 1 mil (0.025 mm) thick.

PART 3 EXECUTION

3.01 EXAMINATION

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

3.02 ERECTION

- A. Do not install joists until supporting construction is in place and secured.
- B. Install joists and accessories plumb, square, and true to line; securely fasten to supporting construction according to SJI's "Specifications," joist manufacturer's written recommendations, and requirements in this Section.
 - 1. Before installation, splice joists delivered to Project site in more than one piece.
 - 2. Space, adjust, and align joists accurately in location before permanently fastening.
 - 3. Install temporary bracing and erection bridging, connections, and anchors to ensure that joists are stabilized during construction.
 - a. Furnish and install temporary bracing as required to maintain frame stability during erection.
 - b. Contractor shall be responsible for design of bracing for wind loads shown on the Drawings and per applicable codes and for other loads which may occur while the bracing is in place.

- C. Field weld joists to supporting steel bearing plates. Coordinate welding sequence and procedure with placement of joists. Comply with AWS requirements and procedures for welding, appearance and quality of welds, and methods used in correcting welding work. MCRC Building and Site
- D. Install and connect bridging concurrently with joist erection, before construction loads are applied. Anchor ends of bridging lines at top and bottom chords if terminating at walls or beams.

3.03 TESTING AND INSPECTION

- A. Fabricated Inspection and Testing:
 - 1. Visual Inspection and Testing:
 - a. Welds shall be subjected to a thorough visual inspection by a representative of an independent testing laboratory, for the purpose of determining compliance with the Specifications and reviewed Shop Drawings.
 - b. Field welds will be visually inspected according to AWS D1.1/D1.1M.
 - c. Welds found to be defective due to improper size, length, or profile, or to contain defects prohibited by the referenced code, are to be repaired by the fabricator to meet Specification and reviewed Shop Drawing requirements.
 - d. Additional testing will be performed to determine compliance of corrected Work with specified requirements.
 - 2. Non-destructive Testing of Welds:
 - a. 25% of the designated full penetration welds shall be selected at random and subjected to radiograph testing by testing laboratory.
 - b. The technique for radiograph testing and interpretation of the results of the testing shall be in accordance with the applicable sections of the American Welding Society Structural Welding Code.
 - c. Defect levels above those allowed by the referenced code will be cause for additional radiograph testing of the full penetration welds.
 - d. Welds which are found to contain defects greater than the tolerances allowed by the referenced code shall be repaired by the fabricator.
 - e. Welds which have been repaired shall be re-tested by the original testing method with this Section assuming all costs involved with re-testing.
 - 3. Verification of Dimensions:
 - a. Members and components to members will be checked by a representative of an independent testing laboratory for proper dimensioning as detailed on the reviewed Shop Drawings.
 - b. Errors discovered during inspection shall be corrected by the fabricator to bring the member or component into compliance with the reviewed Shop Drawings and Specification requirements.
- B. Erection Inspection and Testing:
 - 1. Visual Inspection of Welds:
 - a. Field welding as indicated on the reviewed Shop Drawings shall be inspected visually for conformance to the Contract Documents by a representative of an independent testing laboratory.
 - b. Welds found to be non-conforming to the Contract Documents requirements shall be repaired.
 - c. Repairs made to the defective welds will be subjected to re-inspection by the original method used. Re-inspection costs shall be paid by this Section.
 - 2. Non-destructive Testing of Welds:
 - a. 25% of the field welded joints will be tested non-destructively by a representative of an independent testing laboratory.
 - b. The method of non-destructive testing employed in testing of the field welded joints will be any of the methods allowed by the Specifications, consideration being given to access to the joints, clearance around the joint and joint configuration.

- c. Defects found in the welds by non-destructive testing methods, which do not meet Specification requirements, shall be repaired to bring the weld into conformance with the Specification requirements.
 - d. Re-testing of the defective welds which have been repaired will be by the original non-destructive testing method employed with costs of re-testing to be paid by this Section.
- 3. Access:
 - a. Access shall be permitted to the fabricating shop or the project site for the Owner, Architect or authorized representative of an independent testing laboratory representing their interest for the purpose of inspection or testing of the materials or fabricated items at all times work is being performed on the project or Contract.
- 4. Responsibility Prior to Final Acceptance:
 - a. Comply with the Contract Documents and reviewed Shop Drawings for the fabrication and erection of members, components and items to be incorporated into the final structure.
 - b. The Architect retains the right to reject materials, components or fabricated items prior to final acceptance of the completed portion of the Contract, which do not meet the project Specification and reviewed Shop Drawings or do not meet testing requirements.
 - c. Initial inspection and testing fees incurred will be the Owner's responsibility, for the limits established in Section 014529. Re-inspection and re-testing fees shall be the responsibility of the Contractor.

3.04 REPAIRS AND PROTECTION

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

END OF SECTION

SECTION 05 30 00
STEEL DECKING

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Metal roof decking.

1.02 RELATED REQUIREMENTS

- A. Section 05 12 00 - Struction Steel Framing.
- B. Section 05 21 00 - Steek Joist Framing.
- C. Section 05 50 00 - Metal Fabrications.

1.03 SUBMITTALS

- A. Provide completely dimensioned Shop Drawings and erection drawings showing size, shape, gage, location, finish and type of panels, methods and sequence of erection, and miscellaneous plates and closures, detailed as required with attachment pattern.

1.04 QUALITY ASSURANCE

- A. Qualifications of Suppliers and Personnel:
 - 1. Metal decking fabricator shall have not less than five years continuous experience in fabrication of metal decking.
 - 2. Welding shall be in compliance with "Standard Code for Arc and Gas Welding" of the AMERICAN WELDING SOCIETY.
 - 3. Testing for qualification of welders shall be performed in accordance with AMERICAN WELDING SOCIETY "Structural Welding Code", latest edition.
- B. Codes and Standards: Conform to recommendations of AISI "Specifications for the Design of Cold-Formed Steel Structural Members", SDI "Specifications and Commentaries for Non-Composite Steel Form Deck", and SDI "Specifications and Commentary for Steel Roof Deck".

1.05 DELIVERY, STORAGE AND HANDLING

- A. Deliver, store and handle the metal decking in such a manner as to avoid damage. When so ascertained, damaged sheets or related decking materials shall be immediately removed from the job site. Store sheets and related decking materials so that they are not in contact with the ground, and so that they are properly supported, covered and kept dry.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Metal Decking:
 - 1. Metal Roof Deck: Fabricate panels, without top flange stiffening grooves, to comply with "SDI Specifications and Commentary for Steel Roof Deck," in SDI Publication No. 31, and with the following:
 - a. Galvanized Steel Sheet: ASTM A653, Structural Steel (SS), Grade 33, G60 Zinc Coating.
 - b. Deck Profile: Type B, wide rib.
 - c. Profile Depth: 1 ½ inches.
 - d. Design Uncoated-Steel Thickness: 0.0358 inch for 20 GA Material.
 - e. Span Condition: Triple span or more.
- B. Accessories:
 - 1. General: Provide manufacturer's standard accessory materials for deck that comply with requirements indicated.
 - 2. Side-Lap Fasteners: Corrosion-resistant, hexagonal washer head; self-drilling, carbon-steel screws, No. 10 minimum diameter.

3. Miscellaneous Sheet Steel Metal Deck Accessories: Steel sheet, minimum yield strength of 33 ksi, not less than 0.0358 inch design uncoated thickness, of same material and finish as deck; of profile indicated or required for application.
4. Recessed Sump Pans: Single-piece steel sheet, 0.0747 inch (1.90 mm) thick, of same material and finish as deck, with 3-inch- (76-mm-) wide flanges and level recessed pans of 1-1/2-inch (38-mm) minimum depth. For drains, cut holes in the field.
5. Galvanizing Repair Paint: ASTM A780.

2.02 FABRICATION

- A. General:
 1. Fabricate metal decking in strict accordance with reviewed Shop Drawings and referenced standards.

PART 3 EXECUTION

3.01 ERECTION

- A. Install metal decking and accessories in accordance with applicable specifications and commentary in SDI Publication No. 31, with manufacturer's recommendations and with Shop Drawings.
- B. Locate deck bundles to prevent overloading of supporting members.
- C. 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.
- D. Place deck panels flat and square and fasten to supporting frame without warp or deflection.
- E. Cut and neatly fit deck panels and accessories around openings and other work projecting through or adjacent to deck.
- F. Provide additional reinforcement and closure pieces at openings as required for strength, continuity of deck, and support of other work.
- G. Comply with AWS requirements and procedures for manual shielded metal arc welding, appearance and quality of welds, and methods used for correcting welding work.

3.02 ROOF DECK INSTALLATION

- A. Welding:
 1. Roof deck shall be attached per Structural Drawings.
 2. Plug weld at end laps should go through both sheets.
 3. Side laps shall be #10 hex head screws as noted on Drawings between supports. (36" maximum).
 4. At completion of welding, touch-up welds on top surface.
- B. Install molded polystyrene closers on inside face of perimeter walls and at both faces of interior partitions running perpendicular to decking span. Closure to be set flush with wall face below, eliminating any ledge or pocket. Closure to be compressed in place.
- C. Install metal closures in decking flutes on exterior in all cases where decking passes over a support or other construction. Set closures flush with construction below, eliminating any ledge or pocket.
- D. End Bearing: Install deck ends over supporting members with a minimum end bearing of 1 ½ inches.
 1. End Joints: Lapped 2" minimum.
- E. Field Cutting:
 1. Fitting of metal decking for openings shall be done in a workmanlike manner by power shears, gas torch, cold chisel or other approved means. Openings cut in metal decking for pipe sleeves, ducts, conduits, etc., shall be by respective trades.
 2. No opening exceeding 12" in width parallel to permanent support except as shown in Drawings and/or reviewed by Architect.

- F. Field Painting:
 - 1. Metal decking and accessories shall be touched up with galvanizing repair paint according to ASTM A780 where necessary to correct damage caused by shipping, handling, erection and welding.

3.03 FIELD QUALITY CONTROL

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

END OF SECTION

SECTION 05 50 00
METAL FABRICATIONS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Angles and lintels.
- B. Miscellaneous framing and supports.
- C. Steel shapes and plates for masonry support.
- D. Steel bollards.

1.02 RELATED REQUIREMENTS

- A. Section 03 30 00 - Cast-in-Place Concrete: Placement of metal fabrications in concrete.
- B. Section 04 26 00 - Single-Wythe Unit Masonry: Placement of metal fabrications in masonry.
- C. Section 05 12 00 - Structural Steel Framing: Structural steel column anchor bolts.
- D. Section 05 21 00 - Steel Joist Framing: Structural joist bearing plates, including anchorage.
- E. Section 05 31 00 - Steel Decking: Bearing plates for metal deck bearing, including anchorage.
- F. Section 05 51 00 - Metal Stairs and Handrails.
- G. Section 07 72 00 - Roof Accessories: Manufactured interior roof access ladder.
- H. Section 09 91 23 - Interior Painting: Paint finish.
- I. Section 09 96 00 - High-Performance Coatings: Paint finish of exterior steel.

1.03 REFERENCE STANDARDS

- A. ASTM A36/A36M - Standard Specification for Carbon Structural Steel; 2014.
- B. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products; 2017.
- C. ASTM A283/A283M - Standard Specification for Low and Intermediate Tensile Strength Carbon Steel Plates; 2018.
- D. ASTM A307 - Standard Specification for Carbon Steel Bolts, Studs, and Threaded Rod 60 000 PSI Tensile Strength; 2014, with Editorial Revision (2017).
- E. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2020.
- F. 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; 2018a.
- G. ASTM F3125/F3125M - Standard Specification for High Strength Structural Bolts and Assemblies, Steel and Alloy Steel, Heat Treated, Inch Dimensions 120 ksi and 150 ksi Minimum Tensile Strength, and Metric Dimensions 830 MPa and 1040 MPa Minimum Tensile Strength; 2019.
- H. AWS A2.4 - Standard Symbols for Welding, Brazing, and Nondestructive Examination; 2012.
- I. AWS D1.1/D1.1M - Structural Welding Code - Steel; 2015, with Errata (2016).
- J. AWS D1.2/D1.2M - Structural Welding Code - Aluminum; 2014, with Errata.
- K. IAS AC172 - Accreditation Criteria for Fabricator Inspection Programs for Structural Steel; 2018.
- L. SSPC-Paint 15 - Steel Joist Shop Primer/Metal Building Primer; 1999 (Ed. 2004).
- M. SSPC-Paint 20 - Zinc-Rich Primers (Type I, "Inorganic," and Type II, "Organic"); 2002 (Ed. 2004).
- N. SSPC-SP 2 - Hand Tool Cleaning; 2018.

1.04 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Shop Drawings: Indicate profiles, sizes, connection attachments, reinforcing, anchorage, size and type of fasteners, and accessories. Include erection drawings, elevations, and details where applicable.
 - 1. Indicate welded connections using standard AWS A2.4 welding symbols. Indicate net weld lengths.
 - 2. Design data: Submit drawings and supporting calculations, signed and sealed by a qualified professional structural engineer.
 - a. Include the following, as applicable:
 - 1) Design criteria.
 - 2) Engineering analysis depicting stresses and deflections.
 - 3) Member sizes and gauges.
 - 4) Details of connections.
 - 5) Support reactions.
 - 6) Bracing requirements.
- C. Welders' Certificates: Submit certification for welders employed on the project, verifying AWS qualification within the previous 12 months.
- D. Fabricator's Qualification Statement: Provide documentation showing steel fabricator is accredited under IAS AC172.

1.05 QUALITY ASSURANCE

- A. Design structural metal fabrications 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. Qualification of Welders:
 - 1. Use only certified welders and shielded arc process for welding performed in connection with work of this Section.
- C. Fabricator Qualifications: A qualified steel fabricator that is accredited by IAS AC172.
- D. Codes and Standards:
 - 1. Comply with pertinent codes and regulations during installation of miscellaneous metal fabrications.
 - 2. Comply with recommendations of "Specification for Structural Steel Buildings" of American Institute of Steel Construction.
 - 3. Comply with recommendations of "Code of Welding in Building Construction of American Welding Society".

1.06 TESTING LABORATORY

- A. Testing of structural metal framing will be performed by a Testing Laboratory as indicated in Section 014529.
- B. Erection Inspection and Testing:
 - 1. Visual inspection of welds.
 - a. Field welding as indicated on the reviewed Shop Drawings shall be inspected visually for conformance to the Contract Documents by a representative of an independent testing laboratory.
 - b. Welds found to be non-conforming to the Contract Document requirements shall be repaired.
 - c. Repairs made to the defective welds will be subjected to re-inspection by the original method used. Re-inspection costs shall be paid by this Section.

1.07 PRODUCT DELIVERY, STORAGE AND HANDLING

- A. Deliver items in a sequence as required to be incorporated into the work without delaying the project.

- B. Store and handle in a manner to avoid damage and contact with deleterious elements.
- C. Deliver materials to the site at such intervals to ensure uninterrupted progress of the work.
- D. Deliver anchor bolts and anchorage devices, which are to be embedded in cast-in-place concrete or masonry, in ample time to not delay that work.
- E. Store materials to permit easy access for inspection and identification. Keep steel members off the ground, using pallets, platforms, or other supports. Protect steel members and packaged materials from corrosion and deterioration.
- F. Do not store materials on the structure in a manner that might cause distortion or damage to the members or the supporting structures. Repair or replace damaged materials or structures as directed.

PART 2 PRODUCTS

2.01 MATERIALS - STEEL

- A. Steel tubing shall be new, free from rust and conform with requirements of ASTM A-500, Grade B.
- B. Steel Channels, Plates and Angles shall be new, free from rust and conform with requirements of ASTM A-36.
- C. Steel W Shapes shall be new, free from rust, and conform to requirements of ASTM A992 (Fy = 50 KSI).
- D. Bolts and nuts shall be new, free from rust and conform to requirements of ASTM A-325 or ASTM A-490.
- E. Primer: Federal Specification TT-P-31, fabricator's standard for shop application and field touch-up.
- F. Touch-up primer for galvanized surfaces: Federal Specification TT-P-641.
- G. Angles and Lintels:
 - 1. Provide loose angles to accommodate items embedded in or passing through masonry walls for work of all trades and contracts.
 - 2. Lintels will typically be 12" longer than opening.
 - a. Variation to above will require structural lintel reviewed by Architect.
 - 3. All angles and lintels in exterior walls shall be hot dipped galvanized with a minimum G-60 coating minimum.
- H. Miscellaneous Framing and Supports:
 - 1. Provide miscellaneous steel framing and supports which are not a part of structural steel framework.
 - 2. Fabricate miscellaneous units from structural steel shapes, plates and steel bars of welded construction using mitered joints for field connection. Cut, drill and tap units to receive hardware and similar items.
 - 3. Equip units with integrally welded anchors for casting into concrete or building into masonry. Furnish inserts if units must be installed after concrete is in place.
 - 4. Space anchors 24" on center and provide minimum anchor units of 1-1/4" x 1/4" x 8" steel straps.
 - 5. Galvanize miscellaneous frames and supports exposed to the exterior and units cast into the structure.
 - 6. Interior miscellaneous frames and supports shall be prime painted unless indicated otherwise.
- I. Structural Support Rods and Brackets:
 - 1. Provide structural supports rods to support lighting elements as per Drawings.
 - 2. Provide steel anchors and brackets as required and shown on Drawings.
- J. Rectangular tubing shall be new, free from rust, and conform with requirements of ASTM A-500 Grade B.

- K. Bolts and nuts shall be new, free from rust and conform with requirements of ASTM A-307.
- L. Cast iron shall be new, free from rust, suitable for intended use and conform to ASTM A-48.
- M. Primer: Federal Specification TT-P-31, fabricator's standard for shop application and field touch-up.
- N. Touch-up Primer for Galvanized Surfaces: Federal Specification TT-P-641.

2.02 MATERIALS - STEEL

- A. Steel Sections: ASTM A36/A36M.
- B. Shop and Touch-Up Primer: SSPC-Paint 15, complying with VOC limitations of authorities having jurisdiction.
- C. Touch-Up Primer for Galvanized Surfaces: SSPC-Paint 20, Type I - Inorganic, complying with VOC limitations of authorities having jurisdiction.

2.03 FABRICATION

- A. Verify dimensions on site prior to shop fabrication.
- B. Fabricate metal fabrications in strict accordance with Shop Drawings and referenced standards.
- C. Where possible, prefabricate items complete and ready for installation.
- D. Fabricate items with joints tightly fitted and secured.
- E. Fit and shop assemble in largest practical sections, for delivery to site.
- F. Grind exposed welds flush and smooth with adjacent finished surface. Ease exposed edges to small uniform radius.
- G. Exposed Mechanical Fastenings: Flush countersink screws or bolts; unobtrusively located; consistent with design of structure, except where specifically noted otherwise.
- H. Make exposed joints butt tight, flush, and hairline.
- I. Supply components required for anchorage of metal fabrications. Fabricate anchorage and related components of same material and finish as metal fabrication, except where specifically noted otherwise.
- J. Welding:
 - 1. Weld shop connections.
 - 2. Make joints and intersections of metal tightly fitting and securely fastened.
 - 3. Make work square, plumb, straight and true.
- K. Holes:
 - 1. Drill or punch holes required for attachment of work of other trades and for bolted connections.
 - 2. Burned holes will not be accepted.

2.04 FABRICATED ITEMS

- A. Bollards: Steel pipe, concrete filled, crowned cap, as detailed
 - 1. Finish: Galvanized.
- B. Ledge Angles, Shelf Angles, Channels, and Plates Not Attached to Structural Framing: For support of metal decking, joists, and masonry; prime paint finish.
- C. Lintels: As detailed.
 - 1. Finish for Interior Lintels: Prime paint finish.
 - 2. Finish for Exterior Lintels: Galvanized.
- D. Metal Framing System:
 - 1. Basic channels shall be fabricated of 0.105" thick steel 1-5/8" x 1-5/8".
 - 2. Channels shall have baked acrylic finish which will withstand 400 hours salt spray when tested per ASTM B-117.
 - 3. Parts, screws and nuts shall be electro-galvanized to commercial standards.
 - 4. Channels shall be supported at 4'-0" on center maximum.

5. Vertical supports shall be capable of each supporting 1200 pound tensile stress.
6. Approved Manufacturers:
 - a. Power-strut; Product "PS-200": www.powerstrut.com.
 - b. Unistrut Building Systems; Product "P1000": www.unistrut.com.
 - c. Substitutions: See Section 01 60 00 - Product Requirements.

2.05 FINISHES - STEEL

- A. Prepare surfaces to be primed in accordance with SSPC-SP2.
- B. Clean surfaces of rust, scale, grease, and foreign matter prior to finishing.
- C. Prime Painting: One coat.
- D. Galvanizing of Structural Steel Members: Galvanize after fabrication to ASTM A123/A123M requirements. Provide minimum 1.7 oz/sq ft galvanized coating.
- E. Galvanizing of Non-structural Items: Galvanize after fabrication to ASTM A123/A123M requirements.

2.06 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 SHOP PAINTING

- A. Preparation:
 1. Thoroughly clean metal of mill scale, rust and foreign matter.
- B. Painting:
 1. Shop prime steel except:
 - a. Steel to be encased in concrete.
 - b. Surfaces to be welded.
 - c. Galvanized steel.
 - d. Steel to be spray-on fireproofed.

3.04 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.

END OF SECTION

SECTION 05 51 00
METAL STAIRS AND HANDRAILS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Stairs with concrete treads.
- B. Structural steel stair framing and supports.
- C. Handrails and guards.

1.02 RELATED REQUIREMENTS

- A. Section 03 30 00 - Cast-in-Place Concrete: Concrete fill in stair pans; mesh reinforcement for landings.
- B. Section 03 30 00 - Cast-in-Place Concrete: Placement of metal anchors in concrete.
- C. Section 04 26 00 - Single-Wythe Unit Masonry: Placement of metal fabrications in masonry.
- D. Section 05 12 00 - Structural Steel Framing.
- E. Section 05 50 00 - Metal Fabrications.

1.03 REFERENCE STANDARDS

- A. AISC 201 - AISC Certification Program for Structural Steel Fabricators, Standard for Steel Building Structures; 2006.
- B. ASTM A36/A36M - Standard Specification for Carbon Structural Steel; 2014.
- C. ASTM A53/A53M - Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless; 2018.
- D. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products; 2017.
- E. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware; 2016a.
- F. ASTM A307 - Standard Specification for Carbon Steel Bolts, Studs, and Threaded Rod 60 000 PSI Tensile Strength; 2014, with Editorial Revision (2017).
- G. ASTM A500/A500M - Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes; 2020.
- H. ASTM A501/A501M - Standard Specification for Hot-Formed Welded and Seamless Carbon Steel Structural Tubing; 2014.
- I. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2020.
- J. ASTM A1008/A1008M - Standard Specification for Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, Solution Hardened, and Bake Hardenable; 2018.
- K. 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; 2018a.
- L. ASTM F3125/F3125M - Standard Specification for High Strength Structural Bolts and Assemblies, Steel and Alloy Steel, Heat Treated, Inch Dimensions 120 ksi and 150 ksi Minimum Tensile Strength, and Metric Dimensions 830 MPa and 1040 MPa Minimum Tensile Strength; 2019.
- M. AWS A2.4 - Standard Symbols for Welding, Brazing, and Nondestructive Examination; 2012.
- N. AWS D1.1/D1.1M - Structural Welding Code - Steel; 2015, with Errata (2016).
- O. IAS AC172 - Accreditation Criteria for Fabricator Inspection Programs for Structural Steel; 2018.
- P. SSPC-Paint 15 - Steel Joist Shop Primer/Metal Building Primer; 1999 (Ed. 2004).

- Q. SSPC-Paint 20 - Zinc-Rich Primers (Type I, "Inorganic," and Type II, "Organic"); 2002 (Ed. 2004).
- R. SSPC-SP 2 - Hand Tool Cleaning; 2018.

1.04 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. 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 seal and signature on each sheet of shop drawings.
- C. Design Data: As required by authorities having jurisdiction.
- D. Welders' Certificates.
- E. Designer's Qualification Statement.
- F. Fabricator's Qualification Statement: Provide documentation showing steel fabricator is certified under AISC 201.
- G. Fabricator's Qualification Statement: Provide documentation showing steel fabricator is accredited under IAS AC172.

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: Show certification of welders employed on the Work, verifying AWS qualification within the previous 12 months.
- C. Fabricator Qualifications:
 - 1. A qualified steel fabricator that is certified by the American Institute for Steel Construction (AISC) under AISC 201.
 - 2. A qualified steel fabricator that is accredited by the International Accreditation Service (IAS) Fabricator Inspection Program for Structural Steel in accordance with IAS AC172.
 - 3. A company specializing in manufacturing products specified in this section, with not less than ten years of documented experience.

PART 2 PRODUCTS

2.01 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 that comply 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. Architectural: All joints as inconspicuous as possible, whether welded or mechanical.
 - a. Welded Joints: Continuously welded and ground smooth and flush.

- b. Mechanical Joints: Butted tight, flush, and hairline; concealed fastenings only.
 - c. Exposed Edges and Corners: Eased to small uniform radius.
 - d. Metal Surfaces to be Painted: Sanded or ground smooth, suitable for highest quality gloss 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.

2.02 METAL STAIRS WITH CONCRETE TREADS

- A. Jointing and Finish Quality Level: Architectural, as defined above.
- B. Risers: Closed.
- C. Treads: Metal pan with field-installed concrete fill.
 - 1. Concrete Depth: 1-1/2 inches, minimum.
 - 2. Tread Pan Material: Steel sheet.
 - 3. Tread Pan Thickness: As required by design; 14 gauge, 0.075 inch minimum.
 - 4. Concrete Reinforcement: Welded wire mesh.
 - 5. Concrete Finish: Steel troweled.
- D. Risers: Same material and thickness as tread pans.
 - 1. Riser/Nosing Profile: Sloped riser with rounded nosing of minimum radius.
 - 2. Nosing Depth: Not more than 1-1/2 inch overhang.
 - 3. Nosing Return: Flush with top of concrete fill, not more than 1/2 inch wide.
- E. Stringers: Rolled steel channels.
 - 1. Stringer Depth: 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 pipe railings.
- H. Finish - Interior: Shop prime painted.
- I. Finish - Exterior: Galvanized after fabrication, except sheet components to be galvanized before fabrication.
- J. Under Side of Stair: Exposed to view, to be finished same as specified for other exposed to view surfaces.

2.03 HANDRAILS AND GUARDS

- A. Wall-Mounted Rails: Round pipe or tube rails unless otherwise indicated.
 - 1. Outside Diameter: 1-1/4 inch, minimum, to 1-1/2 inches, maximum.
- B. Guards:
 - 1. Top Rails: Round pipe or tube rails unless otherwise indicated.
 - a. Outside Diameter: 1-1/4 inch, minimum, to 1-1/2 inches, maximum.
 - 2. Infill at Picket Railings: Vertical pickets.
 - a. Horizontal Spacing: Maximum 4 inches on center.
 - b. Material: Solid steel bar.
 - c. Shape: Round.
 - d. Size: 1/2 inch diameter.
 - e. Top Mounting: Welded to underside of top rail.
 - f. Bottom Mounting: Welded to top surface of stringer.
 - 3. End and Intermediate Posts: Same material and size as top rails.
 - a. Horizontal Spacing: As indicated on Drawings.
 - b. Mounting: Welded to top surface of stringer.

2.04 MATERIALS

- A. Steel Sections: ASTM A36/A36M.
- B. Steel Tubing: ASTM A500/A500M or ASTM A501/A501M structural tubing, round and shapes as indicated.
- C. Pipe: ASTM A53/A53M, Grade B Schedule 40, black finish.
- D. 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).
- E. Galvanized Steel Sheet: ASTM A653/A653M, Structural Steel (SS) Grade 33/230 with G40/Z120 coating.
- F. Concrete Fill: Portland cement Type I, 3000 psi 28 day strength, 2 to 3 inch slump.
- G. Concrete Reinforcement: Mesh type as detailed, galvanized.

2.05 ACCESSORIES

- A. Steel Bolts, Nuts, and Washers: ASTM A307, Grade A, plain.
- 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.
- E. Touch-Up Primer for Galvanized Surfaces: SSPC-Paint 20, Type I - Inorganic, and comply with VOC limitations of authorities having jurisdiction.

2.06 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.
- D. Galvanizing: Hot-dip galvanize to minimum requirements of ASTM A123/A123M.
 - 1. Touch up abraded areas after fabrication using specified touch-up primer for galvanized surfaces.

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 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 06 10 00
ROUGH CARPENTRY

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Roofing nailers.
- B. Miscellaneous framing and sheathing.
- C. Communications and electrical room mounting boards.
- D. Concealed wood blocking, nailers, and supports.

1.02 RELATED REQUIREMENTS

- A. Section 07 53 10 - Single Ply Roofing - Fully Adhered EPDM.
- B. Section 07 62 00 - Sheet Metal Flashing and Trim.
- C. Section 07 72 00 - Roof Accessories.
- D. Section 08 71 00 - Door Hardware.
- E. Section 09 21 16 - Gypsum Board Assemblies.
- F. Section 10 11 00 - Visual Display Units.
- G. Section 10 21 13.13 - Metal Toilet Compartments.
- H. Section 10 28 00 - Toilet, Bath, and Laundry Accessories.
- I. Section 10 44 00 - Fire Protection Specialites.
- J. Section 12 34 00 - Manufactured Plastic Laminate Casework.

1.03 REFERENCE STANDARDS

- A. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2020.
- B. ICC (IBC) - International Building Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- C. ICC (IECC) - International Energy Conservation Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- D. PS 1 - Structural Plywood; 2009.
- E. PS 20 - American Softwood Lumber Standard; 2020.
- F. SPIB (GR) - Grading Rules; 2014.

1.04 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements for submittal procedures.
- B. Product Data: Provide technical data on application instructions.
- C. Manufacturer's Certificate: Certify that wood products supplied for rough carpentry meet or exceed specified requirements.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. General: Cover wood products to protect against moisture. Support stacked products to prevent deformation and to allow air circulation.

1.06 WARRANTY

- A. See Section 01 78 00 - Closeout Submittals for additional warranty requirements.
- B. Correct defective work within a two-year period commencing on Date of Substantial Completion.

PART 2 PRODUCTS

2.01 GENERAL REQUIREMENTS

- A. Dimension Lumber: Comply with PS 20 and requirements of specified grading agencies.

1. Species: Douglas Fir, 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.

B. Lumber fabricated from old growth timber is 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. Miscellaneous Framing, Blocking, Nailers, Grounds, and Furring:
 1. Lumber: S4S, No. 2 or Standard 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.

2.04 ACCESSORIES

- A. Fasteners and Anchors:
 1. Metal and Finish: Hot-dipped galvanized steel complying with ASTM A153/A153M for high humidity and preservative-treated wood locations, unfinished steel elsewhere.
- B. Fasteners Used with Fire-Retardant Treated Wood:
 1. Fasteners must be galvanized steel, stainless steel, in accordance with 2015 IBC Section 2304.9.5
- C. Construction Adhesives: Adhesives complying with ASTM C557 or ASTM D3498.
 1. Manufacturers:
 - a. Franklin International, Inc; Titebond Fast Set Polyurethane Construction Adhesive: www.titebond.com.
 - b. Substitutions: See Section 01 60 00 - Product Requirements.

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 framed assemblies that have concealed spaces, provide solid wood fireblocking as required by applicable local code, to close concealed draft openings between floors and between top story and roof/attic space; other material acceptable to code authorities may be used in lieu of solid wood blocking.
- C. In metal stud walls, provide continuous blocking around door and window openings for anchorage of frames, securely attached to stud framing.

- D. 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.
- E. Where ceiling-mounting is indicated, provide blocking and supplementary supports above ceiling, unless other method of support is explicitly indicated.
- F. Provide the following specific nonstructural framing and blocking:
 - 1. Wall brackets.
 - 2. Handrails.
 - 3. Grab bars.
 - 4. Towel and bath accessories.
 - 5. Wall-mounted door stops.
 - 6. Tack boards.
 - 7. Audio / visual equipment.
 - 8. Plastic laminate casework.
 - 9. Lavatory top support brackets.

3.04 INSTALLATION OF CONSTRUCTION PANELS

- A. 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. Where boards are indicated as full floor-to-ceiling height, install with long edge of board parallel to studs.
 - 2. Install adjacent boards without gaps.
 - 3. Size: 48 by 96 inches, installed horizontally at ceiling height.

3.05 TOLERANCES

- A. Framing Members: 1/4 inch from true position, maximum.
- B. Variation from Plane: 1/4 inch in 10 feet maximum, and 1/2 inch in 30 feet maximum.

3.06 FIELD QUALITY CONTROL

- A. See Section 01 40 00 - Quality Requirements, for additional requirements.

3.07 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 07 21 00
THERMAL INSULATION

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Board insulation at perimeter foundation wall.
- B. Batt insulation for filling perimeter window and door shim spaces.

1.02 RELATED REQUIREMENTS

- A. Section 03 30 00 - Cast-in-Place Concrete.
- B. Section 07 21 19 - Foamed-In-Place Insulation.
- C. Section 07 24 00 - Exterior Insulation and Finish Systems.

1.03 REFERENCE STANDARDS

- A. ASTM C518 - Standard Test Method for Steady-State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus; 2017.
- B. ASTM C557 - Standard Specification for Adhesives for Fastening Gypsum Wallboard to Wood Framing; 2003 (Reapproved 2017).
- C. ASTM C578 - Standard Specification for Rigid, Cellular Polystyrene Thermal Insulation; 2018.
- D. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2020.
- E. ASTM E96/E96M - Standard Test Methods for Water Vapor Transmission of Materials; 2016.
- F. ASTM E136 - Standard Test Method for Behavior of Materials in a Vertical Tube Furnace At 750 Degrees C; 2016a.
- G. ASTM E2357 - Standard Test Method for Determining Air Leakage of Air Barrier Assemblies; 2017.
- H. ICC-ES AC239 - Acceptance Criteria for Termite-Resistant Foam Plastic; 2008, with Editorial Revision (2014).
- I. NFPA 285 - Standard Fire Test Method for Evaluation of Fire Propagation Characteristics of Exterior Non-Load-Bearing Wall Assemblies Containing Combustible Components; 2012.

1.04 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide data on product characteristics, performance criteria, and product limitations.

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: Complies with ASTM C578 with either natural skin or cut cell surfaces.
 - 1. Flame Spread Index (FSI): Class A - 0 to 25, when tested in accordance with ASTM E84.
 - 2. Smoke Developed Index (SDI): 450 or less, when tested in accordance with ASTM E84.
 - 3. Type and Thermal Resistance, R-value: Type IV, 5.0 (0.88) per 1 inch thickness at 75 degrees F mean temperature.
 - 4. Board Edges: Square.

5. Type and Water Absorption: Type IV, 0.3 percent by volume, maximum, by total immersion.
6. Products:
 - a. Dow Chemical Company; STYROFOAM HIGHLOAD 40: www.dowbuildingsolutions.com.
 - b. Kingspan Insulation LLC; GreenGuard XPS Type IV, 25 psi: www.kingspan.com.
 - c. Owens Corning Corporation; FOAMULAR Extruded Polystyrene (XPS) Insulation: www.ocbuildingspec.com.
 - d. Substitutions: See Section 01 60 00 - Product Requirements.

2.03 BATT INSULATION MATERIALS

- A. Where batt insulation is indicated, either glass fiber or mineral fiber batt insulation may be used, at Contractor's option.
- B. Glass Fiber Batt Insulation: Flexible preformed batt or blanket, complying with ASTM C665; friction fit.
 1. Flame Spread Index: 75 or less, when tested in accordance with ASTM E84.
 2. Smoke Developed Index: 450 or less, when tested in accordance with ASTM E84.
 3. Combustibility: Non-combustible, when tested in accordance with ASTM E136, except for facing, if any.
 4. Formaldehyde Content: Zero.
 5. Thickness: As required to fit situation.
 6. Facing: Asphalt treated Kraft paper, one side.
 7. Products:
 - a. CertainTeed Corporation: www.certainteed.com.
 - b. Johns Manville: www.jm.com.
 - c. Owens Corning Corporation: www.ocbuildingspec.com.
 - d. Substitutions: See Section 01 60 00 - Product Requirements.
- C. Mineral Fiber Batt Insulation: Flexible or semi-rigid preformed batt or blanket, complying with ASTM C665; friction fit; unfaced flame spread index of 0 (zero) when tested in accordance with ASTM E84.
 1. Flame Spread Index: 25 or less, when tested in accordance with ASTM E84.
 2. Smoke Developed Index: 0 (zero), when tested in accordance with ASTM E84.
 3. Thickness: As required to fit situation.
 4. Products:
 - a. Johns Manville; MinWool Sound Attenuation Fire Batts: www.jm.com.
 - b. Knauf Insulation; EcoBatt Insulation: www.knaufinsulation.com.
 - c. Rockwool (Roxul, Inc); ComfortBatt: www.rockwool.com.
 - d. Thermafiber, Inc; SAFB: www.thermafiber.com.
 - e. Substitutions: See Section 01 60 00 - Product Requirements.

2.04 ACCESSORIES

- A. Adhesive: Gun grade, interior and exterior, and compatible with insulation and substrates; complies with ASTM C557.
 1. Application Temperature: 40 to 100 degrees F at contact surfaces.
 2. Volatile Organic Content (VOC): Less than 7 percent by weight.
 3. Manufacturers:
 - a. Liquid Nails, a brand of PPG Architectural Coatings; LN-903 Heavy Duty Construction Adhesive, 10 fl oz: www.liquidnails.com.
 - b. Substitutions: See Project Manual - Volume 1: Section 01 62 00 - Product Substitutions.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that substrate, adjacent materials, and insulation materials are dry and that substrates are ready to receive insulation.

- B. Verify substrate surfaces are flat, free of honeycomb, fins, irregularities, or materials or substances that may impede adhesive bond.

3.02 BOARD INSTALLATION AT FOUNDATION PERIMETER

- A. Apply adhesive to back of boards:
 - 1. Three continuous beads per board length.
 - 2. Full bed 1/2 inch thick.
- 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. Extend boards over expansion joints, unbonded to foundation on one side of joint.
- D. Cut and fit insulation tightly to protrusions or interruptions to the insulation plane.

3.03 BATT INSTALLATION

- A. Fill perimeter window and door shim spaces.
- B. Trim insulation neatly to fit spaces. Insulate miscellaneous gaps and voids.

3.04 FIELD QUALITY CONTROL

- A. See Section 01 40 00 - Quality Requirements, for additional requirements.

3.05 PROTECTION

- A. Do not permit installed insulation to be damaged prior to its concealment.

END OF SECTION

SECTION 07 21 19
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; 2017.
- B. ASTM D1621 - Standard Test Method for Compressive Properties Of Rigid Cellular Plastics; 2016.
- C. ASTM D1622 - Standard Test Method for Apparent Density of Rigid Cellular Plastics; 2020.
- D. ASTM D1623 - Standard Test Method for Tensile And Tensile Adhesion Properties of Rigid Cellular Plastics; 2017.
- E. ASTM D2842 - Standard Test Method for Water Absorption of Rigid Cellular Plastics; 2012.
- F. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2020.
- G. ASTM E96/E96M - Standard Test Methods for Water Vapor Transmission of Materials; 2016.
- H. ASTM E2178 - Standard Test Method for Air Permeance of Building Materials; 2013.

1.03 ADMINISTRATIVE REQUIREMENTS

- A. Preinstallation Meeting: Convene one week prior to commencing work of this section.

1.04 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide product description, insulation properties, and preparation requirements.
- C. Certificates: Certify that products of this section meet or exceed specified requirements.
- D. Manufacturer's Installation Instructions: Indicate special procedures, and perimeter conditions requiring special attention.

1.05 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing products of the type specified in this section, with not less than five years of documented experience.
- B. Applicator Qualifications: Company specializing in performing work of the type specified, with minimum five years of documented experience.

1.06 MOCK-UP

- A. Locate where directed.
- B. Mock-up may remain as part of the Work.

1.07 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 MANUFACTURERS

- A. Foamed-In-Place Insulation:

1. BASF Corporation: www.spf.basf.com.
2. Henry Company: www.henry.com.
3. Icynene-Lapolla: www.icynene.com.
4. Johns Manville: www.jm.com.
5. Substitutions: See Section 01 60 00 - Product Requirements.

2.02 MATERIALS

- A. Foamed-In-Place Insulation: Medium-density, rigid or semi-rigid, open or closed cell polyurethane foam; foamed on-site, using blowing agent of water or non-ozone-depleting gas.
 1. Application: Total R-value of 13.0, minimum in exterior cold-formed metal framed walls.
 2. Regulatory Requirements: Comply with applicable code for flame and smoke and concealment limitations.
 3. Thermal Resistance: R-value of 5.0, minimum, per 1 inch thickness at 75 degrees F mean temperature when tested in accordance with ASTM C518.
 4. Water Vapor Permeance: Vapor retarder; 2 perms, maximum, when tested at intended thickness in accordance with ASTM E96/E96M, desiccant method.
 5. Water Absorption: Less than 2 percent by volume, maximum, when tested in accordance with ASTM D2842.
 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 90 percent.
 8. Surface Burning Characteristics: Flame spread/Smoke developed index of 25/450, maximum, when tested in accordance with ASTM E84.

2.03 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.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify work within construction spaces or crevices is complete prior to insulation application.
- B. Verify that surfaces are clean, dry, and free of matter that may inhibit insulation adhesion.

3.02 PREPARATION

- A. Mask and protect adjacent surfaces from over spray or dusting.
- B. 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. Apply to achieve a thermal resistance R-value of 13.
- D. Patch damaged areas.
- E. Where applied to voids and gaps assure space for expansion to avoid pressure on adjacent materials that may bind operable parts.
- F. Trim excess away for applied trim or remove as required for continuous sealant bead.

3.04 FIELD QUALITY CONTROL

- A. Field inspections and tests will be performed by an independent testing agency under provisions of Project Manual - Volume 1: Section 01 40 00 - Quality 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.

END OF SECTION

SECTION 07 24 00
EXTERIOR INSULATION AND FINISH SYSTEMS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Provide air and moisture barrier, and compatible EIFS for vertical above grade exterior walls

1.02 RELATED REQUIREMENTS

- A. Section 04 20 22 - Single-Wythe Unit Masonry.
- B. Section 07 53 10 - Single Ply Roofing - Fully Adhered EPDM.
- C. Section 07 62 00 - Sheet Metal Flashing and Trim
- D. Section 07 90 05 - Joint Sealers.
- E. Section 08 11 13 - Hollow Metal Doors and Frames.

1.03 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide data on system materials, product characteristics, performance criteria, and system limitations.
- C. Shop Drawings: Indicate wall joint patterns, joint details, and molding profiles.
- D. Selection Samples: Submit manufacturer's standard range of samples illustrating available coating colors and textures.
- E. Verification Samples: Submit actual samples of selected coating on specified substrate, minimum 12 inches square, illustrating project colors and textures.
- F. Manufacturer's specifications, details, installation instructions and product data
- G. Manufacturer's code compliance report or test summary
- H. Manufacturer's standard warranty
- I. Applicator's industry training credentials
- J. XPS board manufacturer's ICC ES Evaluation Report or UL Listing
- K. Sealant manufacturer's certificate of compliance with ASTM C 1382

1.04 REFERENCE STANDARDS

- A. ASTM Standards:
 - 1. B 117 - Test Method for Salt Spray (Fog) Testing
 - 2. C 297 - Standard Test Method for Flatwise Tensile Strength of Sandwich Constructions
 - 3. C 578 - Specification for Preformed, Cellular Polystyrene Thermal Insulation
 - 4. C 1177 - Specification for Glass Mat Gypsum for Use as Sheathing
 - 5. C 1382 -Test Method for Determining Tensile Adhesion Properties of Sealants When Used in Exterior Insulation and Finish Systems (EIFS) Joints
 - 6. D 968 - Test Method for Abrasion Resistance of Organic Coatings by Falling Abrasive
 - 7. D 1784 - Specification for Rigid Poly (Vinyl Chloride) (PVC) and Chlorinated Poly (Vinyl Chloride) (CPVC) Compounds
 - 8. D 2247 - Practice for Testing Water Resistance of Coatings in 100% Relative Humidity
 - 9. D 3273 - Test for Resistance to Growth of Mold on the Surface of Interior Coatings in an Environmental Chamber
 - 10. E 72 - Standard Test Methods of Conducting Strength Tests of Panels for Building Construction
 - 11. E 84 - Test Method for Surface Burning Characteristics of Building Materials E 96
 - 12. E 96 - Test Methods for Water Vapor Transmission of Materials
 - 13. E 119 - Method for Fire Tests of Building Construction and Materials
 - 14. E 330 - Test Method for Structural Performance of Windows, Curtain Walls, and Doors by Uniform Static Air Pressure Difference

15. E 331 - Test Method for Water Penetration of Exterior Windows, Curtain Walls, and Doors by Uniform Static Air Pressure Difference
 16. E 1233 - Standard Test Method for Structural Performance of Exterior Windows, Curtain Walls and Doors by Cyclic Static Air Pressure Difference
 17. E 2098 - Test Method for Determining Tensile Breaking Strength of Glass Fiber Reinforcing Mesh for Use in Class PB Exterior Insulation and Finish System after Exposure to a Sodium Hydroxide Solution
 18. E 2134 - Test Method for Evaluating the Tensile-Adhesion Performance of an Exterior Insulation and Finish System (EIFS)
 19. E 2178 - Test Method for Air Permeance of Building Materials
 20. E 2273 - Test Method for Determining the Drainage Efficiency of Exterior Insulation and Finish System (EIFS) Clad Wall Assemblies
 21. E 2357 - Standard Test Method for Determining Air Leakage of Air Barrier Assemblies
 22. E 2485 - Standard Test Method for Freeze/Thaw Resistance of Exterior Insulation and Finish Systems (EIFS) and Water Resistive Barrier Coatings
 23. E 2486 - Standard Test Method for Impact Resistance of Class PB and PI Exterior Insulation and Finish Systems (EIFS)
 24. E 2568 - Standard Specification for PB Exterior Insulation and Finish Systems
 25. E 2570 - Test Method for Water-Resistive (WRB) Coatings used Under Exterior Insulation and Finish Systems (EIFS) or EIFS with Drainage
 26. G 153 - Recommended Practice for Operating Light-and Water-Exposure Apparatus (Carbon-Arc Type) for Exposure of Nonmetallic Materials
 27. G 154 - Recommended Practice for Operating Light-and Water-Exposure Apparatus (Fluorescent UV-Condensation Type) for Exposure of Nonmetallic Materials
- B. Building Code Standards:
1. AC 235 - Acceptance Criteria for EIFS Clad Drainage Wall Assemblies (November 2009)
- C. National Fire Protection Association (NFPA) Standards:
1. NFPA 268 - Standard Test Method for Determining Ignitability of Exterior Wall Assemblies Using a Radiant Heat Energy Source
 2. NFPA 285 - Standard Method of Test for the Evaluation of Flammability Characteristics of Exterior Non-Load-Bearing Wall Assemblies containing Combustible Components Using the Intermediate-Scale, Multistory Test Apparatus
- D. Other Referenced Documents:
1. AATCC-127 - American Association of Textile Chemists and Colorists AATCC-127 Water Resistance: Hydrostatic Pressure Test
 2. APA E 30 - Engineered Wood Association E 30, Engineered Wood Construction Guide
 3. ICC-ES ESR-1233 - StoGuard with Gold Coat, StoGuard with EmeraldCoat, and StoGuard VaporSeal Water-Resistive Barriers and StoEnergy Guard
 4. ICC-ES ESR-1748 - StoTherm® ci

1.05 DESIGN REQUIREMENTS

- A. Wind Load:
1. Design for maximum allowable system deflection, normal to the plane of the wall, of L/240.
 2. Design for wind load in conformance with code requirements.
 3. Maximum wind load resistance: + 175 psf, provided structural supports and sheathing/sheathing attachment are adequate to resist these pressures.
- B. Moisture Control:
1. Prevent the accumulation of water behind the EIFS or into the wall assembly, either by condensation or leakage through the wall construction, in the design and detailing of the wall assembly:
 - a. Provide flashing to direct water to the exterior where it is likely to penetrate components in the wall assembly, including, above window and door heads, beneath window and door sills, at roof/wall intersections, decks, abutments of lower walls with higher walls, above projecting features, at floor lines, and at the base of the wall.

- b. Air Leakage Prevention – provide continuity of the air barrier system at foundation, roof, windows, doors, and other penetrations through the wall with connecting and compatible air barrier components to minimize condensation and leakage caused by air movement.
 - c. Vapor Diffusion and Condensation – perform a dew point analysis and/or dynamic hygrothermal modeling of the wall assembly to determine the potential for accumulation of moisture in the wall assembly by diffusion. Adjust insulation thickness and/or other wall assembly components accordingly to minimize risk. Avoid the use of vapor retarders on the interior side of the wall in warm, humid climates.
- C. Impact Resistance:
 - 1. Provide ultra-high impact resistance of the EIFS to a minimum height of 8'-0" above finished grade at all areas accessible to pedestrian traffic and other areas exposed to abnormal stress or impact. Indicate the areas with impact resistance other than
 - 2. "Standard" on contract drawings.
- D. Color Selection:
 - 1. Select finish coat to match other buildings on Joliet Junior College's main campus.
- E. Joints:
 - 1. Provide minimum 3/4 inch wide joints in the EIFS where they exist in the substrate or supporting construction, where the cladding adjoins dissimilar construction or materials, at changes in building height, at expansion, control, and cold joints in construction, and at floor lines in multi-level wood frame construction. Size joints to correspond with anticipated movement. Align terminating edges of EIFS with joint edges of through wall expansion joints and similar joints in construction. Refer to Sto Details.
 - 2. Provide minimum 1/2 inch wide perimeter sealant joints at all penetrations through the EIFS (windows, doors, mechanical, electrical, and plumbing penetrations, etc.).
 - 3. Specify compatible backer rod and sealant that has been evaluated in accordance with ASTM C 1382, and that meets minimum 50% elongation after conditioning.
 - 4. Provide joints so that air barrier continuity is maintained across the joint, and drain joints to the exterior, or provide other means to prevent or control water infiltration at joints.
- F. Grade Condition:
 - 1. Do not specify the EIFS below grade (unless designed for use below grade and permitted by code) or for use on surfaces subject to continuous or intermittent water immersion or hydrostatic pressure. Provide minimum 6 inch clearance above grade or as required by code.
- G. Trim, Projecting Architectural Features and Reveals:
 - 1. All trim and projecting architectural features must have a minimum 1:2 (27°) slope along their top surface. All reveals must have minimum 3/4 inch insulation thickness at the bottom of the reveal. All horizontal reveals must have a minimum 1:2 (27°) slope along their bottom surface. Increase slope for northern climates to prevent accumulation of ice/snow and water on surface. Where trim/feature or bottom surface of reveal projects more than 2 inches from the face of the EIFS wall plane, protect the top surface with waterproof base coat. Periodic inspections and increased maintenance may be required to maintain surface integrity of the EIFS finish on weather exposed sloped surfaces. Limit projecting features to easily accessible areas and limit total area to facilitate and minimize maintenance. Refer to Sto Details.
 - 2. Do not use the EIFS on weather exposed projecting ledges, sills, or other projecting features unless supported by framing or other structural support and protected with metal coping or flashing. Refer to Sto Details 53s.60A and 53s.61.
- H. Insulation Thickness:
 - 1. Minimum XPS insulation thickness is 1 inch.
 - 2. Maximum XPS insulation thickness is 6 inches, except as noted below for fire- resistance rated wall assemblies.
- I. Fire Protection:

1. Do not use XPS foam plastic in excess of 6 inches thick on types I, II, III, or IV construction unless approved by the code official.
2. Where a fire-resistance rating is required by code use the EIFS over a rated concrete or concrete masonry assembly. Limit use overrated frame assemblies to non-load bearing assemblies (the EIFS is considered not to add or detract from the fire-resistance of the rated assembly). Maximum allowable XPS thickness: 2.75 inches.
3. Refer to manufacturer's testing or applicable code compliance report for other limitations that may apply.

1.06 QUALITY ASSURANCE

- A. Manufacturer Requirements:
 1. Member in good standing of the EIFS Industry Members Association (EIMA)
 2. Air/moisture barrier and EIFS manufacturer for a minimum of thirty (30) years
 3. Manufacturing facilities ISO 9001:2008 Certified Quality System and ISO 14001:2004 Certified Environmental Management System
4. Contractor Requirements
 - a. Engaged in application of similar systems for a minimum of three (3) years
 - b. Knowledgeable in the proper use and handling of Sto materials
 - c. Employ skilled mechanics who are experienced and knowledgeable in air/moisture barrier and EIFS application, and familiar with the requirements of the specified work
 - d. Successful completion of minimum of three (3) projects of similar size and complexity to the specified project
 - e. Provide the proper equipment, manpower and supervision on the job site to install the system in compliance with Sto's published specifications and details and the project plans and specifications
5. Insulation Board Manufacturer Requirements
 - a. XPS board listed by an approved manufacturer.

1.07 MOCK-UPS

- A. Mock-up Testing:
 1. Construct full-scale mock-up of typical air/moisture barrier and EIFS/window wall assembly with specified tools and materials and test air and water infiltration and structural performance in accordance with ASTM E 283, ASTM E 331 and ASTM E 330, respectively, through independent laboratory. Mock-up shall comply with requirements of project specifications. Where mock-up is tested at job site maintain approved mock-up at site as reference standard. If tested off-site accurately record construction detailing and sequencing of approved mock-up for replication during construction.
- B. Inspections:
 1. Provide inspection by manufacturer's technical representative.
 2. Conduct inspections in accordance with code requirements and contract documents.

1.08 DELIVERY, STORAGE AND HANDLING

- A. Deliver all materials in their original sealed containers bearing manufacturer's name and identification of product
- B. Protect coatings (pail products) from freezing and temperatures in excess of 90°F. Store away from direct sunlight.
- C. Protect Portland cement based materials (bag products) from moisture and humidity. Store under cover off the ground in a dry location.

1.09 FIELD CONDITIONS

- A. Maintain ambient and surface temperatures above 40°F during application and drying period, minimum 24 hours after application of Air/Moisture barrier and EIFS products
- B. Provide supplementary heat for installation in temperatures less than 40°F.
- C. Provide protection of surrounding areas and adjacent surfaces from application of products

1.10 COORDINATION/SCHEDULING

- A. Provide site grading such that the EIFS terminates above grade a minimum of 6 inches or as required by code.
- B. Coordinate installation of foundation waterproofing, roofing membrane, windows, doors and other wall penetrations to provide a continuously connected air and moisture barrier.
- C. Provide protection of rough openings before installing windows, doors, and other penetrations through the wall.
- D. Install window and door head flashing immediately after windows and doors are installed.
- E. Install diverter flashings wherever water can enter the wall assembly to direct water to the exterior.
- F. Install splices or tie-ins from air/moisture barrier over back leg of flashings, starter tracks, and similar details to form a shingle lap that directs incidental water to the exterior.
- G. Install copings and sealant immediately after installation of the EIFS when coatings are dry, and such that, where sealant is applied against the EIFS surface, it is applied against the base coat or primed base coat surface.
- H. Schedule work such that air/moisture barrier is exposed to weather no longer than 180 days if Sto Gold Coat is used, 90 days if Sto AirSeal is used.
- I. Attach penetrations through the EIFS to structural support and provide watertight seal at penetrations.

1.11 WARRANTY

- A. Provide manufacturer's standard warranty

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Provide Air/Moisture Barrier and EIFS coatings and accessories from single source manufacturer or approved supplier.
- B. Basis of Design EFIS Manufacturer:
 - 1. Sto Corp; StoTherm ci XPS: www.stocorp.com.
- C. Other Acceptable Manufactures:
 - 1. Dryvit Systems, Inc.: www.dryvit.com.
 - 2. Parex USA, Inc: www.parex.com.
 - 3. Substitutions: See Section 01 60 00 - Product Requirements.
- D. Insulation Board Manufacturers:
 - 1. Owens Corning: www.owenscorning.com.
 - 2. Dow (The Dow Chemical Company): www.dow.com.
 - 3. Substitutions: See Section 01 60 00 - Product Requirements.

2.02 AIR/MOISTURE BARRIER

- A. Joint Treatment, Rough Opening Protection, and Detail Components:
 - 1. Sto Gold Fill®: Ready mixed coating applied by trowel or knife for rough opening protection of frame walls and joint treatment of sheathing when used with StoGuard Mesh. Also used as a detail component with StoGuard Mesh to splice over back flange of starter track, flashing, and similar ship lap details.
- B. Waterproof Coating:
 - 1. Sto Gold Coat: Ready mixed waterproof coating for concrete, concrete masonry, wood-based sheathing, and glass mat gypsum sheathing.
- C. Transition Detail Components:
 - 1. StoGuard Transition Membrane: Flexible air barrier membrane for continuity at static transitions such as sheathing to foundation, dissimilar materials (CMU to frame wall), wall to balcony floor slab or ceiling, and shingle lap transitions to flashing. Also used for

dynamic joints: Floor line deflection joints, masonry control joints, and through wall joints in masonry or frame construction.

2. Sto RapidGuard: One component STPE rapid drying gun-applied treatment for sheathing joints, rough openings, seams, cracks, penetrations and other static transitions in above grade wall construction such as: shingle lap transitions to flashing, wall to balcony floor slab or ceiling, and through wall penetrations: Pipes, electrical boxes, and scupper penetrations.

2.03 ADHESIVE

- A. Sto TurboStick™: One component polyurethane spray foam adhesive.

2.04 INSULATION BOARD

- A. Acceptable Products:
 1. Foamular® CI-C – Type X extruded polystyrene (XPS) rigid foam plastic insulation board.
 2. Dow STYROFOAM™ Panel Core 20 Insulation – Type X extruded polystyrene (XPS) rigid foam plastic insulation board

2.05 BASE COAT

- A. Sto BTS® Xtra: One component polymer modified cement based high build base coat for insulation board. Also used as a leveler for concrete and masonry surfaces
- B. Waterproof Base Coat:
 1. Sto Watertight Coat: Pre-packaged two component fiber reinforced acrylic based waterproof base coat.

2.06 REINFORCING MESHES

- A. High Impact Mesh:
 1. Application: 8'-0" above finished grade to top of parapet wall.
 2. Sto Intermediate Mesh – nominal 11.2 oz./yd², high impact, interwoven, open weave glass fiber fabric with alkaline resistant coating for compatibility with Sto materials.
- B. Ultra-High Impact Mesh:
 1. Application: Grade to 8'-0" above finished grade.
 2. Sto Armor Mat – nominal 15 oz/yd², ultra-high impact, double strand, interwoven, open-weave glass fiber fabric with alkaline resistant coating for compatibility with Sto materials.
- C. Specialty Meshes:
 1. Application: Use for standard back wrapping, aesthetic detailing, and reinforcement of sheathing joints and protection of rough openings with trowel applied air/moisture barrier.
 2. Sto Detail Mesh – nominal 4.2 oz/yd², flexible, symmetrical, interlaced glass fiber fabric, with alkaline resistant coating for compatibility with Sto materials.

2.07 PRIMER

- A. StoPrime Sand: Acrylic based tintable primer with sand for roller application.

2.08 FINISH COAT

- A. Stolit® X: Acrylic based textured wall finish with graded marble aggregate and enhanced polymer technology for easy spread and float application.

2.09 JOB MIXED INGREDIENTS

- A. Water: Clean and potable.
- B. Portland Cement: Type I, Type II, or Type I-II in conformance with ASTM C 150.

2.10 ACCESSORIES

- A. Starter Track: Rigid PVC (polyvinyl chloride) plastic track Part No. STDE as furnished by Plastic Components, Inc.: www.plasticcomponents.com.
- B. Sto-Mesh Corner Bead Standard: One component PVC (polyvinyl chloride) accessory with integral reinforcing mesh for outside corner reinforcement.

- C. Sto Drip Edge Profile: One component PVC (polyvinyl chloride) accessory with integral reinforcing mesh that creates a drip edge and plaster return

2.11 MIXING

- A. Sto Gold Fill: Mix with a clean, rust-free high speed mixer to a uniform consistency
- B. Sto Gold Coat: Mix with a clean, rust-free high speed mixer to a uniform consistency
- C. Sto AirSeal: Mix with a clean, rust-free high speed mixer to a uniform consistency
- D. Sto BTS Xtra: Mix ratio with water: 4.75- 5 quarts (4.5-4.7 L) of clean potable water per 38 pound (17.2 kg) bag of Sto BTS Xtra. Pour water into a clean mixing pail. Add Sto BTS Xtra, mix to a uniform consistency and allow to set for approximately 5 minutes. Adjust mix if necessary, with additional Sto BTS Xtra or water and remix to a uniform trowel consistency. Avoid retempering. Keep mix ratio consistent. Do not exceed maximum amount of water in mix ratio.
- E. Sto Flexyl: Mix ratio with portland cement: 1:1 ratio by weight. Pour Sto Flexyl into a clean mixing pail. Add portland cement, mix to a uniform consistency and allow to set for approximately five minutes. Adjust mix if necessary, with additional Sto Flexyl and remix to a uniform trowel consistency. Avoid retempering. Keep mix ratio consistent.
- F. Sto Watertight Coat: Pour liquid component into a clean mixing pail. Add dry component, mix to a uniform consistency and allow to set for approximately five minutes. Adjust mix if necessary and remix to a uniform trowel consistency. Avoid retempering. Keep mix ratio consistent.
- G. Sto primer: Mix with a clean, rust-free high speed mixer to a uniform consistency
- H. Stolit: Mix with a clean, rust-free high speed mixer to a uniform consistency. A small amount of water may be added to adjust workability. Limit addition of water to amount needed to achieve the finish texture.
- I. Mix only as much material as can readily be used
- J. Do not use anti-freeze compounds or other additives

PART 3 EXECUTION

3.01 ACCEPTABLE INSTALLERS

- A. Prequalify under Quality Assurance requirements of this specification.

3.02 EXAMINATION

- A. Inspect concrete masonry unit substrates prior to start of application for:
 - 1. Contamination: Algae, chalkiness, dirt, dust, efflorescence, form oil, fungus, grease, laitance, mildew or other foreign substances.
 - a. Surface absorption and chalkiness.
 - b. Cracks: Measure crack width and record location of cracks.
 - c. Damage and deterioration such as voids, honeycombs and spalls.
 - d. Moisture content and moisture damage – use a moisture meter to determine if the surface is dry enough to receive the products and record any areas of moisture damage.
 - e. Compliance with specification tolerances: Record areas that are out of tolerance (greater than ¼ inch in 8-0 feet deviation in plane).
- B. Inspect sheathing application for compliance with applicable requirement and installation in conformance with specification and manufacturer requirements:
 - 1. Glass Mat Faced gypsum sheathing compliant with ASTM C 1177.
 - 2. Exterior Grade and Exposure I wood based sheathing: APA Engineered Wood Association E 30.
 - 3. Cementitious sheathing: Consult manufacturer.
 - 4. Attachment into structural supports with adjoining sheets abutted (gapped if wood-based sheathing) and fasteners at required spacing to resist design wind pressures as determined by design professional.

5. Fasteners seated flush with sheathing surface and not over-driven.
- C. Report deviations from the requirements of project specifications or other conditions that might adversely affect the Air/Moisture Barrier and the EIFS installation to the General Contractor. Do not start work until deviations are corrected.

3.03 SURFACE PREPARATION

- A. Remove surface contaminants on concrete masonry surfaces.
 1. Repair cracks, spalls or damage in concrete and concrete masonry surfaces and level concrete and masonry surfaces to comply with required tolerances.
 2. Apply conditioner (consult Sto) by spray or roller to chalking or excessively absorptive surfaces or pressure wash to remove surface chalkiness.
 3. Remove fasteners that are not anchored into supporting construction and seal holes with air barrier material.
 4. Seal over-driven fasteners with air barrier material and install additional fasteners as needed to comply with fastener spacing requirement
 5. Fill large gaps between sheathing or voids around pipe, conduit, scupper, and similar penetrations with spray foam and shave flush with surface (refer to Sto Details).
 6. Replace weather-damaged sheathing and repair or replace damaged or cracked sheathing.

3.04 AIR/MOISTURE BARRIER INSTALLATION OVER CONCRETE MASONRY (CMU) WALL CONSTRUCTION:

- A. Transition Detailing:
 1. Detail transition areas with Sto RapidGuard or StoGuard Transition Membrane to achieve air barrier continuity. For illustrations of installation, refer to Sto Guide Details and Sto.
 - a. RapidGuard Installation Guide or StoGuard Transition Membrane Installation Guide (www.stocorp.com).
- B. Rough Opening Protection:
 1. Sto Gold Coat or Sto AirSeal with StoGuard Fabric: Apply coating liberally by spray or roller to corners of openings, immediately place StoGuard RediCorners in the wet coating, and apply additional coating over the RediCorners to completely embed them. After all corners have been completed apply coating liberally to the entire rough opening, immediately place StoGuard Fabric in the wet coating, smooth any wrinkles with a brush or roller, and apply additional coating over the fabric to completely embed it. Overlap all seams minimum 2 inches. Once completed topcoat with additional coating as needed to completely seal the surface. Allow to dry and inspect for pinholes or voids. If pinholes or voids are present, seal with additional coating or StoGuard RapidSeal (refer to Sto Detail 20.20F).
- C. Sheathing Joint Treatment:
 1. Sto Gold Coat or Sto AirSeal with StoGuard Fabric: apply coating liberally by spray or roller along sheathing joints and immediately place 4 inch wide fabric centered over the joints into the wet coating, and 6 inch wide fabric centered and folded at inside and outside corners into the wet coating. Smooth any wrinkles with a brush or roller and apply additional coating to completely embed the fabric. Overlap seams minimum 2 inches.
- D. Air/Moisture Barrier Coating Installation:
 1. CMU Surfaces:
 - a. Repair static cracks up to 1/2 inch wide with Sto RapidGuard or StoGuard RapidFill. Rake the crack with a sharp tool to remove loose or friable material and blow clean with oil-free compressed air. Apply the crack filler with a trowel or putty knife over the crack and tool the surface smooth.
 - 1) For moving cracks or cracks larger than 1/2 inch, consult with a structural engineer for repair method). Protect repair from weather until dry.
 - b. Liberally apply coating to the surface with a 3/4 inch nap roller or spray equipment to a minimum wet thickness of 10-30 mils (Sto Gold Coat) or 20-40 wet mils (Sto AirSeal), depending on surface condition. Apply to a uniform thickness. Additional coats may

be necessary to provide a void and pinhole free surface. Protect from weather until dry.

- E. Air /Moisture Barrier Connections and Shingle Laps:
 - 1. Coordinate installation of connecting air barrier components with other trades to provide a continuous airtight membrane.
 - 2. Coordinate installation of flashing and other moisture protection components with other trades to achieve complete moisture protection such that water is directed to the exterior, not into the wall assembly, and drained to the exterior at sources of leaks (windows, doors and similar penetrations through the wall assembly).
 - 3. Splice-in head flashings above windows, doors, floor lines, roof/sidewall step flashing, and similar locations with StoGuard detail component to achieve shingle lap of the air/moisture barrier such that water is directed to the exterior.

3.05 EIFS INSTALLATION:

- A. Starter Track:
 - 1. Strike a level line at the base of the wall to mark where the top of the starter track terminates.
 - 2. Attach the starter track even with the line into structural supports with the proper fastener: Type S-12 corrosion resistant concrete or masonry screws with minimum 1 inch penetration for CMU. Attach as needed to secure the track flat against the wall surface. Attach at maximum 16 inches on center into framing.
 - 3. Butt sections of starter track together. Miter cut outside corners and abut. Snip front flange of one inside corner piece (to allow XPS insulation board to be seated inside of track) and abut.
 - 4. Install Starter Track at other EIFS terminations as designated on detail drawings: above roof along dormers or gable end walls, and beneath windowsills with concealed flashing (refer to Sto Details).
- B. Detail Splice Strips for Starter Track, Flashing at Floor Lines, Head of Windows and Doors:
 - 1. Starter Track, Window/Door Head Flashing, Floor Line Flashing, and Roof/Side Wall Step Flashing: Install minimum 4 inch wide detail component over back flange of starter track, floor line flashing, head flashing, and roof/side wall step flashing. Center the detail component so it spans evenly between the back leg of flashing (or accessory) and the coated sheathing. Make a smooth transition to the coated sheathing with a trowel, knife, or roller, depending on the detail component material being used. When Sto Gold Fill with StoGuard Mesh is the detail component apply another coat of the waterproof coating over the detail area. Do not leave detail components exposed for more than 30 days.
- C. Backwrapping:
 - 1. Apply a strip of detail mesh to the dry air/moisture barrier at all system terminations (windows, doors, expansion joints, etc.) except where the Starter Track is installed. The mesh must be wide enough to adhere approximately 4 inches of mesh onto the wall, be able to wrap around the insulation board edge and cover a minimum of 2 ½ inches on the outside surface of the insulation board. Attach mesh strips to the air/moisture barrier and allow them to dangle until the backwrap procedure is completed. Alternatively, pre-wrap terminating edges of insulation board.
- D. Adhesive Application and Installation of Insulation Board:
 - 1. Ensure the air/moisture barrier surface (Sto Gold Coat) is free of surface contamination. Install the insulation board within 30 days of the application of the air/moisture barrier coating (Sto Gold Coat) or clean the surface and recoat with Sto Gold Coat.
 - 2. Cut the insulation board squarely to a 2 x 4 foot dimension (if not already furnished pre-cut).
 - 3. Rasp the interior lower face of insulation boards to provide a snug friction fit into the Starter Track. (Note: rasping prevents an outward bow at the Starter Track).
 - 4. Apply adhesive to the back of the insulation board with the dispensing pistol approximately ¾ inch from ends. Apply 6 additional ribbons spaced equally at no greater than 5-6 inches apart between the end ribbons for a total of 8 ribbons. Apply uniform ribbons of adhesive

parallel with the SHORT dimension of the board so that when boards are placed on the wall the ribbons will be VERTICAL. Apply adhesive ribbons approximately $\frac{1}{2}$ inch in diameter which will expand to $\frac{3}{4}$ – 1 inch. Keep adhesive $\frac{1}{2}$ inch short of board edges. Allow adhesive to “dwell” and become “tacky” before placing boards on wall. Adhesive will look smooth, not jagged, when ready to apply to wall surface. Place boards while adhesive is “tacky” and before adhesive “skins”.

5. Place insulation boards in a running bond pattern on the wall with the long dimension horizontal. Start by inserting the lower edge of the boards inside the starter track at the base of the wall until they contact the bottom of the track. Apply light pressure when placing the boards. After boards have been in place for 5-10 minutes use a straight edge to lightly press the boards inward and to keep board joints flush, as post expansion of the adhesive may force boards slightly outward.
 6. Bridge sheathing joints by a minimum of 6 inches. Interlock inside and outside corners.
 7. Butt all board joints tightly together to eliminate any thermal breaks. Care must be taken to prevent any adhesive from getting between the joints of the boards.
 8. Cut insulation board in an L-shaped pattern to fit around openings. Do not align board joints with corners of openings.
 9. Check for satisfactory contact of the insulation board with the substrate. If any boards have loose areas use the dispensing pistol to create a hole through the board and inject adhesive to attach the loose area. Allow the adhesive to expand to the outer face of the board while withdrawing the pistol. Cut excess adhesive flush with the surface of the insulation. Do not use nails, screws, or any other type of non-thermal mechanical fastener.
- E. Slivering and Rasping of Insulation Board Surface:
1. Make sure insulation boards are fully adhered to the substrate before proceeding to next steps.
 - a. Fill any open joints in the insulation board layer with slivers of insulation or the spray foam adhesive.
 - b. Rasp the insulation board surface to achieve a smooth, even surface and to remove any ultraviolet ray damage.
- F. Trim, Reveals and Projecting Aesthetic Features:
1. Attach features and trim where designated on drawings with adhesive to a base layer of insulation board or to the coated sheathing surface. Fill any gaps between the trim and base layer of insulation with spray foam adhesive and rasp flush with the trim surface. Slope the top surface of all trim/features minimum 1:2 (27°) and the bottom of all horizontal reveals minimum 1:2 (27°).
 2. Cut reveals/aesthetic grooves with a hot-knife, router or groove-tool in locations indicated on drawings.
 3. Offset reveals/aesthetic grooves minimum 3 inches from insulation board joints.
 4. Do not locate reveals/aesthetic grooves at high stress areas.
 5. Ensure minimum $\frac{3}{4}$ inch thickness of insulation board at the bottom of the reveals/aesthetic grooves.
- G. Completion of Backwrapping:
1. Complete the backwrapping procedure by applying base coat to exposed edges of insulation board and approximately 4 inches onto the face of the insulation board. Pull mesh tight around the board and embed it in the base coat with a stainless steel trowel. Use a corner trowel for clean, straight lines. Smooth any wrinkles or gaps in the mesh.
- H. Accessory Installation:
1. Corner Bead: cut the corner bead accessory to proper length as needed. Use full pieces wherever possible and avoid using short filler pieces. Offset accessory butt joints from substrate joints. Apply base coat with a stainless steel trowel to an approximate thickness of $\frac{1}{8}$ inch to the outside corner area that will receive the accessory. Immediately place the accessory directly into the wet base coat material. Do not slide into place. Press the accessory into place. A corner trowel is best for this purpose. Embed and completely cover the mesh and PVC by troweling from the corner to the edge of the mesh so that no mesh

or PVC color is visible. Avoid excess build-up of base coat and feather along mesh edges. Adjoin separate pieces by abutting PVC to PVC and overlapping the mesh "tail" from one piece onto the next piece. Fully embed the accessory and mesh "tail" in base coat material. When installing field mesh reinforcement overlap accessory mesh and PVC. Remove any excess base coat from the outside corner.

2. Drip Edge: Install the drip edge accessory prior to application of field mesh. Install with arrow on mesh pointing UP. Cut the accessory to proper length as needed. Use full pieces wherever possible and avoid using short filler pieces. Offset accessory butt joints from substrate joints. Apply base coat with a stainless steel trowel to an approximate thickness of 1/8 inch to the area that will receive the accessory. Immediately place the accessory directly into the wet base coat material and press into place. Do not slide into place. Embed and completely cover the mesh and PVC by troweling from the drip edge screed rail to the edge of the mesh. Avoid excess build-up of base coat, feather along mesh edges, and remove any excess base coat from the drip edge nosing. Abut adjoining pieces and install as described above. When installing field mesh reinforcement overlap accessory mesh 4 inches on both vertical and horizontal faces so the PVC is overlapped, and remove any excess base coat from the drip edge nosing. On vertical and horizontal faces of the accessory install finish to the drip edge lines and remove any protruding finish from the drip edge nosing.

I. Base Coat and Reinforcing Mesh Application:

1. Ensure the insulation board is firmly adhered and free of surface contamination or UV degradation, and is thoroughly rasped before commencing the base coat application.
2. Apply minimum 9x12 inch diagonal strips of detail mesh at corners of windows, doors, and all penetrations through the system. Embed the strips in wet base coat and trowel from the center to the edges of the mesh to avoid wrinkles.
3. Apply detail mesh at trim, reveals and projecting architectural features. Embed the mesh in the wet base coat. Trowel from the base of reveals to the edges of the mesh.
4. Ultra-High impact mesh application 8'-0" above finished grade at all areas: Apply base coat over the insulation board with a stainless steel trowel to a uniform thickness of approximately 1/8 inch. Work horizontally or vertically in strips of 40 inches, and immediately embed the mesh into the wet base coat by troweling from the center to the edge of the mesh. Butt ultra-high impact mesh at seams. Allow the base coat to dry.
5. Sloped Surfaces: For trim, reveals, aesthetic bands, cornice profiles, sills or other architectural features that project beyond the vertical wall plane more than 2 inches (51 mm) apply waterproof base coat with a stainless steel trowel to the sloped surface and minimum four inches above and below it. Embed standard mesh or detail mesh in the waterproof base coat and overlap mesh seams a minimum of 2-½ inches.
6. Allow base coat to thoroughly dry before applying primer or finish.

J. Primer Application:

1. Ensure the base coat surface is free of surface contamination before commencing the primer application.
2. Apply primer evenly with brush, roller or proper spray equipment over the clean, dry base coat and allow to dry thoroughly before applying finish.

K. Finish Coat Application:

1. Ensure the base coat surface or primed base coat is free of surface contamination before commencing the finish application.
2. Apply finish directly over the base coat or primed base coat when dry. Apply finish by spray or stainless steel trowel, depending on the finish specified. Follow these general rules for application of finish:
 - a. Avoid application in direct sunlight.
 - b. Apply finish in a continuous application, and work to an architectural break in the wall.
 - c. Weather conditions affect application and drying time. Hot or dry conditions limit working time and accelerate drying. Adjustments in the scheduling of work may be required to achieve desired results. Cool or damp conditions extend working time and

retard drying and may require added measures of protection against wind, dust, dirt, rain and freezing. Adjust work schedule and provide protection.

- d. Do not install separate batches of finish side-by-side.
- e. Do not apply finish into or over sealant joints. Apply finish to outside face of wall only.
- f. Do not apply finish over irregular or unprepared surfaces, or surfaces not in compliance with the requirements of the project specifications.

3.06 PROTECTION

- A. Provide protection of installed materials from water infiltration into or behind them.
- B. Provide protection of installed materials from dust, dirt, precipitation, freezing and continuous high humidity until they are fully dry.

3.07 CLEANING, REPAIR AND MAINTENANCE

- A. Clean and maintain the EIFS for a fresh appearance and to prevent water entry into and behind the system. Repair cracks, impact damage, spalls or delamination promptly.
- B. Maintain adjacent components of construction such as sealants, windows, doors, and flashing, to prevent water entry into or behind the EIFS and anywhere into the wall assembly.
- C. Refer to Sto reStore Repair and Maintenance Guide ([reStore Program](#)) for detailed information on restoration, cleaning, repairs, recoating, resurfacing and refinishing, or re-cladding.

END OF SECTION

SECTION 07 53 10
SINGLE PLY ROOFING - FULLY ADHERED EPDM

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Substrate: Covering over metal deck and vapor retarder.
- B. 2-ply bituminous vapor retarder.
- C. Insulation.
- D. HD cover board.
- E. EPDM membrane roofing, base flashings, roof expansion joints, and all accessories and appurtenances for a complete system.

1.02 RELATED SECTIONS

- A. Section 06 10 00 - Rough Carpentry.
- B. Section 07 62 10 - Sheet Metal Flashing and Trim.
- C. Section 07 72 00 - Roof Accessories: Roof Hatches.

1.03 REFERENCES

- A. ASTM C 1177/C 1177M - Standard Specification for Glass Mat Gypsum Substrate for Use as Sheathing; 2001.
- B. ASTM C208 - Insulating Board (Cellulosic Fiber) Structural and Decorative (High Density Wood Fiberboard).
- C. ASTM C1289-01 - Class I Grade II - Standard Specification for Faced Rigid Cellular Polyisocyanurate Thermal Insulation Board
- D. ASTM D412 - Rubber Properties in Tension.
- E. ASTM D471 - Standard Test Method for Rubber Property - Effect of Liquids.
- F. ASTM D624 - Rubber Property - Tear Resistance.
- G. ASTM D746 - Brittleness Temperature of Plastics and Elastomeric by Impact.
- H. FTM D822 - Practice for Operating Light and Water Exposure Apparatus (Carbon-Arc) Type for Testing Paint, Varnish, Lacquer, and Related Products.
- I. ASTM D1004 - Initial Tear Resistance of Plastic Film and Sheeting.
- J. ASTM E96 - Water Vapor Transmission of Materials.
- K. E108 - Standard Test Methods for Fire Tests of Roof Coverings
- L. E119 - Standard Test Methods for Fire Tests of Building Construction and Materials
- M. ASTM E136 - Standard Test Method for Behavior of Materials in a Vertical Tube Furnace at 705 degrees C.
- N. FM 4470 (Factory Mutual Engineering Corporation) - Roof Assembly Classifications.
- O. NCRA (National Roofing Contractors Association) - Roofing and Waterproofing Manual, latest edition.
- P. UL (Underwriters' Laboratories) 790 - Fire Hazard Classifications.
- Q. SMACNA - Sheet metal and Air Conditioning Contractor's Association: Architectural Sheet Metal Manual, latest edition.

1.04 SYSTEM DESCRIPTION

- A. Elastomeric Sheet Membrane, Fully Adhered EPDM Roofing System: Fully adhered 60mil EPDM single ply membrane roofing and flashing system with self -adhered vapor retarder, insulation, cover board and all accessories and appurtenances for a complete system.

1.05 SUBMITTALS

- A. Section 00 13 00 - Administrative Requirements: Procedures for submittals.
- B. Submit written certification that the roofing contractor/subcontractor has been an approved applicator of selected roof system for 5 years or more.
 - 1. Submit written certification from Firestone Building Product or Carlisle Syntec that the contractor is a Master Contractor or Centurion Contractor respectively.
- C. Submit written certification of license under the Illinois Roofing Industry Licensing Act.
- D. Submit written certification from the proposed EPDM manufacturer that all appropriate warranty paper work has been submitted prior to starting the work.
- E. Submit written certification from insulation manufacturer that their insulation is compatible with the proposed EPDM .
- F. Submit written certification and/or documentation that the foreman and/or crew members have attended the proposed SPM manufacturer's training seminar.
- G. Submit written certification from roofing system manufacturer that proposed insulation faces are compatible with proposed single ply membranes.
- H. Submit written certification from roofing system manufacturer that all details indicated in the drawings are acceptable to the roofing system manufacturer.
- I. Submit written certification from roofing system manufacturer that all products and labor to install same, including the vapor retarder system being installed in the roof system, are covered under the full system warranty.
- J. Submit nail pull-out test results, roof test location plan and SPM manufacturer's letter of acceptance of pull-out results.
- K. Product Data: Provide characteristics on membrane materials, flashing materials, insulation, adhesive and all products to be installed as part of roofing system.
 - 1. Material safety and technical information data sheets for all roofing system components.
 - 2. Insulation:
 - a. Polyisocyanurate.
 - b. Composite HD polyisocyanurate.
 - 3. EPDM:
 - a. Membrane.
 - b. Self adhering flashing.
 - c. Adhesives.
 - d. Seam tape.
 - e. EPDM lap sealant.
 - f. Water cut off mastic.
 - 4. Mechanical Fasteners:
 - a. Nails.
 - b. Screw Fasteners.
 - 5. EPDM manufacturer's specification and instruction manual for all components of roofing system.
 - 6. Warranty: Sample copy of manufacturer's 20 year full roof system warranty.
 - 7. 2'-0" x 2'-0" rubber walkway pads.
 - 8. Vapor retarder materials.
 - 9. HD cover board.
 - 10. Substrate board.
- L. Shop Drawings:
 - 1. Submit shop drawings to the roofing system manufacturer for approval.
 - 2. Submit Manufacturer approved shop drawings to the Architect. Shop drawings shall exhibit compliance with standards and detailing as specified herein or as indicated in the drawings.

3. Minimum scale: 3" = 1'-0", except where otherwise specified. Manufacturer's standard details are unacceptable.
4. Submit:
 - a. Base flashing:
 - 1) Utilizing field ply EPDM as base flashing.
 - 2) Utilizing reinforced EPDM strip
 - b. Parapet roof edge with coping.
 - c. Mechanical/electrical equipment curbs.
 - d. Pipe penetration.
 - e. Expansion joints.
 - f. Pipe penetrations.
 - g. Overflow scupper detail.
 - h. Base conditions at mechanical penthouse.
 - i. Roof plan/insulation layout:
 - 1) Tapered insulation layout minimum scale 1/8" = 1'-0".
 - 2) Indicate all roof curbs, penetrations, required saddles, and crickets.
 - 3) NO FLAT SUMPS AT DRAINS PERMITTED.
 - j. Roof plan with proposed lap seam layout.
- M. Samples: Submit 1 manufacturer's samples of the following:
 1. Insulation:
 - a. Polyisocyanurate - (3) pieces.
 - b. Cover board.
 2. EPDM: 60 mil.
 3. Semi-cured self adhering EPDM cover strip.
 4. SPDM corner: Premolded, semi-cured self adhering.
 5. Seam tape.
 6. Fasteners, as indicated on the drawings:
 - a. Nails.
 - b. Screw fasteners w/stress plates.
 7. 1/8 x 1 inch aluminum termination bar.
 8. Rubber walkway pad.
 9. Premolded pipe boots: One of each size required.
 10. HD cover board.
 11. Substrate board.

1.06 SUBMITTALS FOR INFORMATION

- A. Section 01 30 00 - Administrative Requirements: Procedures for submittals.
- B. Manufacturer's Installation Instructions: Indicate special precautions required for seaming the membrane.
- C. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.
- D. Reports: Indicate procedures followed; ambient temperatures, humidity, wind velocity during application, work in progress and observations .

1.07 QUALITY ASSURANCE

- A. Manufacturer: Company specializing in manufacturing the products specified in this section with five years documented experience.
- B. Applicator/ Roofing Contractor must:
 1. Specialize in performing the work of this section with five continuous years documented experience as an approved applicator of one of the specified manufacturer's under the same company name.
 2. Be certified by the State of Illinois in accordance with the Illinois Roofing Industry Licensing Act, Senate Bill 1664, as amended.
 3. Have all crew members trained by the SPM manufacturer in the installation of their system. Written certification of same must be forwarded upon request.

- C. Have performed work in accordance with current published manufacturer's instructions and recommendations.

1.08 REGULATORY REQUIREMENTS

- A. Conform to applicable code for roof assembly fire hazard requirements.
- B. UL 790: Class A Fire Hazard Classification.
- C. Roof Assembly Classification of Class 1 Construction, The roofing manufacturer for all systems listed must present written evidence the roofing system is Class A fire rated and shall meet uplift require for wind speeds of 90 mph. (or higher as required by Code) The roofing Contractor shall provide a 75 mph manufactures extended wind speed coverage warranty

1.09 PRE-INSTALLATION MEETING

- A. Section 01 30 00 - Administrative Requirements: Pre-Installation meeting.
- B. Convene no less than one week before starting work of this section.
- C. Roof Foreman and Superintendent for this project - MUST BE IN ATTENDANCE.

1.10 DELIVERY, STORAGE, AND PROTECTION

- A. Section 01 60 00 - Product Requirements: Transport, handle, store, and protect products.
- B. All materials shall be new.
- C. Store products on clean raised pallets in weather protected environment, clear of ground and moisture per manufacturer's recommendations.
- D. Deliver all materials in manufacturer's original, unopened containers and rolls with all labels intact and legible.
- E. Deliver materials requiring fire resistance classification packaged with labels attached as required by the labeling service.
- F. Deliver materials in sufficient time and quality to allow continuity of work and compliance with approved construction schedule.
- G. Store rolled goods on end and handle rolled goods in manner to prevent damage to edges or ends.
- H. Provide continuous protection of materials against damage or deterioration.
- I. Remove damaged or defective materials from site.
- J. Roof Insulation:
 - 1. Store insulation on clean, raised platforms, remove manufacturer's wrappings and cover with breathable, waterproof weather protective coverings.
 - 2. Provide continuous protection of insulation materials against wetting and moisture absorption.
 - 3. Remove wet insulation materials from the project site.
 - 4. Once insulation becomes wet, it will be removed from the site and not used. Wet insulation which then dries shall be removed from the site, the same as wet insulation.
- K. Comply with fire and safety regulations.
- L. EPDM splice cleaner to be contained in UL approved safety cans at all times.
- M. All materials shall be new.
- N. Do not store material or park vehicles/dumpsters in front of doors.
- O. No materials shall be stored on any new or existing roofing system.

1.11 ENVIRONMENTAL REQUIREMENTS

- A. Section 01 60 00 - Product Requirements: Environmental conditions affecting products on site.
- B. Do not apply EPDM roofing membrane during inclement weather and/or ambient temperatures below 20 degrees F or above 95 degrees F.
- C. Do not apply roofing membrane to damp or frozen deck surface.

- D. Do not expose materials vulnerable to water or sun damage in quantities greater than can be weatherproofed during same day.
- E. All EPDM lap sealants mastics and adhesives must be kept at 60 degrees F prior to installation when the ambient temperature falls below 40 degrees.
- F. Do not install roofing materials when vapor retarder is damp, frost covered or wet.

1.12 COORDINATION

- A. Coordinate work under provisions of Section 01 30 00.
- B. Coordinate the work with the installation of trades whose impinges on the roofing and of associated metal flashings, as the work of this section proceeds.

1.13 PROTECTION

- A. Avoid repeated foot traffic and use of heavy equipment over completed roofing.
- B. Restore to original condition or replace all the work or materials damaged by roofing operations.
- C. Repair any damage to existing conditions caused by work of this section.
- D. Remove protection upon completion of the roofing work.

1.14 WARRANTY AND CLOSEOUT DOCUMENTS

- A. Refer to Section 01 70 00 - Closeout Submittals for additional information.
- B. Correct defective work within a two year period after Substantial Completion for damage to building resulting from failure to prevent penetration of water.
- C. The roofing manufacturer for all systems listed must present written evidence the roofing system is Class A fire rated and shall meet uplift require for wind speeds of 90 mph. (or higher as required by Code) The roofing Contractor shall provide a 75 mph manufactures extended wind speed coverage warranty
- D. General Contractor / Roofing Contractor: To provide manufacturer's 20 year No Dollar Limit (NDL) total roofing system warranty guaranteeing the materials manufacturer will pay for repairs to stop the leaks resulting from the natural deterioration of the roof system assembly or from any errors in application of the roof system assembly. Wind uplift requirement of 1-90
 - 1. Firestone Building Product Company Red Shield Roofing System amd Damage Repair Limited Warranty.
 - 2. Carlisle Golden Seal Total Roofing System Warranty with limited Hail Coverage: WA-F0015 (10/02)
 - 3. Johns Manville Gold Shield Roofing System Guarantee: October 1994; SI-645-2 (10/94).
 - 4. Versico Roofing Systems Total System Warranty.
 - 5. Warranty shall include all vapor retarder, insulation and cover board components and the labor to install same.
- E. General Trades/Coordinating Contractor shall include sheet metal as part of the roofing membrane full system edge to edge warranty.
- F. The guarantee shall start from the day of Final Inspection by the Architect and a "PASS" warranty inspection by the manufacturer's representative. The date shall be established as the date the Architect and the manufacturer's representative inspect the work and find that all work is complete in accordance with the Contract Documents and the manufacturer's printed instructions, and forms a watertight installation.
- G. The roofing contractor shall notify the Architect in writing when the roof is complete for final inspection.
- H. Warranty Inspection: The roofing contractor shall notify the Architect in writing when the roof system material manufacturer will conduct their warranty inspection.
 - 1. Copy of Warranty Inspection Checklist report shall be forwarded to the Architect.
- I. Completed Operations Inspection:

1. Upon completion of installation of EPDM roof system, an inspection of the entire roof system shall be made by Contractor to determine compliance with manufacturer's requirements. Submit written notice of same in accord with Section 01 70 00.
2. Upon completion of installation of EPDM roof system, Manufacturer shall certify in writing to the Architect, that materials, workmanship, and installation were in accordance with the manufacturer's printed instructions and current recommendations.

J. See Section 01 78 00 - Closeout Submittals, for additional warranty requirements.

PART 2 PRODUCTS

2.01 MANUFACTURERS- MEMBRANE MATERIAL

- A. Firestone Building Products Company: www.firestonebpco.com.
- B. Johns Manville: www.jm.com.
- C. Carlisle Syntec Systems: www.carlislesyntec.com.
- D. Versico Roofing Systems: www.versico.com.
- E. Substitutions: See section 01 60 00 - Product Requirements

2.02 MEMBRANE AND ASSOCIATED MATERIALS

- A. Membrane: EPDM Non-reinforced, 60 Mil thick, WHITE

	Properties	Test	Pass Test
1.	Tensile Strength	ASTM D412	1305 psi
2.	Elongation	ASTM D412	350%
3.	Tear Strength	ASTM D624 Die C	175#/in.
4.	Water Absorption	ASTM E96	0.1 perms
5.	Moisture Vapor Perms	ASTM E96	0.1 perms
6.	Resistant to Outdoor Weathering	ASTM D22	No cracks- No crazing
7.	Low Temperature Brittleness	ASTM D746	-75 degrees F.
8.	Ozone Resistance	ASTM D1149	No cracks
- B. Seaming Materials: As recommended by membrane manufacturer.

2.03 ADHESIVE MATERIALS

- A. Surface Conditioner: Compatible with membrane, as recommended by membrane manufacturer.
- B. Membrane Adhesives: As recommended by membrane manufacturer.
- C. Insulation Adhesive: As recommended by insulation manufacturer.
- D. Thinner and Cleaner: As recommended by adhesive manufacturer, compatible with sheet membrane.

2.04 COVER / SUBSTRATE BOARD

- A. HD Insulation Roof Cover Board: 1/2 inch thickness, Firestone ISOGARD HD or equal.
- B. Substrate board: 1/2 inch thickness, Dens Deck Prime or manufacturer's equal.

2.05 INSULATION

- A. Manufacturers:
 1. Carlisle Syntec.
 2. Firestone Building Products Company.
 3. Johns Manville.
 4. Versico Roofing Systems.
 5. Substitutions: See section 016000 Product Requirements
- B. Polyisocyanurate foam panels shall be HCFC free and formulated with hydrocarbon blowing agents chemically bonded during the foaming process to facers on top and bottom surfaces.
 1. Flat Insulation: Flat rigid board conforming to ASTM C1289 -01 Type II, Class I, Grade II, UL 1256 No. 120 and 123, UL 790 (ASTM E108) Class A, UI 263 (ASTM E119) FM 4450 /

4470 Class I fire rating, polyisocyanurate rigid board, both faces surfaced with fiber reinforced faces, with the following characteristics:

- a. Board Density: 2.0 lb/cu ft
 - b. Board Size: 4'-0" x 4'-0" or 4'-0" x 8'-0
 - c. Board Thickness: 2.6" or as required to achieve R-30. Must be in two layers of insulation
 - d. Thermal Conductivity: Aged R-value of 5.6/inch per ASTM C1303.
 - e. Board Compressive Resistance: 20 psi min. PER astm D 1621
 - f. Board Edges: Square
2. Tapered Insulation: Conforming to ASTM C1289 -01 Type II, Class I, Grade II, UL 1256 No. 120 and 123, UL 790 (ASTM E108) Class A, UI 263 (ASTM E119) FM 4450 / 4470 Class I fire rating, polyisocyanurate rigid board, both faces surfaced with fiber reinforced faces, with the following characteristics:
- a. Board Density: 2.0 lb/cu ft
 - b. Board Size: 4'-0" x 4'-0"
 - c. Board Taper: Beginning thickness 1/2", 3/16" and 1/2 inch/ft and 1/4 inch/ ft slope.
 - d. Thermal Conductivity : Aged R-value of 5.6/inch as per ASTM C1303.
 - e. Board Edges: Square
 - f. Board Compressive Resistance: 20 psi min.per ASTM D 1621
- C. HD Composite Board can be provided for areas where no saddles exist. HD Cover board will need to be provided at all saddles and crickets.

2.06 VAPOR RETARDER

- A. 2-Ply Vapor Retarter; Over Dens Deck. Firestone MB Base - torch applied. Cap Sheet: SBS Glass Torch Base. Or manufacturers equal. Vapor retarder will be used as a temporary roof. Temporary roof to be inspected prior to new roofing being installed. Contractor shall patch any area as required from inspection report with additional 2-ply vapor retarder.

2.07 FLASHINGS

- A. Flexible Flashings: Same material as membrane.
- B. EPDM Self-Adhering, Semi-cured, various widths required.
- C. EPDM Corners: Self-adhering, premolded, semi-cured; inside and outside.
- D. Copings, Fascias, Counterflashings and Misc. Sheet Metal: As specified in Section 07 62 10.
- E. Control or Expansion Joint Flashing: As detailed and as specified in Section 07 62 10.

2.08 ACCESSORIES

- A. Tapered Edge Strips: High density wood fiber, compatible with EPDM tapered edge strip manufactured configuration as detailed Provided by EPDM membrane manufacturer.
- B. Seam Tape: 3"
- C. Lap Seam Cover Strips: 5" minimum widths, semi-cured, self adhering EPDM as supplied by the roof system manufacturer.
- D. EPDM Lap Sealant: As provided by membrane manufacturer.
- E. Roofing Nails: Ring shank aluminum, size as required to suit application with 1" plastic washer heads.
- F. Insulation Fasteners: Appropriate for purpose intended and approved by system manufacturer; length required for thickness of material with metal washers; manufactured by EPDM manufacturer. Screw Fasteners to have buttress heads.
- G. Silicone Sealants: As recommended by membrane manufacturer.
- H. Walkway Pads: 2'-0" x 2'-0" EPDM QuickSeam Walkway Pads, Firestone or manufacturer's equal.
- I. EPDM Manufacturers Water Cut-Off Mastic: Provide as needed to sheet metal manufacturer.

- J. Foam Adhesive: Low rise ISO Spray by Firestone or compatible foam adhesive by manufacturer that is suitable to achieve the required warranty. Hot or cold weather foam adhesive shall be used as required by manufacturer.
- K. Miro Pipe Curbs: As required for application. Refer to Drawings.
- L. Termination Bars: 1/8 inch by 1 inch minimum as supplied by roofing manufacturer and provided by contractor.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that surfaces and site conditions are ready to receive work.
- B. Verify deck is supported and secure.
 - 1. Notify Owner of all conditions observed that will affect the performance of the roof system; copy Architect.
- C. Verify deck is clean and smooth, free of depressions, waves, or projections, properly sloped to drains.
- D. Verify deck surfaces are dry and free of snow or ice. Confirm dry deck by moisture meter with 12 percent moisture maximum.
- E. Verify roof openings, curbs, pipes, sleeves, ducts, and vents through roof are solidly set and wood blocking is in place.
- F. Verify that all work of subcontractors which penetrates roof deck or requires men and equipment to traverse roof deck has been completed.
- G. Do not issue a proceed order to the subcontractor or proceed with work until all defects are corrected to satisfaction of and with written approval of the roofing system manufacturer.
- H. Repair any minor sections of the roof deck which may have been damaged to provide smooth level surface.
- I. Do not install any roof insulation until all perimeter roof edge wood blocking is installed.
 - 1. Plywood APA.
 - 2. Dimension lumber shall be Douglas Fir, installed with staggered and scarfed joints, without buckles or warps and be screw fastened.
- J. Verify that all roof edge perimeter conditions are constructed prior to roof system installation.

3.02 PREPARATION - METAL DECK

- A. Clean and prime new and/or existing metal to receive self-adhered vapor barrier per manufacturers recommendations.
- B. Install 1/2" Dens Deck gypsum sheathing on metal deck with FM approved screw fasteners and stress plates into top flute of metal roof deck only. Quantity and spacing as required to meet uplift requirements.
- C. Lay sheathing with long side at right angle to flutes; stagger end joints; Ends must terminate on the top flute.
- D. Cut sheathing cleanly and accurately at roof breaks and protrusions to provide smooth surface.

3.03 ROOF SYSTEM INSTALLATION

- A. Install roofing with flashing systems and accessory items in strict accordance with system manufacturer's printed instructions current at the date of bidding documents. When items of conflict arise between the manufacturer's recommendations and the contract documents, the more stringent will govern unless it violates manufacturer's warranty requirements.
- B. Apply roof systems as follows: Reference the drawing sheets where the description of the roof systems are or list roof areas and roof systems construction for each.

3.04 VAPOR RETARDER APPLICATION

- A. Vapor Retarder: 2-ply bituminous.

1. Metal Roof Decks:
 - a. Install 1/2" layer of Dens Deck prime and mechanically fasten with FM approved screw fasteners and stress plates into top flute of metal roof deck only. Quantity and spacing as required to meet uplift requirements.
 - 1) Errant installed fasteners into the bottom flute are to be removed.
 - b. Starting at the low point, fully-adhere base sheet by heat fused to deck. Lapping sides a minimum of 3" and lapping ends of the roll a minimum 6". End laps to be staggered.
 - c. Starting at the low point, fully-adhere cap sheet by heat fused to base sheet. Lapping sides a minimum of 3" and lapping ends of the roll a minimum 6". End laps to be staggered.

3.05 INSULATION APPLICATION ADHESIVE APPLICATION: SPRAY FOAM

- A. Ensure vapor retarder is clean and dry.
- B. Apply adhesive to deck in accordance with adhesive and insulation manufacturer's instructions. Embed insulation into adhesive with full contact. Step into place and position so that no cupping occurs.
- C. For successive layer of insulation apply adhesive to the top surface of insulation. Embed the second layer of insulation into adhesive, with joints staggered minimum 12 inches from joints of first layer.
- D. Place the constant thickness first layer and the tapered thickness insulation second layer to the required slope pattern in accordance with manufacturer's instructions.
- E. Place each constant layer with staggered joints of 1/2 the board width. Similar to running bond. No checker board pattern of four corners touching.
- F. Place Boards perpendicular to deck flutes with edges over top flute surface for bearing support.
- G. Lay boards with edges in moderate contact without forcing. Cut insulation to fit neatly to perimeter blocking and around penetrations through roof.
- H. Lay tapered boards in full compliance with approved tapered insulation shop drawings layout.
- I. Apply no more insulation than can be covered with cover board and membrane in same day.
- J. Leading edge of tapered insulation shall be 1/2" with 0" to 1/2" tapered edge strips provided for a flush transition. Fully adhere.
- K. Install two-way tapered saddles and edge strips in adhesive, as indicated on the drawings. Step into place and position so that no cupping occurs.
- L. Joints between Insulation shall have surface joints 1/4" or less in width.
- M. Repair all joints or holes greater than 1/4" in diameter with same material.
- N. Field cut tapered and base insulation to fit around the differing deck elevations and roof curbs.
- O. Install spray foam into voids between roof curb and penetrations and insulation. Fill to top of insulation and cut flush.
- P. Tapered insulation shall originate at center of the roof drain and be cut perpendicular to the drain flange at the clamping ring.

3.06 COVER BOARD INSTALLTION ADHESIVE APPLICATION: SPRAY FOAM

- A. Install in full accordance with roof system manufacturer's recommendations.
- B. Embed the cover board layer of insulation into adhesive, with joints staggered minimum 12 inches from joints of insulation layer below.
- C. Place cover board layer with staggered joints of 1/2 the board width. Similar to running bond. No checker board pattern of four corners touching.
- D. Joints between boards to be 1/4 inch or less in width. Fill joints greater than 1/4 inch with same material per manufacturer's instructions.
- E. Embed with full contact and step into place. Position so that no creeping occurs. Provide weights at corners of cover board to prevent board raising from foam.

- F. Lay no more cover board than can be covered by EPDM roof membrane in the same day.

3.07 MEMBRANE

- A. Install non-reinforced 60 mil EPDM securement strip at the perimeter conditions.
- B. Broom substrate clean prior to rolling out EPDM to remove all contaminants, including foam insulation bleed out.
- C. Position membrane without stretching over the substrate.
 - 1. Inspect EPDM for punctures, deformation and/or manufacturer's imperfections. If observed, the EPDM sheet should be rejected. The patching of a new EPDM membrane is UNACCEPTABLE.
- D. Allow the membrane to relax for approximately 1/2 hour before adhering.
- E. Fold sheet in half longitudinally.
- F. Apply bonding adhesive to insulation and SPM after adhesive has dried to where it does not string or stick when pushed into with finger.
 - 1. Roll EPDM into bonding adhesive.
 - 2. Broom EPDM flush to insulation to achieve positive bonding.
- G. Repeat steps B through E for remaining portion of the roof.
- H. Membrane should be fully adhered to insulation cover board, perimeter wood blocking and roof curbs with bond adhesive and to securement strip with splice adhesive. Membrane should extend up and over perimeter wood blocking and down 1-1/2" minimum onto the masonry, fully adhere and nail 6" on center with cap nails on the same day installed.
- I. Exposed corners of the perimeter wood blocking are to be flashed with uncured EPDM extending 1" down onto masonry and nailed at 6" on center with cap nails.
- J. Install water cut-offs at end of the day's work using water cut-off mastic. Remove water cut-off mastic prior to beginning the next day's work.
- K. Where applicable, fold the EPDM field sheet into corners and create a "pig's ear" to eliminate excess material. Do not cut membrane. Adhere the pig's ear to the EPDM with splice adhesive.
- L. Lap joints shall be a minimum of 5"-0" from roof drains.
 - 1. Seams shall be water lapped.

3.08 LAP SEAM TAPE SPLICES

- A. Use manufacturer's weathered membrane cleaner to prepare all EPDM left open for 24 hours or more.
- B. All field lap seams to be fabricated using 3" tape adhesive.
- C. Shingle lay membrane 5" towards the roof drain.
- D. Mark 1" to the low side of the overlapping sheet with a crayon.
- E. Tack back the overlaying sheet with primer at 4"-0" on center.
- F. Thoroughly clean and prime membrane, both on the overlap and the under lap conditions. Allow to dry.
- G. When washing and priming seam, be sure to wash lengthwise across the sheet, except at factory seams where you should wash in direction of factory seam to remove talc.
- H. Install tape in proper alignment so it will protrude out 1/4" to 1/2" beyond the overlaying sheet.
- I. Roll seam tape with 4" hand roller. Using hand pressure only is not acceptable.
- J. Bring overlapping membrane over the top of the seam tape and release the paper.
- K. Remove release paper by pulling at a 45 degree angle.
- L. At seam tape laps, lap seam tape 1".
- M. Untack the EPDM sheet and allow it to fall into place.
- N. Following removal of the release paper, broom membrane into sealant tape.

- O. Roll seam with 1-1/2" silicone roller at 45 degree angle to the seam.
- P. Extreme care should be used in mating the EPDM lap seams at vertical transitions so there is a fully bonded 90 degree transition. FISH MOUTHS AT THE LAP SEAM ANGLE CHANGES ARE UNACCEPTABLE.
- Q. All products used in seam must be supplied by membrane manufacturer.
- R. After inspection by the Architect and acceptance of the lap seam, cover EPDM field lap seams to be covered with 6" uncured EPDM, self-adhering EPDM cover strips.

3.09 LAP SEAM COVER STRIPS

- A. Following Architect's inspection of lap seam and the Architect's approval of same, wash the lap seam and EPDM membrane 6" to each side of the lap seam edge to remove any accumulated debris with clean water.
- B. Scrub the power washed lap seam and EPDM membrane with water and soap, using a scrub brush. Rinse thoroughly.
- C. Splice wash cleaned area. Prime 6" to each side of lap splice edge.
- D. Install splice adhesive across the primed membrane with either a roller or a paint brush.
- E. When the splice adhesive has been flashed off and is tacky to a finger-push test, install a 5" min piece of self-adhering cured EPDM; center down lap splice edge.
- F. Thoroughly roll the self-adhering cured white EPDM cover strip into place with a rubber roller
 - 1. The salvaged adhesive edge of cover strip shall be thoroughly rolled into place.
 - 2. At cover strip laps and laps with other membranes, carefully roll along the covered edge.
- G. At the cover strip laps, tee joints and other membrane location laps, an uncured EPDM patch, large enough to extend a minimum of 3" beyond the lap in all directions is to be installed. All patch corners are to be ROUNDED.
- H. Splice wash all edges of the cured EPDM cover strip and the uncured EPDM patches.
- I. All lap seam cover strip application to be reviewed and approved by the Architect, prior to the installation of the rubber walkway pads.

3.10 ROOF CURB AND BASE FLASHING

- A. Prepare existing wall, curb etc for new membrane per manufacturers requirements.
- B. Verify void between roof curb and insulation has been sealed with spray foam.
- C. Use manufacturer's weathered membrane cleaner to prepare EPDM left open for 24 hours or more.
- D. Install manufacturers reinforced 60 mil EPDM securement strip fastened @ 12" o.c. If not possible, secure field membrane by screwing through metal anchor bar at 6" o.c. with approved screw fasteners.
- E. Extend roofing membrane up wall or vertical surface or over wood blocking nailer, as indicated and fully adhere to reinforcement strip vertical surface.
- F. Nail top of base flashing to wood nailer strip at 6" on center with 1" hard roofing nails with cap nails.
- G. All flashings and termination shall be done in accord with the manufacturer's standard details or as detailed, whichever is more stringent.
- H. Use prefabricated, self adhering corners where possible.
- I. Cover anchor bar strips with SPM flashing, extending above anchor bar and 6" out on horizontal roof surface.
- J. Apply appropriate adhesive to both the SPM flashing, the roofing membrane, and the curb wall.
- K. After the lap cement dries to a point where it does not string or stick to the dry finger touch, roll the base flashing into the adhesive and roll with steel roller to achieve positive bonding.

- L. Clean the edges of completed SPM flashing laps with an approved splice wash. Then apply the lap sealant along both edges of the SPM flashing - feather.
- M. All vertical splice laps shall be covered with a 5" minimum cover strip of uncured EPDM extend 3" beyond horizontally on the flat.
- N. Fold EPDM flashing into corners to create a "pig's ear" and eliminate excess material. Do not cut off membrane. Adhere "pig's ear" to SPM.
- O. Cover the vertical surfaces of end wall flashing with the uncured neoprene flashing. Apply SPM lap sealant to exposed edges of uncured neoprene flashing.
- P. Terminate top of flashing on masonry with 1/8 x 1 inch aluminum termination bar with manufacturer-approved expansion anchors at 6" on center.
 - 1. Install water cut-off mastic between masonry and SPM, prior to installation of termination bar.
 - 2. Cut EPDM flush to top of termination bar.
 - 3. Install Polyurethane lap sealant to top of termination bar.
- Q. Terminate vertical flashing ends on masonry with 1/8" aluminum termination bar with manufacturer-approved expansion anchors at 4 inches on center.
 - 1. Install the water-cut off mastic between masonry and SPM prior to installation of the termination bar.
 - 2. Cut EPDM flush to top of termination bar.
 - 3. Install Polyurethane lap sealant to top of termination bar.
- R. Cover termination bar with metal counterflashing.
- S. Remove all adhesive, lap sealant and/or seam tape stains from HVAC equipment and/or building components.
- T. Secure top of flashing on plywood and wood blocking with aluminum nails @ 4" o.c. Seal top of flashing with SPM Lap Sealant installed same day as flashing.
- U. The 1/8" thick aluminum termination bar must be installed atop base flashing on day base flashing is installed.

3.11 PIPE PENETRATIONS

- A. Verify void between roof curb and insulation has been sealed with spray foam.
- B. Use manufacturer's weathered membrane cleaner to prepare EPDM left open for 24 hours or more.
- C. Flash pipe with premolded pipe flashings with self adhering flange where installation is possible.
- D. Where the molded pipe flashings cannot be installed, use field fabricated flashing techniques using uncured white EPDM.
- E. Raise the pipe penetrations and roof vents to maintain a minimum of 8" projection above surface of new roof surface. Verify that all pipe penetrations extend to a minimum of 8 inches above the finished roof surface.
- F. Apply lap sealant at all flashing edges.
- G. Provide water cut-off mastic between the pipe and molded pipe flashing.
- H. Install stainless steel clamping ring around pipe at top of premolded pipe flashing.
- I. Install EPDM lap sealant at top pipe boot/field flashing.
- J. Premolded pipe boot:
 - 1. When flashing must be cut to fit pipe penetration and top of premolded boot is below 8" above EPDM, pipe penetration is to be wrapped in uncured EPDM.
 - 2. Top edge is to be a minimum of 8" above the SPM. Premolded pipe boot is then to be installed.
 - 3. Wrap all gas vent pipe penetration with cured black EPDM membrane following completion of field flashing.

a. Field Flashings:

- 1) Install stainless steel rain cap around pipe and over tip of field flashing.

3.12 ROOF DRAINS

- A. Insert base insulation and tapered insulation under drain extension ring. Twist extension ring tight into insulation.
- B. Originate and set tapered insulation at center of the drain as indicated in the drawings. Cut vertically in line with insulation below.
- C. Cut out insulation at roof drain, vertically at vertical interior face of drain. Insulation shall be a min of 4" at drain.
- D. Set cover board over roof drain and extension ring. Cut cover board insulation perpendicular to drain flange at the clamping ring.
- E. Extend EPDM over roof drain with lap seam greater than 5'-0" away. Cut a circular hole in the EPDM without end cuts or burrs on the EPDM, 1/2" maximum inside vertical wall of extension ring.
- F. Seal between the membrane and drain flange with water cut-off mastic, as indicated in manufacturer's standard details.
- G. Place a full tube of water cut-off mastic below the EPDM atop the roof drain extension flange.
- H. Set clamping rings and clamping ring bolts. Set and secure drain dome.

3.13 DAILY SEAL

- A. Stair step vapor barrier, insulation and cover board 12" each at end of working day. To provide the required staggering required above.
- B. Temporarily seal loose edges of membrane with water cut-off mastic or adhesive at end of the working day. Loose night seals are unacceptable.
 1. Surface shall be clean and dry.
 2. Apply water cut-off mastic at a rate of 100 lineal feet per gallon, 12" back from edge of sheet onto exposed surface.
 3. If necessary, use a trowel to spread material in order to achieve complete seal.
- C. After embedding the membrane in night seal, check for continuous contact. Weight edge, providing continuous pressure over length of the cut off.
- D. When the work is resumed, pull sheet face free before continuing installation.
- E. Cut off and remove a portion of EPDM with water cut-off mastic on it prior to commencing the next days roofing operations.

3.14 RUBBER WALKWAY PADS

- A. Install in full accordance with manufacturer's printed instructions as laid out on the drawings. If no roof walkway pads are shown on the drawings, provide 50 walkway pads to be located as directed by Architect.
- B. Verify location with Architect and Head of Maintenance or Director of Facilities.
- C. Place walkways 1" or less from the vertical face of roof hatches or roof curbs vertical surfaces.
- D. Provide rubber walkway pads to HVAC contractor, as needed, for use as pipe supports.

3.15 FIELD QUALITY CONTROL

- A. Section 01 40 00 - Quality Requirements: Field inspection and Testing.
- B. Correct identified defects or irregularities.

3.16 CLEANING

- A. Section 01 70 00 - Closeout Submittals: Cleaning installed work.
- B. In areas where finished surfaces are soiled by Work of this section, consult manufacturer of surfaces for cleaning advice and conform to their documented instructions.

- C. Repair or replace defaced or disfigured finishes caused by Work of this section.
- D. Remove all membrane adhesive stains from building surfaces and/ or roof top equipment.
- E. Remove all spray foam or asphalt adhesive from roof surfaces, building surfaces, or roof top equipment.

3.17 PROTECTION OF FINISHED WORK OR EXISTING ROOFING

- A. Section 01 70 00 - Closeout Submittals: Protecting installed work.
- B. Protect building surfaces against damage from roofing work.
- C. Where traffic must continue over finished roof membrane or path of travel is required over existing roofing protect surfaces with 1/2" plywood minimum over 1" rigid insulation.

END OF SECTION

SECTION 07 62 00
SHEET METAL FLASHING AND TRIM

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Copings, fascias, counterflashings, and fabricated sheet metal items and miscellaneous flashing.
- B. Manufactured sheet metal items, including copings.
- C. Fabricated sheet metal items, including flashings, counterflashings, expansion joint covers, scuppers and trim.
- D. Reglets and accessories.

1.02 RELATED SECTIONS

- A. Section 07 53 10 - Single Ply Roofing - Fully Adhered EPDM.
- B. Section 07 72 00 - Roofing Accessories.

1.03 REFERENCES

- A. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc Coated (Galvanized) by the Hot-Dip Process, Structural (Physical) Quality.
- B. ASTM B32 - Standard Specification for Solder Metal.
- C. ASTM D2178 - Standard Specification for Asphalt - Saturated Glass Felt Used in Roofing and Waterproofing.
- D. FS L-P-512 - Plastic Sheet (Sheeting), Polyethylene.
- E. FS TT-C-494 - Coating Compound, Bituminous, Solvent Type, Acid Resistant.
- F. CDA (Copper Development Association) - Copper in Architecture - Handbook.
- G. SMACNA (Sheet Metal and Air Conditioning Contractors National Association) - Architectural Sheet Metal Manual, Fifth Edition, 1993.

1.04 DESIGN REQUIREMENTS

- A. Sheet Metal Flashings: Comply with the criteria of SMACNA "Architectural Sheet Metal Manual."

1.05 SUBMITTALS FOR REVIEW

- A. Section 01 30 00 - Administrative Requirements: Procedures for submittals.
- B. Shop Drawings: Indicate material profile, jointing pattern, jointing details, fastening methods, flashings, terminations, and installation details.
- C. Product Data: Provide data on sheet metal material and prefabricated components.
- D. Samples: Submit two full size samples, 12" inches long illustrating typical coping material and finish. Include continuous cleats, backer plates, cover plates and/or drive cleats.
- E. Submit two manufacturer's color charts, illustrating metal finish colors.

1.06 SUBMITTALS AT PROJECT CLOSEOUT

- A. Section 01 78 00 - Closeout Submittals
- B. Warranty: Submit manufacturer's 20 year material warranty. Ensure forms have been completed in Owner's name and registered with manufacturer.
- C. Warranty: Submit contractor's two year workmanship warranty.

1.07 QUALITY ASSURANCE

- A. Perform work in accordance with SMACNA Architectural Sheet Metal Manual requirements and standard details, except as otherwise noted.

- B. Fabricator and Installer Qualifications: Company specializing in architectural sheet metal work with five years documented experience.

1.08 PRE-INSTALLATION MEETING

- A. Section 01 70 00 - Execution Requirements: Pre-installation meeting.
- B. Convene One week before starting work of this section.

1.09 DELIVERY, STORAGE, AND PROTECTION

- A. Section 01 60 00 - Product Requirements: Transport, handle, store, and protect.
- B. Stock material to prevent twisting, bending, and abrasion, and to provide ventilation. Slope metal sheets to ensure drainage.
 - 1. When material is stored on the roof it must be placed on ½" minimum plywood on 1" rigid insulation. Ends of plywood shall exceed end of sheet metal goods by 2'-0".
- C. Prevent contact with materials which may cause discoloration or staining.
- D. All field cutting of sheet metal performed over new roofing shall be permitted only where the new roof is protected by ½" minimum plywood on 1" rigid insulation.

1.10 PROJECT CONDITIONS

- A. Project Coordination: Section 01 30 00 - Administrative Requirements.

1.11 WARRANTY

- A. See Section 01 78 00 - Closeout Submittals.
- B. Sheet Metal Contractor to issue workmanship warranty to correct defective work within a two year period after Date of Substantial Completion. Defective work includes failure of watertightness or seals and oil canning due to rupture restricted expansion/contractors or faulty workmanship.
- C. General Contractor / Roofing Contractor shall include sheet metal as part of the roofing membrane full system edge to edge warranty.
- D. Material warranty from the sheet metal manufacturer for a period of 20 years against deterioration of color, chalking and film integrity.

PART 2 PRODUCTS

2.01 SHEET MATERIALS

- A. Pre-Finished Galvanized Steel Sheet: ASTM A653/A653M, G90 zinc coating; 0.02 inch, 24 gauge core steel, shop pre-coated with PVDF (polyvinylidene fluoride) coating; color as selected from manufacturer's standard.

2.02 ACCESSORIES

- A. Fasteners: Stainless steel with neoprene washers.
- B. Primer: Zinc molybdate type.
- C. Protective Backing Paint: Zinc molybdate alkyd.
- D. Silicone Sealants:
 - 1. Dow Corning Corp; Product: 790: www.dow.com.
 - 2. GE Silicones; Product: Silpruf LM CS 2700/ SilPruf SCS 2000: www.gesealants.com.
 - 3. Pecora Corporation; Product: 890: www.pecora.com.
 - 4. Sika; Product: Sikaflex-15LM: www.sika.com.
 - 5. Tremco, Inc; Product: Spectrum 1: www.tremcosealants.com.
 - 6. Substitutions: See Section 01 60 00 - Product Requirements.

2.03 FABRICATION - GENERAL

- A. Fabricate continuous cleats of same materials as coping minimum 3 inches wide, interlocking with sheet a min. of ½". See drawing for gauge.
 - 1. Drill pilot holes at 6" o.c. for attachment to wood.
 - 2. Drill pilot holes at 6" o.c. for attachment to masonry or concrete.

- B. All fastener locations will have predrilled pilot holes:
 - 1. Nails - 1/4" diameter @ 6" o.c.
 - 2. Screw Fasteners - 5/16" diameter @ 1'-0" o.c.
- C. Form pieces in longest possible lengths.
- D. Hem exposed edges on underside 1/2 inch; miter and seam corners.
- E. Form material with flat lock seams, except where otherwise indicated. At moving joints, use sealed lapped, bayonet-type or interlocking hooked seams.
- F. Tin edges of copper sheet to be soldered. Solder shop formed metal joints. After soldering, remove flux. Wipe and wash solder joints clean. Weather seal joints.
- G. Fabricate corners from one piece with minimum 24-inch long legs; drive cleat for rigidity, seal with sealant and post finished to match adjacent finish.
- H. Fabricate vertical faces with bottom edge formed outward 1/2 inch and hemmed to form drip.
- I. Fabricate flashings to allow toe to extend 2 inches over roofing. Return and brake edges.
- J. Anchorage Devices: in accordance with SMACNA requirements.
- K. Seal metal joints.

2.04 FACTORY FINISHING

- A. PVDF coating: Multiple coat, thermally cured, fluoropolymer system conforming to AAMA 605.2.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify existing conditions before starting work.
- B. Verify roof openings, curbs, pipes, sleeves, ducts, and vents through roof are solidly set, reglets in place, and nailing strips located.
- C. Verify roofing termination and base flashings are in place, sealed, and secure.
 - 1. Verify that surfaces to receive sheet metal are smooth and clean will not impinge upon the integrity of the sheet metal.
- D. Verify that all wood blocking to receive sheet metal is properly installed, anchored without warps and covered with EPDM or vapor barrier.
- E. Do not start sheet metal work until conditions relevant to sheet metal work are acceptable. Commencing of work will indicate acceptance of condition.

3.02 PREPARATION

- A. Install starter and edge strips, and cleats before starting installation.
- B. Lay out joints to be symmetrical about the building corners. May require more than one run be cut down to attain symmetry.
- C. Paint dissimilar metals with bituminous paint to form a complete barrier.

3.03 INSTALLATION - SHOP FABRICATED METAL

- A. Insert flashings into reglets to form tight fit. Secure in place with lead wedges. Pack remaining spaces with foam rod. Prime surfaces to receive sealant and seal flashings into reglets with sealant.
- B. Secure flashings in place using concealed fasteners as indicated in the drawings.
 - 1. Apply plastic cement compound between metal flashings and felt flashings.
 - a. Fit flashings tight in place. Make corners square, surfaces true and straight in planes, and lines accurate to profiles. Install work watertight, without buckles, warps, fastening stresses or distortion. Allow for expansion and contraction.
- C. Extreme care should be taken by Sheet Metal Contractor not to puncture the roofing membrane with metal. All metal trimmings shall be placed in an on-roof-top container.

- D. Verify height of aluminum roof base flashing termination bar allows for installation of counterflashing and sealant below weep holes and throughwall flashing.
- E. Continuous Cleats: Set in water cut-off mastic supplied by the Roofing Contractor or sealant, as indicated in the drawings. Secure to the surface with nail fasteners through 1/4-inch predrilled pilot holes at 6-inch on center. Or per requirements as shown on the Drawings.
- F. Copings: Set continuous cleat in a full bed of water cut-off mastic supplied by the roofing contractor. Set the outside and inside corners. Secure with stainless steel Type A point screw fasteners with neoprene washers that are covered with sealant, following Architect's approval.
 - 1. Lay out coping joints symmetrical about the building corners. May require multiple cutting at 10'-0" lengths to achieve same. Install backer plates at joint locations. Nail through predrilled 1/4-inch pilot holes. Apply continuous sealant to backer plate vertical and horizontal surfaces as indicated in drawings.
 - 2. Run joints at +10'-0", except where the cut pieces are required for symmetry between existing corners.
 - 3. Secure coping to continuous cleat and pull coping over roof edge wood block. Cut 10'-0" lengths to size to provide symmetrical placement between existing building corners.
 - 4. Verify coping is tight to wood blocking. Ancho stainless steel screw fasteners, Type A points with neoprene washers. Cover with sealant, following Architect's approval.
 - 5. Install sealant to each side of joints.
 - 6. Install drive cleat.
- G. Fascias:
 - 1. Set continuous cleat in full bed of sealant or water cut-off mastic supplied by Roofing Contractor, as indicated in the drawings. Secure with nails at 4" on center through 1/4" pre-drilled pilot holes.
 - 2. Set the outside and inside corners. Secure with nails at 4" o.c. through 1/4" pre-drilled pilot holes.
 - 3. Lay out fascia joints symmetrical about corners. May require multiple cutting to achieve lengths of 10'-0".
 - 4. Apply continuous sealant to backer plate vertical and horizontal surfaces as indicated in drawings.
 - 5. Secure fascia to continuous cleat and nail at 4" o.c. through 1/4-inch pre-drilled pilot holes.
- H. Counterflashing:
 - 1. Overlap the base flashing a minimum of 3".
 - 2. Install continuous butyl caulk tape to vertical portion of the counterflashing.
 - 3. Secure to the masonry with 1-1/4" x 3/16" tapcons with climaseal corrosion resistive coating and neoprene washers at 1'-0" on center through 5/16" pre-drilled pilot holes. Cover with sealant following the Architect's approval.
 - 4. Lap counterflashing pieces 3" with bead of sealant and between pieces.
 - 5. Cover fastener heads with sealant after the Architect's approval.
 - 6. Fill sealant reservoir with sealant to shed water.
 - 7. Counterflashing Corner Pieces: Install pieces per Steps 1 through 6 in 3.3.I. above.
- I. Expansion Joint Covers:
 - 1. Lay out joint locations to be symmetrical about ends.
 - 2. Set backer plates in full bed of water cut-off mastic.
 - 3. Install sealant to both sides of top and vertical joint location on backer plate.
 - 4. Set cover pieces, centering joint on backer plates.
 - a. Install cleats at sloped horizontal joint locations. Lock into hems. Nail in place. Cover nail head with sealant.
 - b. Install 1-1/4" x 1/4" tapcon screw fasteners with climaseal corrosion coating and neoprene washers or Type "A" point stainless steel screw fasteners with neoprene washers, where indicated, at 1'-0" o.c. through 3/16" pre-drilled pilot holes.
 - 5. Install sealant to expansion joint cover drive cleat hems.
 - 6. Install drive cleat at cover joints, center on hems and close end.

7. Install expansion joint cover as shown in detail. Hand crimp lock seam at short leg.
 8. Install sealant into expansion joint cover drive cleat hems.
 9. Install drive cleat close ends.
 10. Close end of expansion joint as indicated on drawings.
- J. Scupper Openings:
1. Fit scupper sections in place. Lock seams.
 2. Nail flanges over wood blocking.
 - a. Secure trim flanges utilizing tapcon screw fasteners with climaseal corrosion resistive coating and neoprene washers at 4" on center.
- K. End Wall Flashings:
1. Set in full bed of water cut-off mastic.
 2. Secure with screw fasteners through 1/4" pre-drilled pilot holes as indicated on drawings.
 3. Coordinate installation with roofing contractor.
 4. Have the roofing contractor flash in vertical flange of end wall flashing.
 5. Install coping, or standing seam siding, over the end wall flashing by:
 - a. Secure to end wall flashing vertical flange and pulling coping over the roof edge wood blocking, or, securing to the continuous clip and laying against mansard.
- L. Miscellaneous Flashings: Install as indicated on Drawings.
1. Coordinate with interfacing contractors.

3.04 INSTALLATION - PREFABRICATED METAL ROOF EDGE SYSTEM

- A. Install per manufactures requirements and accordance with the requirements of ANSI/SPRI ES-1.

3.05 CLEANING

- A. Leave material clean and free of stains.
- B. Remove all sheet metal debris from roof top daily.
- C. Remove all sheet metal debris from site daily.

3.06 FIELD QUALITY CONTROL

- A. Section 01 40 00 - Quality Requirements: Field inspection.
- B. Inspection will involve surveillance of work during installation to ascertain compliance with specified requirements.

END OF SECTION

SECTION 07 72 00
ROOF ACCESSORIES

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Roof hatches.
- B. Non-penetrating roof hatch safety rail assemblies.
- C. Roof hatch access ladder.

1.02 RELATED REQUIREMENTS

- A. Section 05 50 00 - Metal Fabrications: Shop-fabricated steel ladder assemblies.
- B. Section 07 53 10 - Single Ply Roofing - Fully Adhered EPDM.
- C. Section 07 61 00 - Sheet Metal Roofing.

1.03 REFERENCE STANDARDS

- A. 29 CFR 1910.23 - Ladders; current edition.
- B. ANSI A14.3 - American National Standard for Ladders -- Fixed -- Safety Requirements; 2018.
- C. AAMA 611 - Voluntary Specification for Anodized Architectural Aluminum; 2014 (2015 Errata).
- D. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products; 2017.
- E. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware; 2016a.
- F. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2020.
- G. ASTM B211/B211M - Standard Specification for Aluminum and Aluminum-Alloy Rolled or Cold Finished Bar, Rod, and Wire; 2019.
- H. FM P7825 - Approval Guide; Factory Mutual Research Corporation; current edition.
- I. MSS SP-58 - Pipe Hangers and Supports - Materials, Design, Manufacture, Selection, Application, and Installation; 2018.
- J. UL (DIR) - Online Certifications Directory; Current Edition.

1.04 SUBMITTALS

- A. See Section 01 30 00 - 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.

1.05 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.

1.06 WARRANTY

- A. See Section 01 78 00 - Closeout Submittals, for additional warranty requirements.

PART 2 PRODUCTS

2.01 ROOF HATCH / NON-PENETRATING ROOF HATCH SAFETY RAIL ASSEMBLIES

- A. Roof Hatch Manufacturers:
 - 1. Acudor Products Inc: www.acudor.com.
 - 2. Bilco Company: www.bilco.com.
 - 3. Milcor, Inc: www.milcorinc.com.
 - 4. Substitutions: See Section 01 60 00 - Product Requirements.
- B. Frames and Curbs: One-piece curb and frame with integral cap flashing to receive roof flashings; extended bottom flange to suit mounting.
 - 1. Frame and Curb shall be a Bilco insulated Thermally Broken Roof Hatch or manufactures equal
 - 2. Material: Mill finished aluminum, 11 gauge, 0.0907 inch thick.
 - 3. Insulation: 3" insulation; double-lined.
 - 4. Curb Height: 12 inches from finished surface of roof, minimum.
- C. 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: Neoprene, continuous around cover perimeter.
- D. Safety Railing System: Manufacturer's standard accessory safety rail system mounted (non-penetrating to curb and roof membrane) directly to curb.
 - 1. Basis of Design: Safety Rail Company: SRC Hatchguard
 - 2. Railing: Comply with 29 CFR 1910.23 for ladder safety, with a safety factor of two.
 - 3. Posts and Rails: Steel tube.
 - 4. Gate: Same material as railing; automatic closing with latch.
 - 5. Finish: Manufacturer's standard, factory applied finish.
 - 6. Safety Zone: Provide 2-foot safe landing zone.
 - 7. Manufacturers:
 - a. Safety Rail Company: SRC Hatchguard: www.safetyrailcompany.com
 - b. Substitutions: Not permitted.

2.02 ROOF HATCH ACCESS LADDER

- A. 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.
 - 2. Side rails members spaced 24 inches
 - 3. Rungs spaced at 12 inches on center
 - 4. Space rungs 7 inches from the wall surface or hatch curb interior. Which ever is less
 - 5. Top of rung of ladder to be within 6" of the hatch cover
 - 6. Bottom rung of ladder to be within 12" of the floor
 - 7. Mounting brackets to be spaced at 48" oc max
 - 8. Fit and shop assemble items in largest practical sections, for delivery to site.
 - 9. Fabricate items with joints tightly fitted and secured.
 - 10. Exposed Mechanical Fastenings: Flush countersunk screws or bolts; unobtrusively located; consistent with design of component, except where specifically noted otherwise.
 - 11. Supply components required for anchorage of fabrications. Fabricate anchors and related components of same material and finish as fabrication, except where specifically noted otherwise.
 - 12. Materials: Aluminum; ASTM B211/B211M, 6063 alloy, T52 temper.
 - 13. Finish: Manufacturer's standard clear anodized coating, comply with AAMA 611, Class 1.
 - 14. Manufacturers:

- a. O'Keeffe's Inc; Model 501: www.okeeffes.com.
- b. Precision Ladders, LLC; Fixed Aluminium Wall Ladder: www.precisionladders.com.
- c. Substitutions: See Section 01 60 00 - Product Requirements.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Do not begin installation until substrates have been properly prepared.
- B. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

3.02 PREPARATION

- A. Clean surfaces thoroughly prior to installation.
- 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.

3.04 CLEANING

- A. 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 81 00
APPLIED FIRE PROTECTION

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Applied fire protection of structural steel exposed to damage or moisture.
- B. Preparation of applied fire protection for application of exposed overcoat finish.

1.02 RELATED REQUIREMENTS

- A. Section 05 12 00 - Structural Steel Framing.
- B. Section 05 21 00 - Steel Joist Framing.
- C. Section 05 31 00 - Steel Decking.
- D. Section 07 84 00 - Firestopping.

1.03 REFERENCE STANDARDS

- A. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2020.
- B. ASTM E605/E605M - Standard Test Methods for Thickness and Density of Sprayed Fire-Resistive Material (SFRM) Applied to Structural Members; 1993, with Editorial Revision (2015).
- C. ASTM E736/E736M - Standard Test Method for Cohesion/Adhesion of Sprayed Fire-Resistive Materials Applied to Structural Members; 2019.
- D. ASTM E759/E759M - Standard Test Method for Effect of Deflection on Sprayed Fire-Resistive Material Applied to Structural Members; 1992 (Reapproved 2020).
- E. ASTM E760/E760M - Standard Test Method for Effect of Impact on Bonding of Sprayed Fire-Resistive Material Applied to Structural Members; 1992 (Reapproved 2020).
- F. ASTM E761/E761M - Standard Test Method for Compressive Strength of Sprayed Fire-Resistive Material Applied to Structural Members; 1992 (Reapproved 2020).
- G. ASTM E859/E859M - Standard Test Method for Air Erosion of Sprayed Fire-Resistive Material (SFRMs) Applied to Structural Members; 1993 (Reapproved 2020).
- H. ASTM E937/E937M - Standard Test Method for Corrosion of Steel by Sprayed Fire-Resistive Material (SFRM) Applied to Structural Members; 1993 (Reapproved 2020).
- I. ASTM G21 - Standard Practice for Determining Resistance of Synthetic Polymeric Materials to Fungi; 2015.
- J. UL (FRD) - Fire Resistance Directory; Current Edition.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Coordinate with placement of mechanical component hangers and electrical components.
- B. Preinstallation Meeting: Convene one week before starting work of this section.

1.05 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittals procedures.
- B. Product Data: Provide data indicating product characteristics.
- C. Manufacturer's Certificate: Certify that applied fireproofing products meet or exceed requirements of Contract Documents.
- D. Test Reports: Reports from reputable independent testing agencies for proposed products, indicating compliance with specified criteria, conducted under conditions similar to those on project, as follows:
 - 1. Bond strength.
 - 2. Bond impact.
 - 3. Compressive strength.

- 4. Fire tests using substrate materials similar those on project.
- E. Manufacturer's Installation Instructions: Indicate special procedures.
- F. Field Quality Control Submittals: Submit field test report.
- G. Manufacturer Reports: Indicate environmental conditions that applied fireproofing materials were installed.
- H. Manufacturer's Qualification Statement.
- I. Installer's Qualification Statement.

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 the type specified and with at least five years of documented experience

1.07 MOCK-UP

- A. Construct mock-up, 100 square feet in size.
- B. Comply with project requirements for fire ratings.
- C. Locate where directed.
- D. Examine installation within one hour of application to determine variances from specified requirements due to shrinkage, temperature, and humidity.
- E. Where shrinkage and cracking are evident, adjust mixture and method of application as necessary; remove materials and re-construct mock-up.
- F. Mock-up may remain as part of the Work.

1.08 FIELD CONDITIONS

- A. Do not apply fireproofing when temperature of substrate material and surrounding air is below 40 degrees F or when temperature is predicted to be below said temperature for 24 hours after application.
- B. Provide ventilation in areas to receive fireproofing during application and 24 hours afterward, to dry applied material.
- C. Provide temporary enclosure to prevent spray from contaminating air.
- D. Do not allow roof traffic during installation of roof fireproofing and drying period.

1.09 WARRANTY

- A. See Section 01 78 00 - Closeout Submittals, for additional warranty requirements.
- B. Correct defective Work within a two year period after Date of Substantial Completion.
 - 1. Include coverage for fireproofing to remain free from cracking, checking, dusting, flaking, spalling, separation, and blistering.
 - 2. Reinstall or repair failures that occur within warranty period.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Applied Fire Protection:
 - 1. GCP Applied Technologies: www.gcpat.com.
 - 2. Isolatek International Corp: www.isolatek.com.
 - 3. Southwest Fireproofing Products Company: www.sfrm.com.
 - 4. Substitutions: See Section 01 60 00 - Product Requirements.

2.02 APPLIED FIRE PROTECTION ASSEMBLIES

- A. Provide assemblies as indicated on drawings.
- B. UL listings with a Load Restriction are not allowed.

- C. Provide fire resistance ratings for following building elements as required by local building code:
 - 1. Roof construction, including supporting beams, roof deck, and joists, 1 hours.

2.03 MATERIALS

- A. Applied Fire Protection Material Exposed to Damage or Moisture: Manufacturer's standard factory mixed material, which when combined with water is capable of providing indicated fire resistance, and complying with following requirements:
 - 1. Recommended by manufacturer for permanent exterior exposure.
 - 2. Composition: Portland cement-based; not mineral fiber-based.
 - 3. Bond Strength: 1,000 psf, minimum, when tested in accordance with ASTM E736/E736M when set and dry.
 - 4. Dry Density: As required by fire resistance design.
 - 5. Effect of Impact on Bonding: No cracking, spalling or delamination, when tested in accordance with ASTM E760/E760M.
 - 6. Corrosivity: No evidence of corrosion, when tested in accordance with ASTM E937/E937M.
 - 7. Air Erosion Resistance: Weight loss of 0.025 g/sq ft, maximum, when tested in accordance with ASTM E859/E859M after 24 hours.
 - 8. Surface Burning Characteristics: Maximum flame spread index of 0 (zero) and maximum smoke developed index of 0 (zero), when tested in accordance with ASTM E84.
 - 9. Fungal Resistance: No growth after 28 days when tested according to ASTM G21.

2.04 ACCESSORIES

- A. Primer Adhesive: Of type recommended by applied fire protection manufacturer.
- B. Overcoat: As recommended by manufacturer of applied fire protection material.
- C. Water: Clean, potable.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that surfaces are ready to receive fireproofing.
- B. Verify that clips, hangers, supports, sleeves, and other items required to penetrate fireproofing are in place.
- C. Verify that ducts, piping, equipment, or other items that would interfere with application of fireproofing have not been installed.
- D. Verify that voids and cracks in substrate have been filled.
- E. Verify that projections have been removed where fireproofing will be exposed to view as a finish material.

3.02 PREPARATION

- A. Perform tests as recommended by fireproofing manufacturer in applications where adhesion of fireproofing to substrate is in question.
- B. Remove incompatible materials that could effect bond by scraping, brushing, scrubbing, or sandblasting.
- C. Prepare substrates to receive fireproofing in strict accordance with instructions of fireproofing manufacturer.
- D. Apply fireproofing manufacturer's recommended bonding agent on primed steel.
- E. Protect surfaces not scheduled for fireproofing and equipment from damage by overspray, fall-out, and dusting.
- F. Close off and seal duct work in areas where fireproofing is being applied.

3.03 APPLICATION

- A. Apply primer adhesive in accordance with manufacturer's instructions.

- B. Apply fireproofing in uniform thickness and density as necessary to achieve required ratings.
- C. Apply overcoat at the rate recommended by fireproofing manufacturer.

3.04 FIELD QUALITY CONTROL

- A. Perform field inspection and testing in accordance with Section 01 40 00 - Quality Requirements.
- B. Inspect installed fireproofing after application and curing for integrity, prior to its concealment.
 - 1. Submit field test reports promptly to General Trades/Coordinating Contractor and Architect.
- C. Ensure that actual thicknesses, densities, and bond strengths meet requirements for specified ratings and requirements of authorities having jurisdiction (AHJ).
- D. Repair or replace applied fireproofing at locations where test results indicate fireproofing does not meet specified requirements.
- E. Re-inspect installed fireproofing for integrity of fire protection, after installation of subsequent Work.

3.05 CLEANING

- A. Remove excess material, overspray, droppings, and debris.
- B. Remove fireproofing from materials and surfaces not required to be fireproofed.
- C. At exposed fireproofing, clean surfaces that have become soiled or stained, using manufacturer's recommended procedures.

END OF SECTION

SECTION 07 84 00
FIRESTOPPING

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Firestopping systems.
- B. Firestopping of joints and penetrations in fire resistance rated and smoke resistant assemblies, whether indicated on drawings or not, and other openings indicated.

1.02 RELATED REQUIREMENTS

- A. Section 04 20 02 - Single-Wythe Unit Masonry.
- B. Section 07 81 00 - Applied Fire Protection.
- C. Section 09 21 16 - Gypsum Board Assemblies: Gypsum wallboard fireproofing.

1.03 REFERENCE STANDARDS

- A. ASTM E119 - Standard Test Methods for Fire Tests of Building Construction and Materials; 2020.
- B. ASTM E814 - Standard Test Method for Fire Tests of Penetration Firestop Systems; 2013a (Reapproved 2017).
- C. ASTM E2393 - Standard Practice for On-Site Inspection of Installed Fire Resistive Joint Systems and Perimeter Fire Barriers; 2020.
- D. ASTM E2837 - Standard Test Method for Determining the Fire Resistance of Continuity Head-of-Wall Joint Systems Installed Between Rated Wall Assemblies and Nonrated Horizontal Assemblies; 2013 (Reapproved 2017).
- E. ASTM G21 - Standard Practice for Determining Resistance of Synthetic Polymeric Materials to Fungi; 2015.
- F. ITS (DIR) - Directory of Listed Products; current edition.
- G. FM 4991 - Approval Standard for Firestop Contractors; 2013.
- H. FM (AG) - FM Approval Guide; current edition.
- I. SCAQMD 1168 - Adhesive and Sealant Applications; 1989 (Amended 2017).
- J. UL 1479 - Standard for Fire Tests of Penetration Firestops; Current Edition, Including All Revisions.
- K. UL 2079 - Standard for Tests for Fire Resistance of Building Joint Systems; Current Edition, Including All Revisions.
- L. UL (DIR) - Online Certifications Directory; Current Edition.
- M. UL (FRD) - Fire Resistance Directory; Current Edition.

1.04 SUBMITTALS

- A. See Section 01 30 00 - 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.
- D. Manufacturer's Installation Instructions: Indicate preparation and installation instructions.
- E. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.
- F. Installer Qualification: Submit qualification statements for installing mechanics.

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.

1. Listing in UL (FRD), FM (AG), or ITS (DIR) will be considered as constituting an acceptable test report.
 2. Valid evaluation report published by ICC Evaluation Service, Inc. (ICC-ES) at www.icc-es.org will be considered as constituting an acceptable test report.
 3. Submission of actual test reports is required for assemblies for which none of the above substantiation exists.
- 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:
 - a. Verification of minimum five years documented experience installing work of this type.
 - b. Verification of at least five satisfactorily completed projects of comparable size and type.
 - c. Licensed by local authorities having jurisdiction (AHJ).

1.06 MOCK-UP

- 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. If accepted, mock-up will represent minimum standard for the Work.
- C. If accepted, mock-up may remain as part of the 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.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Firestopping Manufacturers:
1. Basis of Design Manufacturer:
 - a. Hilti, Inc: www.us.hilti.com.
 2. Other Acceptable Manufacturers:
 - a. 3M Fire Protection Products: www.3m.com/firestop.
 - b. A/D Fire Protection Systems Inc: www.adfire.com.
 - c. Nelson FireStop Products: www.nelsonfirestop.com.
 - d. Specified Technologies Inc: www.stifirestop.com.
 - e. Tremco Commercial Sealants & Waterproofing: www.tremcosealants.com.
 - f. Substitutions: See Section 01 60 00 - 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 ratings.

2.03 FIRESTOPPING ASSEMBLY REQUIREMENTS

- A. Head-of-Wall Joint System Firestopping at Joints Between Fire-Rated Wall Assemblies and Non-Rated Horizontal Assemblies: Use system that has been tested according to ASTM E2837 to have fire resistance F Rating equal to required fire rating of floor or wall, whichever is greater.
- B. Floor-to-Floor, Wall-to-Wall, and Wall-to-Floor Joints, Except Perimeter, Where Both Are Fire-Rated: Use system that has been tested according to ASTM E1966 or UL 2079 to have fire resistance F Rating equal to required fire rating of the assembly in which the joint occurs.
 - 1. Listing by FM (AG), ITS (DIR), UL (DIR), or UL (FRD) in their certification directories will be considered evidence of successful testing.
- 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.
 - 1. Listing by FM (AG), ITS (DIR), UL (DIR), or UL (FRD) in their certification directories will be considered evidence of successful testing.

2.04 FIRESTOPPING FOR FLOOR-TO-FLOOR, WALL-TO-FLOOR, AND WALL-TO-WALL JOINTS

- A. Concrete and Concrete Masonry Walls and Floors:
 - 1. Floor to Floor Joints:
 - a. 2 Hour Construction: UL System FF-D-1013; Hilti CFS-SP WB Firestop Joint Spray and CP 672.
 - 2. Top of Wall Joints at Concrete/Concrete Masonry Wall to Concrete Over Metal Deck Floor:
 - a. 2 Hour Construction: UL System HW-D-0181; Hilti CFS-SP WB Firestop Joint Spray and CP 672.
 - b. 2 Hour Construction: UL System HW-D-1037; Hilti CFS-SP WB Firestop Joint Spray and CP 672.
 - 3. Top of Wall Joints at Concrete/Concrete Masonry Wall to Concrete Floor:
 - a. 3 Hour Construction: UL System HW-D-1058; Hilti CFS-SP WB Firestop Joint Spray and CP 672.
 - b. 2 Hour Construction: UL System HW-D-0268; Hilti CP 606 Flexible Firestop Sealant.
 - 4. Concrete/Concrete Masonry Wall to Wall Joint Systems That Have Movement Capabilities (Dynamic):
 - a. 2 Hour Construction: UL System WW-D-0017; Hilti CFS-SP WB Firestop Joint Spray and CP 672.
 - b. 2 Hour Construction: UL System WW-D-0032; Hilti CP 606 Flexible Firestop Sealant.
- B. Gypsum Board Walls:
 - 1. Wall to Wall Joints That Have Movement Capabilities (Dynamic):
 - a. 2 Hour Construction: UL System WW-D-0067; Hilti CP 606 Flexible Firestop Sealant.
 - b. 1 Hour Construction: UL System WW-D-0067; Hilti CP 606 Flexible Firestop Sealant.
 - 2. Top of Wall Joints at Underside of Steel Beam and Concrete Over Metal Deck Floor with Sprayed On Fireproofing:
 - a. 2 Hour Construction: UL System HW-D-0259; Hilti CFS-SP WB Firestop Joint Spray and CP 672.
 - b. 1 Hour Construction: UL System HW-D-0259; Hilti CFS-SP WB Firestop Joint Spray and CP 672.
 - 3. Top of Wall Joints at Underside of Flat Concrete:
 - a. 2 Hour Construction: UL System HW-D-1068; Hilti CFS-SP WB Firestop Joint Spray and CP 672.
 - b. 2 Hour Construction: UL System HW-D-0757; Hilti CFS-TTS Top Track Seal.
 - c. 1 Hour Construction: UL System HW-D-1068; Hilti CFS-SP WB Firestop Joint Spray and CP 672.
 - d. 1 Hour Construction: UL System HW-D-0757; Hilti CFS-TTS Top Track Seal.
 - 4. Top of Wall Joints at Concrete Over Metal Deck, Wall Parallel to Ribs:
 - a. 2 Hour Construction: UL System HW-D-0049; Hilti CFS-SP WB Firestop Joint Spray and CP 672.

- b. 2 Hour Construction: UL System HW-D-0184; Hilti CP 606 Flexible Firestop Sealant.
- c. 1 Hour Construction: UL System HW-D-0049; Hilti CFS-SP WB Firestop Joint Spray and CP 672.
- d. 1 Hour Construction: UL System HW-D-0184; Hilti CP 606 Flexible Firestop Sealant.
- 5. Top of Wall Joints at Concrete Over Metal Deck, Wall Perpendicular to Ribs, Cut to Fit Ribs:
 - a. 2 Hour Construction: UL System HW-D-0045; Hilti CP 606 Flexible Firestop Sealant.
 - b. 1 Hour Construction: UL System HW-D-0045; Hilti CP 606 Flexible Firestop Sealant.
- 6. Top of Wall Joints at Concrete Over Metal Deck, Wall Perpendicular to Ribs, Not Cut to Fit:
 - a. 2 Hour Construction: UL System HW-D-0042; Hilti CFS-SP WB Firestop Joint Spray and CP 672.
 - b. 2 Hour Construction: UL System HW-D-0045; Hilti CP 606 Flexible Firestop Sealant.
 - c. 1 Hour Construction: UL System HW-D-0042; Hilti CFS-SP WB Firestop Joint Spray and CP 672.
 - d. 1 Hour Construction: UL System HW-D-0045; Hilti CP 606 Flexible Firestop Sealant.

2.05 FIRESTOPPING PENETRATIONS THROUGH CONCRETE AND CONCRETE MASONRY CONSTRUCTION

- A. Penetrations Through Floors or Walls By:
 - 1. Multiple Penetrations in Large Openings:
 - a. 3 Hour Construction: UL System C-AJ-8099; Hilti FS-ONE MAX Intumescent Firestop Sealant.
 - b. 3 Hour Construction: UL System C-AJ-8110; Hilti CFS-BL Firestop Block.
 - c. 2 Hour Construction: UL System C-AJ-8143; Hilti FS-ONE MAX Intumescent Firestop Sealant.
 - 2. Uninsulated Metallic Pipe, Conduit, and Tubing:
 - a. 3 Hour Construction: UL System C-AJ-1184; Hilti FS-ONE MAX Intumescent Firestop Sealant.
 - b. 3 Hour Construction: UL System C-AJ-1226; Hilti FS-ONE MAX Intumescent Firestop Sealant.
 - c. 3 Hour Construction: UL System C-AJ-1421; Hilti FS-ONE MAX Intumescent Firestop Sealant or CP 604 Self-Leveling Firestop Sealant.
 - d. 3 Hour Construction: UL System C-AJ-1425; Hilti CFS-S SIL GG Firestop Silicone Sealant Gun-Grade.
 - e. 2 Hour Construction: UL System C-AJ-1226; Hilti FS-ONE MAX Intumescent Firestop Sealant.
 - f. 2 Hour Construction: UL System C-AJ-1425; Hilti CFS-S SIL GG Firestop Silicone Sealant Gun-Grade.
 - 3. Uninsulated Non-Metallic Pipe, Conduit, and Tubing:
 - a. 3 Hour Construction: UL System C-AJ-2109; Hilti CP 643N/644 Firestop Collar.
 - b. 3 Hour Construction: UL System C-AJ-2220; Hilti FS-ONE MAX Intumescent Firestop Sealant.
 - c. 3 Hour Construction: UL System C-AJ-2342; Hilti CP-E/S Firestop Wrap Strip.
 - d. 2 Hour Construction: UL System C-AJ-2167; Hilti FS-ONE MAX Intumescent Firestop Sealant.
 - e. 2 Hour Construction: UL System C-AJ-2109; Hilti CP 643N/644 Firestop Collar.
 - f. 2 Hour Construction: UL System C-BJ-2021; Hilti CP 643N Firestop Collar.
 - 4. Electrical Cables Not In Conduit:
 - a. 3 Hour Construction: UL System C-AJ-3095; Hilti FS-ONE MAX Intumescent Firestop Sealant.
 - b. 3 Hour Construction: UL System C-AJ-3208; Hilti CP 618 Firestop Putty Stick.
 - c. 2 Hour Construction: UL System C-AJ-3216; Hilti CFS-PL Firestop Plug.
 - d. 2 Hour Construction: UL System C-AJ-3283; Hilti CP653 Speed Sleeve.
 - e. 2 Hour Construction: UL System C-AJ-3283; Hilti CP653 Speed Sleeve.

- f. 2 Hour Construction: UL System W-J-3198; Hilti CFS-SL RK Retrofit Sleeve Kit for existing cables.
 - g. 2 Hour Construction: UL System W-J-3199; Hilti CFS-SL SK Firestop Sleeve Kit.
 - 5. Cable Trays with Electrical Cables:
 - a. 3 Hour Construction: UL System C-AJ-4093; Hilti CFS-BL Firestop Block.
 - b. 2 Hour Construction: UL System C-AJ-4094; Hilti CFS-BL Firestop Block.
 - 6. Electrical Busways:
 - a. 3 Hour Construction: UL System C-AJ-6017; Hilti FS-ONE MAX Intumescent Firestop Sealant.
 - 7. Insulated Pipes:
 - a. 3 Hour Construction: UL System C-AJ-5090; Hilti FS-ONE MAX Intumescent Firestop Sealant.
 - b. 2 Hour Construction: UL System C-AJ-5048; Hilti FS-ONE MAX Intumescent Firestop Sealant, CP 606 Flexible Firestop Sealant, CP 601S Elastomeric Firestop Sealant, CP 604 Self-Leveling Firestop Sealant or CFS-S SIL GG Firestop Silicone Sealant Gun-Grade.
 - c. 2 Hour Construction: UL System C-AJ-5091; Hilti FS-ONE IMAX intumescent Firestop Sealant.
 - 8. HVAC Ducts, Uninsulated:
 - a. 3 Hour Construction: UL System C-AJ-7051; Hilti FS-ONE MAX Intumescent Firestop Sealant.
 - b. 2 Hour Construction: UL System C-AJ-7111; Hilti FS-ONE MAX Intumescent Firestop Sealant.
- B. Penetrations Through Floors By:
 - 1. Multiple Penetrations in Large Openings:
 - a. 3 Hour Construction: UL System F-A-1023; Hilti CP 680-P/M Cast-In Device.
 - b. 2 Hour Construction: UL System F-A-8012; Hilti CFS-S SIL GG Firestop Silicone Sealant Gun-Grade or CFS-S SIL SL Firestop Silicone Sealant Self-Leveling.
 - 2. Uninsulated Metallic Pipe, Conduit, and Tubing:
 - a. 3 Hour Construction: UL System F-A-1017; Hilti CP 680-P/M Cast-In Device.
 - b. 2 Hour Construction: UL System F-A-1016; Hilti CP 680-P/M Cast-In Device.
 - 3. Uninsulated Non-Metallic Pipe, Conduit, and Tubing:
 - a. 3 Hour Construction: UL System F-A-2054; Hilti CP 680-P Cast-In Device.
 - b. 3 Hour Construction: UL System F-A-2066; Hilti CP 680-P Cast-In Device.
 - c. 3 Hour Construction: UL System F-A-2213; Hilti CFS-DID Drop-In Device.
 - d. 2 Hour Construction: UL System F-A-2065; Hilti CP 680-P Cast-In Device.
 - e. 2 Hour Construction: UL System F-A-2213; Hilti CFS-DID Drop-In Device.
 - f. 2 Hour Construction: UL System F-A-2053; Hilti CP 680-P Cast-In Device.
 - 4. Electrical Cables Not In Conduit:
 - a. 3 Hour Construction: UL System F-A-3033; Hilti CP 680-P/M Cast-In Device.
 - b. 2 Hour Construction: UL System F-A-3033; Hilti CP 680-P/M Cast-In Device.
 - 5. Electrical Busways:
 - a. 3 Hour Construction: UL System C-AJ-6017; Hilti CFS-S SIL GG Firestop Silicone Sealant Gun-Grade or CFS-S SIL SL Firestop Silicone Sealant Self-Leveling.
 - b. 2 Hour Construction: UL System F-A-6002; Hilti CP 604 Self-Leveling Firestop Sealant.
 - 6. Insulated Pipes:
 - a. 3 Hour Construction: UL System F-A-5016; Hilti CP 680-P Cast-In Device.
 - b. 3 Hour Construction: UL System F-A-5018; Hilti CP 680-P Cast-In Device.
 - c. 2 Hour Construction: UL System F-A-5015; Hilti CP 680-P/M Cast-In Device.
 - d. 2 Hour Construction: UL System F-A-5017; Hilti CP 680-P/M Cast-In Device.
- C. Penetrations Through Walls By:
 - 1. Uninsulated Metallic Pipe, Conduit, and Tubing:

- a. 2 Hour Construction: UL System W-J-1067; Hilti FS-ONE MAX Intumescent Firestop Sealant.
 - b. 1 Hour Construction: UL System W-J-1067; Hilti FS-ONE MAX Intumescent Firestop Sealant.
- 2. Electrical Cables Not In Conduit:
 - a. 2 Hour Construction: UL System C-AJ-3095; Hilti FS-ONE MAX Intumescent Firestop Sealant.
 - b. 2 Hour Construction: UL System C-AJ-3216; Hilti CFS-PL Firestop Plug.
- 3. Insulated Pipes:
 - a. 2 Hour Construction: UL System C-AJ-5090; Hilti FS-ONE MAX Intumescent Firestop Sealant.
 - b. 2 Hour Construction: UL System C-AJ-5091; Hilti FS-ONE MAX Intumescent Firestop Sealant.
 - c. 1 Hour Construction: UL System C-AJ-5090; Hilti FS-ONE MAX Intumescent Firestop Sealant.
 - d. 1 Hour Construction: UL System C-AJ-5091; Hilti FS-ONE MAX Intumescent Firestop Sealant.
- 4. HVAC Ducts, Uninsulated:
 - a. 2 Hour Construction: UL System W-J-7109; Hilti FS-ONE MAX Intumescent Firestop Sealant or CP 606 Flexible Firestop Sealant.
- 5. HVAC Ducts, Insulated:
 - a. 2 Hour Construction: UL System W-J-7112; Hilti FS-ONE MAX Intumescent Firestop Sealant.

2.06 FIRESTOPPING PENETRATIONS THROUGH GYPSUM BOARD WALLS

- A. Penetrations By:
 - 1. Multiple Penetrations in Large Openings:
 - a. 2 Hour Construction: UL System W-L-1408; Hilti FS-ONE MAX Intumescent Firestop Sealant.
 - b. 2 Hour Construction: UL System W-L-8013; Hilti CFS-BL Firestop Block.
 - c. 2 Hour Construction: UL System W-L-8071; Hilti FS-ONE MAX Intumescent Firestop Sealant.
 - d. 2 Hour Construction: UL System W-L-8079; Hilti FS-ONE MAX Intumescent Firestop Sealant.
 - e. 1 Hour Construction: UL System W-L-1408; Hilti FS-ONE MAX Intumescent Firestop Sealant.
 - f. 1 Hour Construction: UL System W-L-8013; Hilti CFS-BL Firestop Block.
 - g. 1 Hour Construction: UL System W-L-8071; Hilti FS-ONE MAX Intumescent Firestop Sealant.
 - h. 1 Hour Construction: UL System W-L-8079; Hilti FS-ONE MAX Intumescent Firestop Sealant.
 - 2. Uninsulated Metallic Pipe, Conduit, and Tubing:
 - a. 2 Hour Construction: UL System W-L-1054; Hilti FS-ONE MAX Intumescent Firestop Sealant.
 - b. 2 Hour Construction: UL System W-L-1164; Hilti FS-ONE MAX Intumescent Firestop Sealant.
 - c. 2 Hour Construction: UL System W-L-1506; Hilti CFS-D Firestop Cable Disc.
 - d. 1 Hour Construction: UL System W-L-1054; Hilti FS-ONE MAX Intumescent Firestop Sealant.
 - e. 1 Hour Construction: UL System W-L-1164; Hilti FS-ONE MAX Intumescent Firestop Sealant.
 - f. 1 Hour Construction: UL System W-L-1506; Hilti CFS-D Firestop Cable Disc.
 - 3. Uninsulated Non-Metallic Pipe, Conduit, and Tubing:
 - a. 2 Hour Construction: UL System W-L-2078; Hilti CP 643N/644 Firestop Collar.

- b. 2 Hour Construction: UL System W-L-2128; Hilti FS-ONE MAX Intumescent Firestop Sealant.
 - c. 1 Hour Construction: UL System W-L-2078; Hilti CP 643N/644 Firestop Collar.
 - d. 1 Hour Construction: UL System W-L-2128; Hilti FS-ONE MAX Intumescent Firestop Sealant.
- 4. Electrical Cables Not In Conduit:
 - a. 2 Hour Construction: UL System W-L-3065; Hilti FS-ONE MAX Intumescent Firestop Sealant, CP 606 Flexible Firestop Sealant, CD 601S Elastomeric Firestop Sealant, or CP 618 Firestop Putty Stick.
 - b. 2 Hour Construction: UL System W-L-3334; Hilti CP 653 Speed Sleeve.
 - c. 2 Hour Construction: UL System W-L-3393; Hilti CFS-SL RK Retrofit Sleeve Kit for existing cables.
 - d. 2 Hour Construction: UL System W-L-3395; Hilti CP653 Speed Sleeve.
 - e. 2 Hour Construction: UL System W-L-3414; Hilti CFS-D Firestop Cable Disc.
 - f. 1 Hour Construction: UL System W-L-3065; Hilti FS-ONE MAX Intumescent Firestop Sealant, CP 606 Flexible Firestop Sealant, CD 601S Elastomeric Firestop Sealant, or CP 618 Firestop Putty Stick.
 - g. 1 Hour Construction: UL System W-L-3334; Hilti CP 653 Speed Sleeve.
 - h. 1 Hour Construction: UL System W-L-3393; Hilti CFS-SL RK Retrofit Sleeve Kit for existing cables.
 - i. 1 Hour Construction: UL System W-L-3414; Hilti CFS-D Firestop Cable Disc.
- 5. Cable Trays with Electrical Cables:
 - a. 2 Hour Construction: UL System W-L-4011; Hilti CFS-BL Firestop Block.
 - b. 2 Hour Construction: UL System W-L-4060; Hilti FS-ONE MAX Intumescent Firestop Sealant.
 - c. 1 Hour Construction: UL System W-L-4011; Hilti CFS-BL Firestop Block.
 - d. 1 Hour Construction: UL System W-L-4060; Hilti FS-ONE MAX Intumescent Firestop Sealant.
- 6. Insulated Pipes:
 - a. 2 Hour Construction: UL System W-L-5028; Hilti FS-ONE MAX Intumescent Firestop Sealant.
 - b. 2 Hour Construction: UL System W-L-5029; Hilti FS-ONE Intumescent Firestop Sealant.
 - c. 1 Hour Construction: UL System W-L-5028; Hilti FS-ONE MAX Intumescent Firestop Sealant.
 - d. 1 Hour Construction: UL System W-L-5029; Hilti FS-ONE Intumescent Firestop Sealant.
- 7. HVAC Ducts, Insulated:
 - a. 2 Hour Construction: UL System W-L-7156; Hilti FS-ONE MAX Intumescent Firestop Sealant.
 - b. 1 Hour Construction: UL System W-L-7156; Hilti FS-ONE MAX Intumescent Firestop Sealant.

2.07 FIRESTOPPING SYSTEMS

- A. Firestopping: Any material meeting requirements.
 - 1. Fire Ratings: Use system that is listed by FM (AG), ITS (DIR), or UL (FRD) and tested in accordance with ASTM E814, ASTM E119, or UL 1479 with F Rating equal to fire rating of penetrated assembly and minimum T Rating Equal to F Rating and in compliance with other specified requirements.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify openings are ready to receive the work of this section.

3.02 PREPARATION

- A. Clean substrate surfaces of dirt, dust, grease, oil, loose material, or other materials that could adversely affect bond of firestopping material.
- B. Remove incompatible materials that could adversely affect bond.
- C. Install backing materials to prevent liquid material from leakage.

3.03 INSTALLATION

- A. Install materials in manner described in fire test report and in accordance with manufacturer's instructions, completely closing openings.

3.04 FIELD QUALITY CONTROL

- A. Independent Testing Agency: Inspection agency employed and paid by Owner, will examine penetration firestopping in accordance with ASTM E2174, and ASTM E2393.
- B. Repair or replace penetration firestopping and joints at locations where inspection results indicate firestopping or joints do not meet specified requirements.

3.05 CLEANING

- A. Clean adjacent surfaces of firestopping materials.

3.06 PROTECTION

- A. Protect adjacent surfaces from damage by material installation.

END OF SECTION

SECTION 07 90 05
JOINT SEALERS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Sealants and joint backing.

1.02 RELATED REQUIREMENTS

- A. Section 04 27 23 - Single-Wythe Unit Masonry.
- B. Section 07 24 00 - Exterior Insulation and Finish Systems.
- C. Section 08 11 13 - Hollow Metal Doors and Frames.
- D. Division 22: Plumbing Fixtures.

1.03 REFERENCE STANDARDS

- A. ASTM C834 - Standard Specification for Latex Sealants; 2017.
- B. ASTM C919 - Standard Practice for Use of Sealants in Acoustical Applications; 2012 (Reapproved 2017).
- C. ASTM C920 - Standard Specification for Elastomeric Joint Sealants; 2018.
- D. ASTM C1193 - Standard Guide for Use of Joint Sealants; 2016.
- E. ASTM C1311 - Standard Specification for Solvent Release Sealants; 2014.
- F. ASTM D1056 - Standard Specification for Flexible Cellular Materials--Sponge or Expanded Rubber; 2014.
- G. ASTM D1667 - Standard Specification for Flexible Cellular Materials--Poly(Vinyl Chloride) Foam (Closed-Cell); 2017.
- H. ASTM D2240 - Standard Test Method for Rubber Property--Durometer Hardness; 2015.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Coordinate the work with other sections referencing this section.

1.05 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide data indicating sealant chemical characteristics, performance criteria, substrate preparation, limitations, and color availability.
- C. Samples: Submit two samples, 6 inch in size illustrating sealant colors for selection.
- D. Manufacturer's Installation Instructions: Indicate special procedures.

1.06 QUALITY ASSURANCE

- A. Maintain one copy of each referenced document covering installation requirements on site.
- B. Manufacturer Qualifications: Company specializing in manufacturing the Products specified in this section with minimum five years documented experience.
- C. Applicator Qualifications: Company specializing in performing the work of this section with minimum five years documented experience and approved by manufacturer.

1.07 MOCK-UP

- A. Construct mock-up with specified sealant types and with other components noted.
- B. Locate where directed.
- C. Mock-up may remain as part of the Work.

1.08 FIELD CONDITIONS

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

1.09 WARRANTY

- A. See Section 01 78 00 - Closeout Submittals, for additional warranty requirements.
- B. Correct defective work within a five year period after Date of Substantial Completion.
- C. Warranty: Include coverage for installed sealants and accessories which fail to achieve airtight seal, exhibit loss of adhesion or cohesion, or do not cure.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Gunnable and Pourable Sealants:
 - 1. Dow Corning Corporation: www.dowcorning.com.
 - 2. Momentive Performance Materials, Inc (formerly GE Silicones): www.momentive.com.
 - 3. Pecora Corporation: www.pecora.com.
 - 4. Tremco Global Sealants: www.tremcosealants.com.
 - 5. Substitutions: See Project Manual - Volume 1: Section 01 62 00 - Product Substitutions.

2.02 SEALANTS

- A. Type S-1 - General Purpose Exterior Sealant: Polyurethane; ASTM C920, Grade NS, Class 25 minimum; Uses M, G, and A; single component.
 - 1. Color: To be selected by Architect from manufacturer's standard range.
 - 2. Applications: Use for:
 - a. Joints between concrete and other materials.
 - b. Joints between metal frames and other materials.
 - c. Other exterior joints for which no other sealant is indicated.
- B. Type S-2 - Exterior Expansion Joint Sealer: Precompressed foam sealer; urethane with water-repellent;
 - 1. Face color: As selected by Architect from manufacturer's full line of colors..
 - 2. Size as required to provide weathertight seal when installed.
 - 3. Applications: Use for:
 - a. Exterior wall expansion joints.
- C. Type S-3 - General Purpose Interior Sealant: Acrylic emulsion latex; ASTM C834, Type OP, Grade NF single component, paintable.
 - 1. Color: To be selected by Architect from manufacturer's standard range.
 - 2. Applications: Use for:
 - a. Interior wall and ceiling control joints.
 - b. Joints between door and window frames and wall surfaces.
 - c. Other interior joints for which no other type of sealant is indicated.
- D. Type S-4 - Bathtub/Tile Sealant: White silicone; ASTM C920, Uses I, M and A; single component, mildew resistant.
 - 1. Applications: Use for:
 - a. Joints between plumbing fixtures and floor and wall surfaces.
 - b. Joints between kitchen and bath countertops and wall surfaces.
- E. Type S-4 - Acoustical Sealant for Concealed Locations:
 - 1. Composition: Acrylic latex emulsion sealant.
 - 2. Applications: Use for concealed locations only:
 - a. Sealant bead between top stud runner and structure and between bottom stud track and floor.
- F. Type S-5 - Concrete Paving Joint Sealant: Polyurethane, self-leveling; ASTM C920, Class 25, Uses T, I, M and A; single component.
 - 1. Color: Color as selected.
 - 2. Applications: Use for:
 - a. Joints in sidewalks and vehicular paving.

2.03 ACCESSORIES

- A. Primer: Non-staining type, recommended by sealant manufacturer to suit application.
- B. Joint Cleaner: Non-corrosive and non-staining type, recommended by sealant manufacturer; compatible with joint forming materials.
- C. Joint Backing: Round foam rod compatible with sealant; ASTM D1667, closed cell PVC; oversized 30 to 50 percent larger than joint width.
- D. Bond Breaker: Pressure sensitive tape recommended by sealant manufacturer to suit application.

PART 3 EXECUTION

3.01 EXAMINATION

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

3.02 PREPARATION

- A. Remove loose materials and foreign matter that could impair adhesion of sealant.
- B. Clean and prime joints in accordance with manufacturer's instructions.
- C. Perform preparation in accordance with manufacturer's instructions and ASTM C1193.
- D. Protect elements surrounding the work of this section from damage or disfigurement.
- E. Exposed Concrete Floor Joints: Test joint filler in inconspicuous area of floor slab. Verify specified product does not stain or discolor slab.

3.03 INSTALLATION

- A. Perform work in accordance with sealant manufacturer's requirements for preparation of surfaces and material installation instructions.
- B. Perform installation in accordance with ASTM C1193.
- C. Perform acoustical sealant application work in accordance with ASTM C919.
- D. Measure joint dimensions and size joint backers to achieve the following:
 - 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 where joint backing is not used.
- F. Install sealant free of air pockets, foreign embedded matter, ridges, and sags.
- G. Apply sealant within recommended application temperature ranges. Consult manufacturer when sealant cannot be applied within these temperature ranges.
- H. Tool joints concave.
- I. Precompressed Foam Sealant: Do not stretch; avoid joints except at corners, ends, and intersections; install with face 1/8 to 1/4 inch below adjoining surface.

3.04 CLEANING

- A. Clean adjacent soiled surfaces.

3.05 PROTECTION

- A. Protect sealants until cured.

END OF SECTION

SECTION 08 11 13
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. Hollow metal frames for wood doors.
- D. Thermally insulated hollow metal doors with frames.
- E. Hollow metal borrowed lites glazing frames.

1.02 RELATED REQUIREMENTS

- A. Section 08 14 16 - Flush Wood Doors: Non-hollow metal door for hollow metal frames.
- B. Section 08 71 00 - Door Hardware.
- C. Section 08 80 00 - Glazing: Glass for doors and borrowed lites.
- D. Section 09 91 23 - Interior Painting: Field painting.

1.03 ABBREVIATIONS AND ACRONYMS

- A. ANSI: American National Standards Institute.
- B. ASCE: American Society of Civil Engineers.
- C. HMMA: Hollow Metal Manufacturers Association.
- D. NAAMM: National Association of Architectural Metal Manufacturers.
- E. NFPA: National Fire Protection Association.
- F. SCIF: Sensitive Compartmented Information Facility.
- G. SDI: Steel Door Institute.
- H. UL: Underwriters Laboratories.

1.04 REFERENCE STANDARDS

- A. ADA Standards - Americans with Disabilities Act (ADA) Standards for Accessible Design; 2010.
- B. ANSI/SDI A250.3 - Test Procedure and Acceptance Criteria for Factory Applied Finish Coatings for Steel Doors and Frames; 2007 (Reaffirmed 2011).
- C. ANSI/SDI A250.4 - Test Procedure and Acceptance Criteria for Physical Endurance for Steel Doors, Frames and Frame Anchors; 2011.
- D. ANSI/SDI A250.6 - Recommended Practice for Hardware Reinforcing on Standard Steel Doors and Frames; 2003 (R2009).
- E. ANSI/SDI A250.8 - Specifications for Standard Steel Doors and Frames (SDI-100); 2014.
- F. ANSI/SDI A250.10 - Test Procedure and Acceptance Criteria for Prime Painted Steel Surfaces for Steel Doors and Frames; 2011.
- G. ASCE 7 - Minimum Design Loads and Associated Criteria for Buildings and Other Structures; Most Recent Edition Cited by Referring Code or Reference Standard.
- H. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2020.
- I. ASTM A1008/A1008M - Standard Specification for Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, Solution Hardened, and Bake Hardenable; 2018.
- 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; 2018a.

- K. ASTM C143/C143M - Standard Test Method for Slump of Hydraulic-Cement Concrete; 2015a.
- L. ASTM C476 - Standard Specification for Grout for Masonry; 2020.
- M. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2020.
- N. ASTM E90 - Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements; 2009 (Reapproved 2016).
- O. ASTM E330/E330M - Standard Test Method for Structural Performance of Exterior Windows, Doors, Skylights and Curtain Walls by Uniform Static Air Pressure Difference; 2014.
- P. ASTM F1450 - Standard Test Methods for Hollow Metal Swinging Door Assemblies for Detention and Correctional Facilities; 2012a.
- Q. BHMA A156.115 - American National Standard for Hardware Preparation in Steel Doors and Steel Frames; 2016.
- R. ICC A117.1 - Accessible and Usable Buildings and Facilities; 2017.
- S. ITS (DIR) - Directory of Listed Products; current edition.
- T. NAAMM HMMA 805 - Recommended Selection and Usage Guide for Hollow Metal Doors and Frames; 2012.
- U. NAAMM HMMA 830 - Hardware Selection for Hollow Metal Doors and Frames; 2002.
- V. NAAMM HMMA 831 - Hardware Locations for Hollow Metal Doors and Frames; 2011.
- W. NAAMM HMMA 840 - Guide Specifications For Receipt, Storage and Installation of Hollow Metal Doors and Frames; 2007.
- X. NAAMM HMMA 850 - Fire-Protection and Smoke Control Rated Hollow Metal Door and Frame Products; 2014.
- Y. NAAMM HMMA 860 - Guide Specifications for Hollow Metal Doors and Frames; 2018.
- Z. NAAMM HMMA 861 - Guide Specifications for Commercial Hollow Metal Doors and Frames; 2014.
- AA. NFPA 80 - Standard for Fire Doors and Other Opening Protectives; 2016.
- AB. NFPA 252 - Standard Methods of Fire Tests of Door Assemblies; 2017.
- AC. SDI 117 - Manufacturing Tolerances for Standard Steel Doors and Frames; 2013.
- AD. UL (DIR) - Online Certifications Directory; Current Edition.
- AE. UL 10B - Standard for Fire Tests of Door Assemblies; Current Edition, Including All Revisions.
- AF. UL 10C - Standard for Positive Pressure Fire Tests of Door Assemblies; Current Edition, Including All Revisions.
- AG. UL 1784 - Standard for Air Leakage Tests of Door Assemblies; Current Edition, Including All Revisions.

1.05 SUBMITTALS

- A. See Section 01 30 00 - 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.
- D. Installation Instructions: Manufacturer's published instructions, including any special installation instructions relating to this project.
- E. Manufacturer's Certificate: Certification that products meet or exceed specified 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 five years of documented experience.
- C. Maintain at project site copies of reference standards relating to installation of products specified.

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.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Hollow Metal Doors and Frames:
 - 1. Ceco Door, an Assa Abloy Group Company: www.assaabloydss.com.
 - 2. Curries, an Assa Abloy Group Company: www.assaabloydss.com.
 - 3. Fleming Door Products, an Assa Abloy Group Company: www.assaabloydss.com.
 - 4. Philipp Manufacturing Company: www.philipp-mfg.com.
 - 5. Republic Doors, an Allegion Brand: www.republicdoor.com.
 - 6. Steelcraft, an Allegion Brand: www.allegion.com.
 - 7. 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; galvanized 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. Exterior Door Top Closures: Flush end closure channel, with top and door faces aligned.
 - 4. Door Edge Profile: Manufacturers standard for application indicated.
 - 5. Typical Door Face Sheets: Flush.
 - 6. Glazed Lights: Non-removable stops on non-secure side; sizes and configurations as indicated on drawings. Style: Manufacturers standard.
 - 7. 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.
 - 8. Zinc Coating for Typical Interior and/or Exterior Locations: Provide metal components zinc-coated (galvanized) and/or zinc-iron alloy-coated (galvanized) 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 (galvanized) when necessary, coating not required for typical interior door applications, and at least A60/ZF180 (galvanized) for corrosive locations.
- B. 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 1 - Full Flush.
 - d. Door Face Metal Thickness: 16 gauge, 0.053 inch, minimum.
 - e. Zinc Coating: A60/ZF180 galvanized coating; ASTM A653/A653M.
 - 2. Door Core Material: Vertical steel stiffeners with fiberglass batts.
 - a. Polyurethane Insulation: Manufacturer's standard board insulation with maximum flame spread index (FSI) of 75, and maximum smoke developed index (SDI) of 450 in accordance with ASTM E84, and completely enclosed within interior of door.
 - 3. Door Thermal Resistance: R-Value of 2.50 - minimum.
 - 4. Door Thickness: 1-3/4 inches, nominal.
- 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 1 - Full Flush.
 - d. Door Face Metal Thickness: 16 gauge, 0.053 inch, minimum.
 - e. Zinc Coating: A60/ZF180 galvanized coating; ASTM A653/A653M.
 - 2. Door Thickness: 1-3/4 inches, nominal.
- D. Fire-Rated Doors:
 - 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 1 - Full Flush.
 - d. Door Face Metal Thickness: 16 gauge, 0.053 inch, minimum.
 - e. Zinc Coating: A60/ZF180 galvanized coating; ASTM A653/A653M.
 - 2. Fire Rating: As indicated on Door Schedule, tested in accordance with UL 10C and NFPA 252 ("positive pressure fire tests").
 - 3. Provide units listed and labeled by UL (DIR) or ITS (DIR).
 - a. Attach fire rating label to each fire rated unit.
 - 4. Door Thickness: 1-3/4 inches, nominal.

2.04 HOLLOW METAL FRAMES

- A. Comply with standards and/or custom guidelines as indicated for corresponding door in accordance with applicable door frame requirements.
- B. Exterior Door Frames: Full profile/continuously welded type.
 - 1. Galvanizing: Components hot-dipped zinc-iron alloy-coated (galvanized) in accordance with ASTM A653/A653M, with A40/ZF120 coating.
 - 2. Frame Metal Thickness: 14 gauge, 0.067 inch, minimum.
 - 3. Frame Finish: Factory primed and field finished.
 - 4. Weatherstripping: Separate, see Section 08 71 00.
 - 5. Hardware Reinforcing:
 - a. Butt and Pivot Hinges: 7 gauge steel; Full interior width of door by 10 inches long.
 - b. Locks: 12 gauge steel; Size to template.
 - c. Closers: Full width of frame by 18 inches long.
 - d. Surface Applied Hardware: 12 gauge steel; Size to template.

- e. Dust Covers: 20 gauge.
- C. Interior Door Frames, Non-Fire Rated: Full profile/continuously welded type.
 - 1. Frame Metal Thickness: 14 gauge, 0.067 inch, minimum.
 - 2. Frame Finish: Factory primed and field finished.
 - 3. Hardware Reinforcing:
 - a. Butt and Pivot Hinges: 7 gauge steel; Full interior width of door by 10 inches long.
 - b. Locks: 12 gauge steel; Size to template.
 - c. Closers: Full width of frame by 18 inches long.
 - d. Surface Applied Hardware: 12 gauge steel; Size to template.
 - e. Dust Covers: 20 gauge.
- D. Door Frames, Fire-Rated: Full profile/continuously welded type.
 - 1. Fire Rating: Same as door, labeled.
 - 2. Frame Metal Thickness: 14 gauge, 0.067 inch, minimum.
 - 3. Frame Finish: Factory primed and field finished.
 - 4. Hardware Reinforcing:
 - a. Butt and Pivot Hinges: 7 gauge steel; Full interior width of door by 10 inches long.
 - b. Locks: 12 gauge steel; Size to template.
 - c. Closers: Full width of frame by 18 inches long.
 - d. Surface Applied Hardware: 12 gauge steel; Size to template.
 - e. Dust Covers: 20 gauge.
- E. Frames for Wood Doors: Comply with frame requirements in accordance with corresponding door.
- F. Borrowed Lites Glazing Frames: Construction and face dimensions to match door frames, and as indicated on drawings.
- G. Frames in Masonry Walls: Size to suit masonry coursing with head member 4 inches high to fill opening without cutting masonry units.

2.05 FINISHES

- A. Primer: Rust-inhibiting, complying with ANSI/SDI A250.10, door manufacturer's standard.
- B. Bituminous Coating: Cold-applied asphalt mastic, compounded for 15 mil, 0.015 inch dry film thickness (DFT) per coat; provide inert-type noncorrosive compound free of asbestos fibers, sulfur components, and other deleterious impurities.
 - 1. Fire-Rated Frames: Comply with fire rating requirements indicated.

2.06 ACCESSORIES

- A. Door Window Frames: Door window frames with glazing securely fastened within door opening.
 - 1. Size: As indicated on drawings.
 - 2. Frame Material: 18 gauge, 0.0478 inch, galvanized steel.
- B. Glazing: As specified in Section 08 80 00, factory installed.
- C. Removable Stops: Formed sheet steel, shape as indicated on drawings, mitered or butted corners; prepared for countersink style tamper proof screws.
- D. 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.
- E. 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.
- F. 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 PREPARATION

- A. Coat inside of frames to be installed in masonry or to be grouted, with bituminous coating, prior to installation.

3.03 INSTALLATION

- A. Install doors and frames in accordance with manufacturer's instructions and related requirements of specified door and frame standards or custom guidelines indicated.
- B. Door frames with card readers are to be prepped for electric strike. Door frames should have 1/2" diameter hole drilled 42" above finished floor on card reader side of frame.
- C. Install fire rated units in accordance with NFPA 80.
- D. Coordinate frame anchor placement with wall construction.
- E. Grout frames in masonry construction, using hand trowel methods; brace frames so that pressure of grout before setting will not deform frames.
- F. Install door hardware as specified in Section 08 71 00.
 - 1. Comply with recommended practice for hardware placement of doors and frames in accordance with ANSI/SDI A250.6 or NAAMM HMMA 861.
- G. Comply with glazing installation requirements of Section 08 80 00.
- H. Coordinate installation of electrical connections to electrical hardware items.
- I. Touch up damaged factory finishes.

3.04 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. Maximum Diagonal Distortion: 1/16 inch measured with straight edge, corner to corner.

3.05 ADJUSTING

- A. Adjust for smooth and balanced door movement.
- B. Adjust sound control doors so that seals are fully engaged when door is closed.
- C. Test sound control doors for force to close, latch, and unlatch; adjust as necessary in compliance with requirements.

3.06 SCHEDULE

- A. Refer to Door and Frame Schedule on the drawings.

END OF SECTION

SECTION 08 14 16
FLUSH WOOD DOORS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Flush wood doors; flush configuration; fire-rated and non-rated.

1.02 RELATED REQUIREMENTS

- A. Section 08 11 13 - Hollow Metal Doors and Frames.
- B. Section 08 71 00 - Door Hardware.
- C. Section 08 80 00 - Glazing.

1.03 REFERENCE STANDARDS

- A. ANSI A135.4 - American National Standard for Basic Hardboard; 2012.
- B. ANSI A208.1 - American National Standard for Particleboard; 2016.
- C. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2020.
- D. AWI (QCP) - Quality Certification Program; Current Edition.
- E. AWI/AWMAC/WI (AWS) - Architectural Woodwork Standards; 2014, with Errata (2018).
- F. AWMAC (GIS) - Guarantee and Inspection Services Program; Current Edition.
- G. AWMAC/WI (NAAWS) - North American Architectural Woodwork Standards, U.S. Version 3.1; 2017, with Errata (2019).
- H. FM (AG) - FM Approval Guide; current edition.
- I. ICC (IBC) - International Building Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- J. NFPA 80 - Standard for Fire Doors and Other Opening Protectives; 2016.
- K. NFPA 105 - Standard for Smoke Door Assemblies and Other Opening Protectives; 2016.
- L. NFPA 252 - Standard Methods of Fire Tests of Door Assemblies; 2017.
- M. UL (DIR) - Online Certifications Directory; Current Edition.
- N. UL 10B - Standard for Fire Tests of Door Assemblies; Current Edition, Including All Revisions.
- O. UL 10C - Standard for Positive Pressure Fire Tests of Door Assemblies; Current Edition, Including All Revisions.
- P. WDMA I.S. 1A - Interior Architectural Wood Flush Doors; 2013.
- Q. WI (CCP) - Certified Compliance Program (CCP); Current Edition.

1.04 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Indicate door core materials and construction; veneer species, type and characteristics.
- C. Shop Drawings: Show doors and frames, elevations, sizes, types, swings, undercuts, beveling, blocking for hardware, factory machining, factory finishing, cutouts for glazing and other details.
 - 1. Provide information as required by AWI/AWMAC/WI (AWS) or AWMAC/WI (NAAWS).
 - 2. Include certification program label.
- D. Samples: Submit two samples of door veneer, 6 by 8 inches in size illustrating wood grain, stain color, and sheen.
- E. Certificate: Submit labels and certificates required by quality assurance and quality control programs.
- F. Manufacturer's Installation Instructions: Indicate special installation instructions.

- G. Specimen warranty.
- H. Warranty, executed in Owner's name.

1.05 QUALITY ASSURANCE

- A. Maintain one copy of the specified door quality standard on site for review during installation and finishing.
- B. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section, with not less than five years of documented experience.
 - 1. Company with at least one project within past five years with value of woodwork within at least 20 percent of cost of woodwork for this project.
 - 2. Accredited participant in the specified certification program prior to the commencement of fabrication and throughout the duration of the project.
- C. Installer Qualifications: Company specializing in performing work of the type specified in this section, with not less than five years of documented experience.
- D. Quality Certification:
 - 1. Comply with AWI (QCP) woodwork association quality certification service/program in accordance with requirements for work specified in this section: www.awiqcp.org/#sle.
 - 2. Comply with AWMAC (GIS) woodwork association quality certification service/program in accordance with requirements for work specified in this section: www.awmac.com/#sle.
 - 3. Comply with WI (CCP) woodwork association quality certification service/program in accordance with requirements for work specified in this section: www.woodworkinstitute.com/#sle.
 - 4. Provide labels or certificates indicating that installed work will comply with AWI/AWMAC/WI (AWS) or AWMAC/WI (NAAWS) requirements for grade or grades specified.
 - 5. Provide designated labels on shop drawings as required by certification program.
 - 6. Provide designated labels on installed products as required by certification program.
 - 7. Submit certifications upon completion of installation that verifies this work is in compliance with specified requirements.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Package, deliver and store doors in accordance with specified quality standard.
- B. Accept doors on site in manufacturer's packaging, and inspect for damage.
- C. Protect doors with resilient packaging sealed with heat shrunk plastic; do not store in damp or wet areas or areas where sunlight might bleach veneer; seal top and bottom edges with tinted sealer if stored more than one week, and break seal on site to permit ventilation.

1.07 WARRANTY

- A. See Section 01 78 00 - Closeout Submittals, for additional warranty requirements.
- B. Interior Doors: Provide manufacturer's warranty for the life of the installation.
- C. Include coverage for delamination of veneer, warping beyond specified installation tolerances, defective materials, and telegraphing core construction.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Wood Veneer Faced Doors:
 - 1. Basis of Design Manufacturer:
 - a. V.T. Industries: www.vtindustries.com.
 - 2. Other Acceptable Manufacturers:
 - a. Algoma Hardwoods: www.algomahardwoods.com.
 - b. Masonite Architectural: www.architectural.masonite.com.
 - c. Marshfield DoorSystems, Inc: www.marshfielddoors.com.
 - d. Substitutions: See Section 01 60 00 - Product Requirements.

2.02 DOORS

- A. Doors: See drawings for locations and additional requirements.
 - 1. Quality Standard: Custom Grade, Heavy Duty performance, in accordance with AWI/AWMAC/WI (AWS) or AWMAC/WI (NAAWS), unless noted otherwise.
 - 2. Wood Veneer Faced Doors: 5-ply unless otherwise indicated.
- B. Interior Doors: 1-3/4 inches thick unless otherwise indicated; flush construction.
 - 1. Provide solid core doors at each location.
 - 2. Fire Rated Doors: Tested to ratings as indicated on the Drawings in accordance with UL 10C - Positive Pressure; Underwriters Laboratories Inc (UL) or Intertek/Warnock Hersey (WHI) labeled without any visible seals when door is open.
 - 3. Wood veneer facing with factory transparent finish.

2.03 DOOR AND PANEL CORES

- A. Non-Rated Solid Core and 20 Minute Rated Doors: Type particleboard core (PC), plies and faces as indicated.
- B. Fire-Rated Doors: Mineral core type, with fire resistant composite core (FD), plies and faces as indicated above; with core blocking as required to provide adequate anchorage of hardware without through-bolting.

2.04 DOOR FACINGS

- A. Veneer Facing for Transparent Finish: White maple, veneer grade in accordance with quality standard indicated, plain sliced (flat cut), with book match between leaves of veneer, running match of spliced veneer leaves assembled on door or panel face.
 - 1. Vertical Edges: Same species as face veneer.
 - 2. "Running Match" each pair of doors and doors in close proximity to each other.
- B. Facing Adhesive: Type I - waterproof.

2.05 DOOR CONSTRUCTION

- A. Fabricate doors in accordance with door quality standard specified.
- B. Cores Constructed with stiles and rails:
 - 1. Provide solid blocks at lock edge and top of door for closer for hardware reinforcement.
 - 2. Provide solid blocking for other throughbolted hardware.
- C. Factory machine doors for hardware other than surface-mounted hardware, in accordance with hardware requirements and dimensions.
- D. Factory fit doors for frame opening dimensions identified on shop drawings, with edge clearances in accordance with specified quality standard.
- E. Provide edge clearances in accordance with the quality standard specified.

2.06 FINISHES - WOOD VENEER DOORS

- A. 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. System - 1, Lacquer, Nitrocellulose.
 - b. Stain: Ravine RA18 as provided by V.T. Industries.
 - c. Sheen: Satin.
- B. Factory finish doors in accordance with approved sample.
- C. Seal door top edge with color sealer to match door facing.

2.07 ACCESSORIES

- A. Hollow Metal Door Frames: See Section 08 12 13.
- B. Glazing: See Section 08 80 00.

- C. Glazing Stops: Wood, of same species as door facing, mitered corners; prepared for countersink style tamper proof screws.
- D. Astragals and Edges for Double Doors: Pairs of doors astragals, and door edge sealing and protection devices.
 - 1. UL listed products in compliance with requirements of authorities having jurisdiction.
 - 2. Provide surface mounted astragal to cover or fill space for full door height between pair of doors or door and adjacent jamb.
 - 3. Astragal Type: Split, two parts, and with automatic locking, cutouts for other door hardware, and sealing gasket.
 - 4. Edge Type: Beveled edge
 - 5. Material: Aluminum.
 - 6. Metal Finish: Dark Bronze powder coating.
- E. Door Hardware: See Section 08 71 00.

PART 3 EXECUTION

3.01 EXAMINATION

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

3.02 INSTALLATION

- A. Install doors in accordance with manufacturer's instructions and specified quality standard.
 - 1. Install fire-rated doors in accordance with NFPA 80 requirements.
- B. Factory-Finished Doors: Do not field cut or trim; if fit or clearance is not correct, replace door.
- C. Use machine tools to cut or drill for hardware.
- D. Coordinate installation of doors with installation of frames and hardware.
- E. Coordinate installation of glazing.
- F. Install door louvers plumb and level.

3.03 TOLERANCES

- A. Comply with specified quality standard for fit and clearance tolerances.
- B. Comply with specified quality standard for telegraphing, warp, and squareness.

3.04 ADJUSTING

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

3.05 SCHEDULE

- A. Refer to Door and Frame Schedule on the Drawings.

END OF SECTION

SECTION 08 31 00
ACCESS DOORS AND PANELS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Wall and ceiling mounted access units.

1.02 RELATED REQUIREMENTS

- A. Section 04 20 02 - Single-Wythe Unit Masonry.
- B. Section 09 21 16 - Gypsum Board Assemblies.
- C. Section 09 91 23 - Interior Painting: Field paint finish.

1.03 REFERENCE STANDARDS

- A. ADA Standards - Americans with Disabilities Act (ADA) Standards for Accessible Design; 2010.
- B. ASTM A36/A36M - Standard Specification for Carbon Structural Steel; 2014.
- C. ASTM A240/A240M - Standard Specification for Chromium and Chromium-Nickel Stainless Steel Plate, Sheet, and Strip for Pressure Vessels and for General Applications; 2019.
- D. ASTM A276/A276M - Standard Specification for Stainless Steel Bars and Shapes; 2017.
- E. ASTM A500/A500M - Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes; 2020.
- F. ASTM A513/A513M - Standard Specification for Electric-Resistance-Welded Carbon and Alloy Steel Mechanical Tubing; 2015.
- G. ASTM A1008/A1008M - Standard Specification for Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, Solution Hardened, and Bake Hardenable; 2018.
- 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; 2018a.

1.04 SUBMITTALS

- A. See Section 01 30 00 - 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.
- D. Samples: Submit two access units, 3 X 3 inch in size illustrating frame configuration.
- E. Manufacturer's Installation Instructions: Indicate installation requirements.
- F. 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 five years documented experience.

PART 2 PRODUCTS

2.01 ACCESS DOORS AND PANELS ASSEMBLIES

- A. Wall-Mounted Units:
 - 1. Panel Material: Steel.
 - 2. Quantity: Provide (5) five wall-mounted access panels.
 - 3. Location: As directed in field by Architect.
 - 4. Size: 16 by 16 inches.
 - 5. Door/Panel: Hinged, standard duty, with tool-operated spring or cam lock and no handle.
 - 6. Wall Mounting Criteria: Provide surface-mounted face frame and door surface flush with frame surface.

- B. Wall-Mounted Units in Wet Areas:
 - 1. Quantity: Provide (1) one wall-mounted access panel in each plumbing wall.
 - 2. Location: As directed in field by Architect.
 - 3. Material: Stainless steel, Type 304.
 - 4. Size: 16 inch by 32 inch.
 - 5. Door/Panel: Hinged, standard duty, with tool-operated spring or cam lock and no handle.
 - 6. Wall Mounting Criteria: Provide surface-mounted face frame and door surface flush with frame surface.
- C. Ceiling Mounted Units:
 - 1. Quantity: Provide (4) four ceiling or wall mounted units as found needed.
 - 2. Location: As directed in field by Architect to give access to mechanical and/or electrical components.
 - 3. Panel Material: Steel.
 - 4. Finish: Field painted to match adjacent finish.
 - 5. Size - 24 inch by 24 inch.
 - 6. Door/Panel: Hinged, standard duty, with tool-operated spring or cam lock and no handle.

2.02 WALL-MOUNTED UNITS

- A. Manufacturers:
 - 1. ACUDOR Products Inc: www.acudor.com.
 - 2. Babcock-Davis: www.babcockdavis.com.
 - 3. Cendrex, Inc: www.cendrex.com.
 - 4. Karp Associates, Inc: www.karpinc.com.
 - 5. Milcor, Inc: www.milcorinc.com.
 - 6. Nystrom, Inc: www.nystrom.com.
 - 7. Williams Brothers Corporation of America: www.wbdoors.com.
 - 8. Substitutions: See Section 01 60 00 - Product Requirements.

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.

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. Position units to provide convenient access to concealed equipment when necessary.

END OF SECTION

SECTION 08 33 23
OVERHEAD COILING DOORS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Overhead coiling doors, operating hardware, non-fire-rated and exterior; manually or electrically operated.
- B. Wiring from electric circuit disconnect to operator to control station.

1.02 RELATED REQUIREMENTS

- A. Section 05 12 00 - Structural Steel Framing.
- B. Section 05 50 00 - Metal Fabrications.
- C. Section 08 71 00 - Door Hardware: Cylinder cores and keys.
- D. Division 26: Conduit from electric circuit to operator and from operator to control station, power to disconnect.
- E. Section 26 05 83 - Wiring Connections: Power to disconnect.

1.03 REFERENCE STANDARDS

- A. ASTM A36/A36M - Standard Specification for Carbon Structural Steel; 2014.
- B. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products; 2017.
- C. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2020.
- D. ASTM A666 - Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar; 2015.
- E. ASTM B221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes; 2014.
- F. ASTM B221M - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes (Metric); 2013.
- G. FBC TAS 201 - Impact Test Procedures; Testing Application Standard; 1994.
- H. FBC TAS 202 - Criteria for Testing Impact and Non-Impact Resistant Building Envelope Components Using Uniform Static Air Pressure; Testing Application Standard; 1994.
- I. FBC TAS 203 - Criteria for Testing Products Subject To Cyclic Wind Pressure Loading; Testing Application Standard; 1994.
- J. ITS (DIR) - Directory of Listed Products; current edition.
- K. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum); 2018.
- L. NEMA ICS 2 - Industrial Control and Systems Controllers, Contactors and Overload Relays Rated 600 Volts; 2000, with Errata (2008).
- M. NEMA MG 1 - Motors and Generators; 2017.
- N. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- O. UL (DIR) - Online Certifications Directory; Current Edition.
- P. UL 325 - Standard for Door, Drapery, Gate, Louver, and Window Operators and Systems; Current Edition, Including All Revisions.
- Q. UL 1784 - Standard for Air Leakage Tests of Door Assemblies; Current Edition, Including All Revisions.

1.04 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

- B. Product Data: Provide general construction, electrical equipment, and component connections and details.
- C. Shop Drawings: Indicate pertinent dimensioning, anchorage methods, hardware locations, and installation details.
- D. Samples: Submit two slats, 2 by 12 inches in size illustrating shape, color and finish texture.
- E. Manufacturer's Installation Instructions: Indicate installation sequence and procedures, adjustment and alignment procedures.
- F. Maintenance Data: Indicate lubrication requirements and frequency and periodic adjustments required.
- G. Warranty Documentation: Submit manufacturer warranty and ensure that forms have been completed in Owner's name and registered with manufacturer.

1.05 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum five years of documented experience.
- B. Installer Qualifications: Company specializing in performing work of type specified and with at least five years documented experience.
- C. 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.

1.06 WARRANTY

- A. See Section 01 78 00 - Closeout Submittals, for additional warranty requirements.
- B. Provide five year manufacturer limited warranty for three-ply multifilament polyester fabric curtain.
- C. Provide lifetime manufacturer limited warranty for counterweights and tension springs.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Overhead Coiling Doors:
 - 1. Cornell Iron Works, Inc: www.cornelliron.com.
 - 2. Raynor Garage Doors: www.raynor.com.
 - 3. The Cookson Company: www.cooksondoor.com.
 - 4. Wayne-Dalton, a Division of Overhead Door Corporation: www.wayne-dalton.com.
 - 5. Substitutions: See Section 01 60 00 - Product Requirements.

2.02 COILING DOORS

- A. Exterior Coiling Doors: Aluminum slat curtain.
 - 1. Capable of withstanding positive and negative wind loads of 20 psf, without undue deflection or damage to components.
 - 2. Sandwich slat construction with insulated core of foamed-in-place polyurethane insulation; minimum R-value of 8.0.
 - 3. Nominal Slat Size: 2 inches wide by required length.
 - 4. Finish: Factory painted, color as selected.
 - 5. Guide, Angles: Galvanized steel.
 - 6. Hood Enclosure: Manufacturer's standard; aluminum.
 - 7. Electric operation.
 - 8. Mounting: As indicated on drawings.
 - 9. Locking Devices: Lock and latch handle on outside.

2.03 MATERIALS AND COMPONENTS

- A. Metal Curtain Construction: Interlocking slats.
 - 1. Slat Ends: Each slat fitted with end locks to act as wearing surface in guides and to prevent lateral movement.

2. Curtain Bottom for Slat Curtains: Fitted with angles to provide reinforcement and positive contact in closed position.
 3. Weatherstripping for Exterior Doors: Moisture and rot proof, resilient type, located at jamb edges, bottom of curtain, and where curtain enters hood enclosure of exterior doors.
 4. Aluminum Slats: ASTM B221 (ASTM B221M), aluminum alloy Type 6063; 0.40 inch minimum thickness.
 5. STC Rating: Sound Transmission Class (STC) rating, STC 22 for the entire assembly.
- B. Guide Construction: Continuous, of profile to retain door in place with snap-on trim, mounting brackets of same metal.
- C. Guides - Angle: ASTM A36/A36M metal angles, size as indicated.
1. Stainless Steel: ASTM A 666, Type 304, rollable temper.
- D. Hood Enclosure and Trim: Internally reinforced to maintain rigidity and shape.
1. Minimum thickness; 0.40 inch aluminum with reinforced top and bottom edges. Provide minimum 1/4 inch intermediate support brackets as required to prevent excessive sag.
 2. Finish: Same finish as door slats.
- E. Lock Hardware:
1. Cylindrical Locking Mechanism: Latchset lock cylinder, specified in Section 08 71 00.
 2. Latching Mechanism: Inside mounted, adjustable keeper, spring activated latch bar feature to keep in locked or retracted position.
 3. Latch Handle: Manufacturer's standard.
- F. Roller Shaft Counterbalance: Steel pipe and helical 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: Comply with UL 325; provide products listed by ITS (DIR), UL (DIR), or testing agency acceptable to authorities having jurisdiction.
1. Provide interlock switches on motor operated units.
- B. Electric Operators:
1. Mounting: Side mounted.
 2. Motor Enclosure:
 - a. Exterior Coiling Doors: NEMA MG 1, Type 4; open drip proof.
 3. Motor Rating: 1 HP; continuous duty.
 4. Motor Voltage: 120 volts, single phase, 60 Hz.
 5. Motor Controller: NEMA ICS 2, full voltage, reversing magnetic motor starter.
 6. Controller Enclosure: NEMA 250, Type 4.
 7. Opening Speed: 12 inches per second.
 8. Brake: Manufacturer's standard type, activated by motor controller.
 9. Manual override in case of power failure.
 10. Refer to Division 26 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 interior door jamb.
 3. Entrapment Protection Devices: Provide sensing devices and safety mechanisms complying with UL 325.
 - a. Primary Device: Provide electric sensing edge, wireless sensing, NEMA 1 photo eye sensors, or NEMA 4X photo eye sensors as required with momentary-contact control device.
- E. Proximity Card Reader Control: Provide interconnection to Owner's security system.

1. Provide proximity card control pedestal and wiring to door motor operator.
 - a. Finish: Clear anodized aluminum.
 2. Proximity card reader to be provided by Owner.
- F. Interior In-Ground Loop Detectors: Provide in-ground loop detectors in interior/egress side of doors.
- G. Safety Edge: Located at bottom of coiling door, full width, electro-mechanical sensitized type, wired to stop and reverse door direction upon striking object, hollow neoprene covered.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that opening sizes, tolerances and conditions are acceptable.

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 05 83.
- F. Complete wiring from disconnect to unit components.
- G. Install enclosure and perimeter trim.

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 feet 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 43 13
ALUMINUM-FRAMED STOREFRONTS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Aluminum-framed storefront, with vision glass.
- B. Aluminum doors.

1.02 RELATED REQUIREMENTS

- A. Section 07 90 05 - Joint Sealers.
- B. Section 08 71 00 - Door Hardware: Hardware items other than specified in this section.
- C. Section 08 80 00 - Glazing: Glass and glazing accessories.
- D. Section 08 87 20 - Architectural Window Film.

1.03 REFERENCE STANDARDS

- A. AAMA CW-10 - Care and Handling of Architectural Aluminum From Shop to Site; 2015.
- B. AAMA 501.2 - Quality Assurance and Diagnostic Water Leakage Field Check of Installed Storefronts, Curtain Walls, and Sloped Glazing Systems; 2015.
- C. AAMA 503 - Voluntary Specification for Field Testing of Newly Installed Storefronts, Curtain Walls and Sloped Glazing Systems; 2014.
- D. AAMA 609 & 610 - Cleaning and Maintenance Guide for Architecturally Finished Aluminum (Combined Document); 2015.
- E. AAMA 611 - Voluntary Specification for Anodized Architectural Aluminum; 2014 (2015 Errata).
- F. AAMA 1503 - Voluntary Test Method for Thermal Transmittance and Condensation Resistance of Windows, Doors and Glazed Wall Sections; 2009.
- G. ASCE 7 - Minimum Design Loads and Associated Criteria for Buildings and Other Structures; Most Recent Edition Cited by Referring Code or Reference Standard.
- H. ASTM A36/A36M - Standard Specification for Carbon Structural Steel; 2014.
- I. ASTM B209 - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate; 2014.
- J. ASTM B209M - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate (Metric); 2014.
- K. ASTM B221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes; 2014.
- L. ASTM B221M - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes (Metric); 2013.
- M. ASTM E331 - Standard Test Method for Water Penetration of Exterior Windows, Skylights, Doors, and Curtain Walls by Uniform Static Air Pressure Difference; 2000 (Reapproved 2016).
- N. ASTM E783 - Standard Test Method for Field Measurement of Air Leakage Through Installed Exterior Windows and Doors; 2002 (Reapproved 2018).
- O. ASTM E1105 - Standard Test Method for Field Determination of Water Penetration of Installed Exterior Windows, Skylights, Doors, and Curtain Walls, by Uniform or Cyclic Static Air Pressure Difference; 2015.

1.04 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide component dimensions, describe components within assembly, anchorage and fasteners, glass and infill, and internal drainage details.
- 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 3 by 5 inches in size illustrating finished aluminum surface, glass, glazing materials.
- 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 Qualifications: Company specializing in performing work of type specified and with at least five years of documented experience.
- B. Installer Qualifications: Company specializing in performing work of type specified and with at least five years of documented experience.

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 WARRANTY

- A. See Section 01 78 00 - 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 excessive degradation of exterior finish. Include provision for replacement of units with excessive fading, chalking, or flaking.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Basis of Design Manufacturer:
 - 1. EFCO Corporation; Series 401 NT, Non-Thermal Storefront Framing: www.efcocorp.com.
 - a. Style: Center-Set.
 - b. Vertical Mullion Dimensions: 1-3/4 inches wide by 4-1/2 inches deep.
 - c. Application: Interior aluminum doors and storefront framing system.
- B. Other Acceptable Manufacturers:
 - 1. Kawneer North America: www.kawneer.com.
 - 2. Oldcastle BuildingEnvelope: www.oldcastlebe.com.
 - 3. Pittco Architectural Metals Inc: www.pittcometals.com.
 - 4. Tubelite, Inc; _____: www.tubeliteinc.com.
 - 5. Trulite Glass & Aluminum Solutions, LLC: www.trulite.com.
 - 6. YKK AP America Inc: www.ykkap.com.
 - 7. Substitutions: See Section 01 60 00 - Product Requirements.

2.02 SWINGING DOORS

- A. Medium Stile, Monolithic Glazing:
 - 1. Basis of Design Manufacturer:
 - a. EFCO Corporation; Series T500 Wide Style: www.efcocorp.com.
 - 1) Thickness: 1-3/4".
 - 2. Other Acceptable Manufacturers:
 - a. Kawneer North America: www.kawneer.com.
 - b. Oldcastle BuildingEnvelope: www.oldcastlebe.com.
 - c. Pittco Architectural Metals Inc: www.pittcometals.com.
 - d. Tubelite, Inc: www.tubeliteinc.com.
 - e. Trulite Glass & Aluminum Solutions, LLC: www.trulite.com.
 - f. YKK AP America Inc: www.ykkap.com.
 - g. Substitutions: See Section 01 60 00 - Product Requirements.

2.03 ALUMINUM-FRAMED STOREFRONT

- A. Aluminum-Framed Storefront: Factory fabricated, factory finished aluminum framing members with infill, and related flashings, anchorage and attachment devices.
 - 1. Glazing Rabbet: For fire-rated glazing; thickness as required.
 - 2. Glazing Position: Centered (front to back).
 - 3. Finish: Class I natural anodized.
 - a. Factory finish all surfaces that will be exposed in completed assemblies.
 - 4. 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.
 - 5. 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.
 - 6. Movement: Allow for movement between storefront and adjacent construction, without damage to components or deterioration of seals.
 - 7. Perimeter Clearance: Minimize space between framing members and adjacent construction while allowing expected movement.

2.04 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.
 - 3. Cross-Section: 1-3/4 by 4-1/2 inch nominal dimension.
- B. Glazing: As specified in Section 08 80 00.
- C. Swing Doors: Glazed aluminum.
 - 1. Thickness: 1-3/4 inches.
 - 2. Top Rail: 5 inches wide.
 - 3. Vertical Stiles: 5 inches wide.
 - 4. Bottom Rail: 10 inches wide.
 - 5. Glazing Stops: Square.
 - 6. Finish: Same as storefront.

2.05 MATERIALS

- A. Extruded Aluminum: ASTM B221 (ASTM B221M).
- B. Fasteners: Stainless steel.
- C. Glazing Gaskets: Type to suit application to achieve weather, moisture, and air infiltration requirements.
- D. Glazing Accessories: As specified in Section 08 80 00.

2.06 FINISHES

- A. Class I Natural Anodized Finish: AAMA 611 AA-M12C22A41 Clear anodic coating not less than 0.7 mils thick.

2.07 HARDWARE

- A. Door Hardware: As specified in Section 08 71 00.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify dimensions, tolerances, and method of attachment with other work.
- B. Verify that wall openings and adjoining air and vapor 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 glass in accordance with Section 08 80 00, using glazing method required to achieve performance criteria.
- F. Install glass in accordance with Section 08 80 00.
- 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 71 00
DOOR HARDWARE

PART 1 GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SUMMARY

- A. Section Includes:
 - 1. Mechanical and electrified door hardware for:
 - a. Swinging doors.
 - 2. Electronic access control system components, including:
 - a. Electronic access control devices.
 - 3. Field verification, preparation and modification of existing doors and frames to receive new door hardware.
 - 4. The intent of the hardware specification is to specify the hardware for interior and exterior doors, and to establish a type, continuity, and standard of quality. However, it is the contractor's responsibility to thoroughly review existing conditions, schedules, specifications, drawings, and other Contract Documents to verify the suitability of the hardware specified.
- B. Exclusions: Unless specifically listed in hardware sets, hardware is not specified in this section for:
 - 1. Windows
 - 2. Cabinets (casework), including locks in cabinets
 - 3. Signage
 - 4. Toilet accessories
 - 5. Overhead doors
 - 6. Shower doors
 - 7. Access doors and panels
 - 8. Conduit, junction boxes & wiring

1.03 RELATED REQUIREMENTS

- A. Section 01 23 00 - Alternates.
- B. Section 07 90 0 5 - Joint Sealers: Sealant requirements applicable to threshold installation specified.
- C. Section 08 11 13 - Hollow Metal Doors and Frames.
- D. Section 08 14 16 - Flush Wood Doors.
- E. Section 08 33 23 - Overhead Coiling Doors.
- F. Section 08 43 13 - Aluminum-Framed Storefronts.
- G. Section 08 80 00 - Glazing: Fire rated glass related to fire rated hardware.
- H. Division 26: Connections to electrical power system and for low-voltage wiring.
- I. Division 28: Coordination with other components of electronic access control system.

1.04 REFERENCES

- A. UL - Underwriters Laboratories
 - 1. UL 10B - Fire Test of Door Assemblies
 - 2. UL 10C - Positive Pressure Test of Fire Door Assemblies
 - 3. UL 1784 - Air Leakage Tests of Door Assemblies
 - 4. UL 294 - Standard for Access Control System Units
 - 5. UL 305 - Panic Hardware
- B. DHI - Door and Hardware Institute

1. Sequence and Format for the Hardware Schedule
2. Recommended Locations for Builders Hardware
3. Key Systems and Nomenclature
- C. ANSI - American National Standards Institute
 1. ANSI/BHMA A156.1 - A156.29, and ANSI/BHMA A156.31 - Standards for Hardware and Specialties
 2. ICC/ANSI A117.1 - 2017 – Specifications for making buildings and facilities usable by physically handicapped people
 3. ANSI/BHMA A156.28 “Recommended Practices for Keying Systems”
- D. NFPA – National Fire Protection Association
 1. NFPA 70 – National Electrical Code
 2. NFPA 80 – Fire Doors and Windows
 3. NFPA 105 – Smoke and Draft Control Door Assemblies
 4. NFPA 252 – Fire Test of Door Assemblies
- E. WHI – Warnock Hersey Incorporated
- F. SDI – Steel Door Institute
- G. WI – Woodwork Institute
- H. AWI – Architectural Woodwork Institute
- I. NAAMM – National Association of Architectural Metal Manufacturers
- J. Local applicable codes

1.05 SUBMITTALS

- A. General:
 1. Submit in accordance with Conditions of Contract and Division 01 requirements.
 2. Highlight, encircle, or otherwise specifically identify on submittals deviations from Contract Documents, issues of incompatibility or other issues which may detrimentally affect the Work.
 3. Prior to forwarding submittal, comply with procedures for verifying existing door and frame compatibility for new hardware, as specified in PART 3, “EXAMINATION” article, herein.
- B. Action Submittals:
 1. Product Data: Technical product data for each item of door hardware, installation instructions, maintenance of operating parts and finish, and other information necessary to show compliance with requirements.
 2. Riser and Wiring Diagrams: After final approval of hardware schedule, submit details of electrified door hardware, indicating:
 - a. Wiring Diagrams: For power, signal, and control wiring and including:
 - 1) Details of interface of electrified door hardware and building safety and security systems.
 - 2) Schematic diagram of systems that interface with electrified door hardware.
 - 3) Point-to-point wiring.
 - 4) Risers.
 3. Samples for Verification: If requested by Architect, submit production sample or sample installations of each type of exposed hardware unit in finish indicated, and tagged with full description for coordination with schedule.
 - a. Samples will be returned to supplier. Units that are acceptable to Architect may, after final check of operations, be incorporated into Work, within limitations of key coordination requirements.
 4. Door Hardware Schedule: Submit schedule with hardware sets in vertical format. Indicate complete designations of each item required for each door or opening, include:
 - a. Door Index; include door number, heading number, and Architects hardware set number.
 - b. Quantity, type, function, style, size, and finish of each hardware item.

- c. Name and manufacturer of each item.
 - d. Fastenings and other pertinent information.
 - e. Location of each hardware set cross-referenced to indications on Drawings.
 - f. Explanation of all abbreviations, symbols, and codes contained in schedule.
 - g. Mounting locations for hardware.
 - h. Door and frame sizes and materials.
 - i. Operational Description of openings with any electrified hardware (locks, exits, electromagnetic locks, electric strikes, automatic operators, door position switches, magnetic holders or closer/holder units, and access control components). Operational description should include operational descriptions for: egress, ingress (access), and fire/smoke alarm connections.
 - 1) Submittal Sequence: Submit door hardware schedule concurrent with submissions of Product Data, Samples, and Shop Drawings. Coordinate submission of door hardware schedule with scheduling requirements of other work to facilitate fabrication of other work that is critical in Project construction schedule.
5. Key Schedule:
- a. After Keying Conference, provide keying schedule listing levels of keying as well as explanation of key system's function, key symbols used and door numbers controlled.
 - b. Provide 3 copies of keying schedule for review prepared and detailed in accordance with referenced DHI publication. Include schematic keying diagram and index each key to unique door designations.
 - c. Index keying schedule by door number, keyset, hardware heading number, cross keying instructions, and special key stamping instructions.
 - d. Provide one complete bitting list of key cuts and one key system schematic illustrating system usage and expansion.
 - 1) Forward bitting list, key cuts and key system schematic directly to Owner, by means as directed by Owner.
 - e. Prepare key schedule by or under supervision of supplier, detailing Owner's final keying instructions for locks.
6. Templates: After final approval of hardware schedule, provide templates for doors, frames and other work specified for door hardware installation.
- C. Informational Submittals:
- 1. Qualification Data: For Supplier, Installer and Architectural Hardware Consultant.
 - 2. Certificates of Compliance:
 - a. UL listings for fire-rated hardware and installation instructions if requested by Architect or Authority Having Jurisdiction.
 - b. Installer Training Meeting Certification: Letter of compliance, signed by Contractor, attesting to completion of installer training meeting specified in "QUALITY ASSURANCE" article, herein.
 - c. Electrified Hardware Coordination Conference Certification: Letter of compliance, signed by Contractor, attesting to completion of electrified hardware coordination conference, specified in "QUALITY ASSURANCE" article, herein.
 - 3. Warranty: Special warranty specified in this Section.
- D. Closeout Submittals:
- 1. Operations and Maintenance Data: Provide in accordance with Division 01 and include:
 - a. Complete information on care, maintenance, and adjustment; data on repair and replacement parts, and information on preservation of finishes.
 - b. Catalog pages for each product.
 - c. Factory order acknowledgement numbers (for warranty and service)
 - d. Parts list for each product.
 - e. Final approved hardware schedule, edited to reflect conditions as-installed.
 - f. Final keying schedule
 - g. Copies of floor plans with keying nomenclature

- h. As-installed wiring diagrams for each opening connected to power, both low voltage and 110 volts.
- i. Copy of warranties including appropriate reference numbers for manufacturers to identify project.

1.06 QUALITY ASSURANCE

- A. If discrepancy between drawings and scheduled material in this section, bid the more expensive of the two choices, note the discrepancy in the submittal and request direction from Architect for resolution.
- B. Supplier Qualifications and Responsibilities: Recognized architectural hardware supplier with record of successful in-service performance for supplying door hardware similar in quantity, type, and quality to that indicated for this Project and that provides certified Architectural Hardware Consultant (AHC) available to Owner, Architect, and Contractor, at reasonable times during the Work for consultation.
 - 1. Warehousing Facilities: In Project's vicinity.
 - 2. Scheduling Responsibility: Preparation of door hardware and keying schedules.
 - 3. Coordination Responsibility: Assist in coordinating installation of electronic security hardware with Architect and electrical engineers and provide installation and technical data to Architect and other related subcontractors.
- C. Architectural Hardware Consultant Qualifications: Person who is experienced in providing consulting services for door hardware installations that are comparable in material, design, and extent to that indicated for this Project and meets these requirements:
 - 1. For door hardware, DHI-certified, Architectural Hardware Consultant (AHC).
 - 2. Can provide installation and technical data to Architect and other related subcontractors.
 - 3. Can inspect and verify components are in working order upon completion of installation.
 - 4. Capable of coordinating installation of electrified hardware with Architect and electrical engineers.
- D. Single Source Responsibility: Obtain each type of door hardware from single manufacturer.
 - 1. Bid and submit manufacturer's updated/improved item if scheduled item is discontinued.
- E. Fire-Rated Door Openings: Provide door hardware for fire-rated openings that complies with NFPA 80 and requirements of authorities having jurisdiction. Provide only items of door hardware that are listed products tested by Underwriters Laboratories, Intertek Testing Services, or other testing and inspecting organizations acceptable to authorities having jurisdiction for use on types and sizes of doors indicated, based on testing at positive pressure and according to NFPA 252 or UL 10C and in compliance with requirements of fire-rated door and door frame labels.
- F. Electrified Door Hardware: Listed and labeled as defined in NFPA 70, Article 100, by testing agency acceptable to authorities having jurisdiction.
- G. Accessibility Requirements: For door hardware on doors in an accessible route, comply with governing accessibility regulations cited in "REFERENCES" article, herein.
- H. Keying Conference
 - 1. Incorporate keying conference decisions into final keying schedule after reviewing door hardware keying system including:
 - a. Function of building, flow of traffic, purpose of each area, degree of security required, and plans for future expansion.
 - b. Preliminary key system schematic diagram.
 - c. Requirements for key control system.
 - d. Requirements for access control.
 - e. Address for delivery of keys.
- I. Pre-installation Conference
 - 1. Review and finalize construction schedule and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
 - 2. Inspect and discuss preparatory work performed by other trades.

3. Inspect and discuss electrical roughing-in for electrified door hardware.
 4. Review sequence of operation for each type of electrified door hardware.
 5. Review required testing, inspecting, and certifying procedures.
- J. Coordination Conferences:
1. Installation Coordination Conference: Prior to hardware installation, schedule and hold meeting to review questions or concerns related to proper installation and adjustment of door hardware.
 2. Electrified Hardware Coordination Conference: Prior to ordering electrified hardware, schedule and hold meeting to coordinate door hardware with security, electrical, doors and frames, and other related suppliers.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Inventory door hardware on receipt and provide secure lock-up for hardware delivered to Project site.
- B. Tag each item or package separately with identification coordinated with final door hardware schedule, and include installation instructions, templates, and necessary fasteners with each item or package.
1. Deliver each article of hardware in manufacturer's original packaging.
- C. Project Conditions:
1. Maintain manufacturer-recommended environmental conditions throughout storage and installation periods.
 2. Control handling and installation of hardware items so that completion of Work will not be delayed by hardware losses both before and after installation.
- D. Protection and Damage:
1. Promptly replace products damaged during shipping.
 2. Handle hardware in manner to avoid damage, marring, or scratching. Correct, replace or repair products damaged during Work.
 3. Protect products against malfunction due to paint, solvent, cleanser, or any chemical agent.
- E. Deliver keys and permanent cores to Owner by registered mail or overnight package service or as directed by owner in keying meeting.

1.08 COORDINATION

- A. Existing Openings: Where existing doors, frames and/or hardware are to remain, field verify existing functions, conditions and preparations and coordinate to suit opening conditions and to provide proper door operation. If conflict between the specified/scheduled hardware and existing conditions, submit request for direction from Architect. Include date of jobsite visit in the submittal.
- B. Coordinate layout and installation of floor-recessed door hardware with floor construction. Cast anchoring inserts into concrete.
- C. Installation Templates: Distribute for doors, frames, and other work specified to be factory or shop prepared. Check Shop Drawings of other work to confirm that adequate provisions are made for locating and installing door hardware to comply with indicated requirements.
- D. Security: Coordinate installation of door hardware, keying, and access control with Owner's security consultant.
- E. Electrical System Roughing-In: Coordinate layout and installation of electrified door hardware with connections to power supplies and building safety and security systems.
- F. Existing Openings: Where existing doors, frames and/or hardware are to remain, field verify existing functions, conditions and preparations and coordinate to suit opening conditions and to provide proper door operation.

1.09 WARRANTY

- A. Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of door hardware that fail in materials or workmanship within specified warranty period.
 - 1. Warranty Period: Beginning from date of Substantial Completion, for durations indicated.
 - a. Closers:
 - 1) Mechanical: 30 years
 - b. Automatic Operators: 2 years.
 - c. Exit Devices:
 - 1) Mechanical: 3 years.
 - 2) Electrified: 1 year.
 - d. Locksets:
 - 1) Mortise Mechanical: 3 years; Cylindrical Mechanical: 10 years
 - 2) Electrified: 1 year.
 - e. Continuous Hinges: Lifetime warranty.
 - f. Key Blanks: Lifetime
 - 2. Warranty does not cover damage or faulty operation due to improper installation, improper use or abuse.

1.10 MAINTENANCE

- A. Maintenance Tools: Furnish complete set of special tools required for maintenance and adjustment of hardware, including changing of cylinders.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. The Owner requires use of certain products for their unique characteristics and project suitability to insure continuity of existing and future performance and maintenance standards. After investigating available product offerings, the Awarding Authority has elected to prepare proprietary specifications. These products are specified with the notation: "No Substitute."
 - 1. Where "No Substitute" is noted, substitution requests for other products will not be considered.
- B. Approval of manufacturers and/or products other than those listed as "Scheduled Manufacturer" or "Basis of Design" shall be in accordance with substitution procedure in division 01 25 00. In the individual article for the product category items, shall be in accordance with the QUALITY ASSURANCE article, herein.
- C. Approval of products is contingent upon those products providing all functions and features and meeting all requirements of scheduled manufacturer's product.
- D. Where specified hardware is not adaptable to finished shape or size of members requiring hardware, furnish suitable types having same operation and quality as type specified, subject to Architect's approval in accordance with substitution procedure in division 01 25 00.

2.02 MATERIALS

- A. Fasteners
 - 1. Provide hardware manufactured to conform to published templates, generally prepared for machine screw installation.
 - 2. Furnish screws for installation with each hardware item. Finish exposed (exposed under any condition) screws to match hardware finish, or, if exposed in surfaces of other work, to match finish of this other work including prepared for paint surfaces to receive painted finish.
 - 3. Provide concealed fasteners for hardware units exposed when door is closed except when no standard units of type specified are available with concealed fasteners. Do not use thru-bolts for installation where bolt head or nut on opposite face is exposed in other work unless thru-bolts are required to fasten hardware securely. Review door specification and advise Architect if thru-bolts are required.

4. Install hardware with fasteners provided by hardware manufacturer.
- B. Modification and Preparation of Existing Doors: Where existing door hardware is indicated to be removed and reinstalled.
 1. Provide necessary fillers, Dutchmen, reinforcements, and fasteners, compatible with existing materials, as required for mounting new opening hardware and to cover existing door and frame preparations.
 2. Use materials which match materials of adjacent modified areas.
 3. When modifying existing fire-rated openings, provide materials permitted by NFPA 80 as required to maintain fire-rating.
- C. Provide screws, bolts, expansion shields, drop plates and other devices necessary for hardware installation.
 1. Where fasteners are exposed to view: Finish to match adjacent door hardware material.
- D. Cable and Connectors: Hardwired Electronic Access Control Lockset and Exit Device Trim:
 1. Data: 24AWG, 4 conductor shielded, Belden 9843, 9841 or comparable.
 2. DC Power: 18 AWG, 2 conductor, Belden 8760 or comparable.
 3. Provide type of data and DC power cabling required by access control device manufacturer for this installation.
 4. Where scheduled in the hardware sets, provide each item of electrified hardware and wire harnesses with sufficient number and wire gauge with standardized Molex plug connectors to accommodate electric function of specified hardware. Provide Molex connectors that plug directly into connectors from harnesses, electric locking and power transfer devices. Provide through-door wire harness for each electrified locking device installed in a door and wire harness for each electrified hinge, electrified continuous hinge, electrified pivot, and electric power transfer for connection to power supplies.

2.03 HINGES

- A. Manufacturers and Products:
 1. Scheduled Manufacturer and Product: Ives 5BB series. No substitution.
- B. Requirements:
 1. Provide hinges conforming to ANSI/BHMA A156.1.
 2. 1-3/4 inch (44 mm) thick doors, up to and including 36 inches (914 mm) wide:
 - a. Exterior: Standard weight, bronze or stainless steel, 4-1/2 inches (114 mm) high
 - b. Interior: Standard weight, steel, 4-1/2 inches (114 mm) high
 - c. Interior: Heavy weight steel, all doors with closers or overhead stops
 3. 1-3/4 inch (44 mm) thick doors 36 inches (914 mm) wide and over:
 - a. Exterior: Heavy weight, bronze/stainless steel, 5 inches (127 mm) high
 - b. Interior: Heavy weight, steel, 5 inches (127 mm) high
 4. 2 inches or thicker doors:
 - a. Exterior: Heavy weight, bronze or stainless steel, 5 inches (127 mm) high
 - b. Interior: Heavy weight, steel, 5 inches (127 mm) high
 5. Provide three hinges per door leaf for doors 90 inches (2286 mm) or less in height, and one additional hinge for each 30 inches (762 mm) of additional door height.
 6. Where new hinges are specified for existing doors or existing frames, provide new hinges of identical size to hinge preparation present in existing door or existing frame.
 7. Hinge Pins: Except as otherwise indicated, provide hinge pins as follows:
 - a. Steel Hinges: Steel pins
 - b. Non-Ferrous Hinges: Stainless steel pins
 - c. Out-Swinging Exterior Doors: Non-removable pins
 - d. Out-Swinging Interior Lockable Doors: Non-removable pins
 - e. Interior Non-lockable Doors: Non-rising pins
 8. Width of hinges: 4-1/2 inches (114 mm) at 1-3/4 inch (44 mm) thick doors, and 5 inches (127 mm) at 2 inches (51 mm) or thicker doors. Adjust hinge width as required for door, frame, trim and wall conditions to allow proper degree of opening.

2.04 ELECTRIC POWER TRANSFER

- A. Manufacturers:
 - 1. Scheduled Manufacturer: Von Duprin EPT-10. No substitution.
- B. Requirements:
 - 1. Provide power transfer with electrified options as scheduled in the hardware sets. Provide with number and gage of wires sufficient to accommodate electric function of specified hardware.
 - 2. Locate electric power transfer per manufacturer's template and UL requirements, unless interference with operation of door or other hardware items.

2.05 FLUSH BOLTS

- A. Manufacturers:
 - 1. Scheduled Manufacturer: Ives. No substitution.
- B. Requirements:
 - 1. Provide automatic, constant latching, and manual flush bolts with forged bronze or stainless-steel face plates, extruded brass levers, and with wrought brass guides and strikes. Provide 12 inch (305 mm) steel or brass rods at doors up to 90 inches (2286 mm) in height. For doors over 90 inches (2286 mm) in height increase top rods by 6 inches (152 mm) for each additional 6 inches (152 mm) of door height. Provide dust-proof strikes at each bottom flush bolt.

2.06 COORDINATORS

- A. Manufacturers:
 - 1. Scheduled Manufacturer: Ives. No substitution.
- B. Requirements:
 - 1. Where pairs of doors are equipped with automatic flush bolts, an astragal, or other hardware that requires synchronized closing of the doors, provide bar-type coordinating device, surface applied to underside of stop at frame head.
 - 2. Provide filler bar of correct length for unit to span entire width of opening, and appropriate brackets for parallel arm door closers, surface vertical rod exit device strikes or other stop mounted hardware. Factory-prepared coordinators for vertical rod devices as specified.

2.07 MORTISE LOCKS

- A. Manufacturers and Products:
 - 1. Scheduled Manufacturer and Product: Schlage L9000 series. No substitution.
- B. Requirements:
 - 1. Provide mortise locks conforming to ANSI/BHMA A156.13 Series 1000, Grade 1, and UL Listed for 3 hour fire doors.
 - 2. Indicators: Where specified, provide indicator window measuring a minimum 2 inch x 1/2 inch with 180 degree visibility. Provide messages color-coded with full text and/or symbols, as scheduled, for easy visibility.
 - a. Outside Occupancy Indicator: Provide indicator above cylinder or emergency release for visibility while operating the lock that identifies an occupied/unoccupied status of the lock or latch.
 - 3. Provide locks manufactured from heavy gauge steel, containing components of steel with a zinc dichromate plating for corrosion resistance.
 - 4. Provide lock case that is multi-function and field reversible for handing without opening case. Cylinders: Refer to "KEYING" article, herein.
 - 5. Provide locks with standard 2-3/4 inches (70 mm) backset with full 3/4 inch (19 mm) throw stainless steel mechanical anti-friction latchbolt. Provide deadbolt with full 1 inch (25 mm) throw, constructed of stainless steel.
 - 6. Provide standard ASA strikes unless extended lip strikes are necessary to protect trim.
 - 7. Provide electrified options as scheduled in the hardware sets. Where scheduled, provide switches and sensors integrated into the locks and latches.

8. Provide motor based electrified locksets with electrified options as scheduled in the hardware sets and comply with the following requirements:
 - a. Universal input voltage – single chassis accepts 12 or 24V DC to allow for changes in the field without changing lock chassis.
 - b. Fail Safe/Fail Secure – changing mode between electrically locked (fail safe) and electrically unlocked (fail secure) is field selectable without opening the lock case
 - c. Low maximum current draw – maximum 0.4 amps to allow for multiple locks on a single power supply.
 - d. Low holding current – maximum 0.01 amps to produce minimal heat, eliminate “hot levers” in electrically locked applications, and to provide reliable operation in wood doors that provide minimal ventilation and air flow.
 - e. Request to Exit Switch (RX) –
 - 1) Modular Design – provide electrified locks capable of using, adding, or changing a modular RX switch without opening the lock case.
 - 2) Monitoring – where scheduled, provide a request to exit (RX) switch that detects rotation of the inside lever.
 - f. Connections – provide quick-connect Molex system standard.
9. Lever Trim: Solid brass, bronze, or stainless steel, cast or forged in design specified, with wrought roses and external lever spring cages. Provide thru-bolted levers with 2-piece spindles.
 - a. Lever Design: Schlage 06A
 - b. Tactile Warning (Knurling): Where required by authority having jurisdiction. Provide on levers on exterior (secure side) of doors serving rooms considered to be hazardous.

2.08 EXIT DEVICES

- A. Manufacturers and Products:
 1. Scheduled Manufacturer and Product: Von Duprin 99 series. No substitution.
- B. Requirements:
 1. Provide exit devices tested to ANSI/BHMA A156.3 Grade 1 and UL listed for Panic Exit or Fire Exit Hardware.
 2. Cylinders: Refer to “KEYING” article, herein.
 3. Provide touchpad type exit devices, fabricated of brass, bronze, stainless steel, or aluminum, plated to standard architectural finishes to match balance of door hardware.
 4. Touchpad must extend a minimum of one half of door width. No plastic inserts are allowed in touchpads.
 5. Provide exit devices with deadlatching feature for security and for future addition of alarm kits and/or other electrified requirements.
 6. Provide flush end caps for exit devices.
 7. Provide exit devices with manufacturer’s approved strikes.
 8. Provide exit devices cut to door width and height. Install exit devices at height recommended by exit device manufacturer, allowable by governing building codes, and approved by Architect.
 9. Mount mechanism case flush on face of doors, or provide spacers to fill gaps behind devices. Where glass trim or molding projects off face of door, provide glass bead kits.
 10. Provide cylindrical or hex-key dogging as specified at non fire-rated openings.
 11. Provide electrified options as scheduled.
 12. Concealed Vertical Cable Exit Devices: provide cable-actuated concealed vertical latch system in two-point for non-rated or fire rated wood doors up to a 90 minute rating and less bottom latch (LBL) configuration for non-rated or fire rated wood doors up to 20 minute rating. Vertical rods not permitted.
 - a. Cable: Stainless steel with abrasive resistant coating. Conduit and core wire ends snap into latch and center slides without use of tools.
 - b. Wood Door Prep: Maximum 1 inch x 1.1875 inch x 3.875 inches top latch pocket and 1 inch x 1.1875 inch x 5 inches bottom latch pocket which does not require the use of a metal wrap or edge for non-rated or fire rated wood doors up to a 45 minute rating.

- c. Latchbolts and Blocking Cams: Manufactured from sintered metal low carbon copper-infiltrated steel, with molybdenum disulfide low friction coating.
- d. Top Latchbolt: Minimum 0.38 inch (10 mm) and greater than 90 degree engagement with strike to prevent door and frame separation under high static load.
- e. Bottom Latchbolt: Minimum of 0.44 inch (11 mm) engagement with strike.
- f. Product Cycle Life: 1,000,000 cycles.
- g. Latch Operation: Top and bottom latch operate independently of each other. Top latch fully engages top strike even when bottom latch is compromised. Separate trigger mechanisms not permitted.
- h. Latch release does not require separate trigger mechanism.
- i. Cable and latching system characteristics:
 - 1) Installed independently of exit device installation, and capable of functioning on door prior to device and trim installation.
 - 2) Connected to exit device at single point in steel and aluminum doors, and two points for top and bottom latches in wood doors.
 - 3) Bottom latch height adjusted, from single point for steel and aluminum doors and two points for wood doors, after system is installed and connected to exit device, while door is hanging
 - 4) Bottom latch position altered up and down minimum of 2 inches (51 mm) in steel and aluminum doors without additional adjustment. Bottom latch deadlocks in every adjustment position in wood doors.
 - 5) Top and bottom latches in steel and aluminum doors and top latch in wood doors may be removed while door is hanging.
- 13. Top latch mounting: double or single tab mount for steel doors, face mount for aluminum doors eliminating requirement of tabs, and double tab mount for wood doors.
- 14. Provide exit devices with optional trim designs to match other lever and pull designs used on the project.
 - a. Tactile Warning (Knurling): Where required by authority having jurisdiction. Provide on levers on exterior (secure side) of doors serving rooms considered to be hazardous.

2.09 CYLINDERS

- A. Manufacturers:
 - 1. Scheduled Manufacturer: Schlage. No substitution.
- B. Requirements:
 - 1. Provide interchangeable cylinders/cores to match Owner's existing key system, compliant with ANSI/BHMA A156.5; latest revision; cylinder face finished to match lockset, manufacturer's series as indicated. Refer to "KEYING" article, herein.
 - 2. Provide the following keyway: verify with owner.
- C. Construction Keying:
 - 1. Replaceable Construction Cores.
 - a. Provide temporary construction cores replaceable by permanent cores, furnished in accordance with the following requirements.
 - 1) 3 construction control keys
 - 2) 12 construction change (day) keys.
 - b. Owner or Owner's Representative will replace temporary construction cores with permanent cores.

2.10 KEYING

- A. Provide a factory registered keying system, complying with guidelines in ANSI/BHMA A156.28, incorporating decisions made at keying conference.
- B. Provide cylinders/cores keyed into Owner's existing factory registered keying system.
- C. Comply with guidelines in ANSI/BHMA A156.28, incorporating decisions made at keying conference.
- D. Requirements:

1. Provide permanent cylinders/cores keyed by the manufacturer according to the following key system.
 - a. Master Keying system as directed by the Owner.
2. Forward biting list and keys separately from cylinders, by means as directed by Owner. Failure to comply with forwarding requirements will be cause for replacement of cylinders/cores involved at no additional cost to Owner.
3. Provide keys with the following features:
 - a. Material: Nickel silver; minimum thickness of .107-inch (2.3mm)
 - b. Patent Protection: Keys and blanks protected by one or more utility patent(s) until the year, 2029.
 - c. Geographically Exclusive: Where High Security or Security cylinders/cores are indicated, provide nationwide, geographically exclusive key system complying with the following restrictions.
4. Identification:
 - a. Mark permanent cylinders/cores and keys with applicable blind code per DHI publication "Keying Systems and Nomenclature" for identification. Do not provide blind code marks with actual key cuts.
 - b. Identification stamping provisions must be approved by the Architect and Owner.
 - c. Stamp cylinders/cores and keys with Owner's unique key system facility code as established by the manufacturer; key symbol and embossed or stamped with "DO NOT DUPLICATE" along with the "PATENTED" or patent number to enforce the patent protection.
 - d. Failure to comply with stamping requirements will be cause for replacement of keys involved at no additional cost to Owner.
 - e. Forward permanent cylinders/cores to Owner, separately from keys, by means as directed by Owner.
5. Quantity: Furnish in the following quantities.
 - a. Change (Day) Keys: 3 per cylinder/core.
 - b. Permanent Control Keys: 3.
 - c. Master Keys: 6.

2.11 KEY CONTROL SYSTEM

- A. Manufacturers:
 1. Scheduled Manufacturer: Telkee.
 2. Acceptable Manufacturers: HPC, Lund.
- B. Requirements:
 1. Provide key control system, including envelopes, labels, tags with self-locking key clips, receipt forms, 3-way visible card index, temporary markers, permanent markers, and standard metal cabinet, all as recommended by system manufacturer, with capacity for 150% of number of locks required for Project.
 - a. Provide complete cross index system set up by hardware supplier, and place keys on markers and hooks in cabinet as determined by final key schedule.
 - b. Provide hinged-panel type cabinet for wall mounting.

2.12 DOOR CLOSERS

- A. Manufacturers and Products:
 1. Scheduled Manufacturer and Product: LCN 4040XP series. No substitution.
- B. Requirements:
 1. Provide door closers conforming to ANSI/BHMA A156.4 Grade 1 requirements by BHMA certified independent testing laboratory. ISO 9000 certify closers. Stamp units with date of manufacture code.
 2. Provide door closers with fully hydraulic, full rack and pinion action with high strength cast iron cylinder, and full complement bearings at shaft.
 3. Cylinder Body: 1-1/2 inch (38 mm) diameter with 3/4 inch (19 mm) diameter double heat-treated pinion journal.

4. Hydraulic Fluid: Fireproof, passing requirements of UL10C, and requiring no seasonal closer adjustment for temperatures ranging from 120 degrees F to -30 degrees F.
5. Spring Power: Continuously adjustable over full range of closer sizes, and providing reduced opening force as required by accessibility codes and standards.
6. Hydraulic Regulation: By tamper-proof, non-critical valves, with separate adjustment for latch speed, general speed, and backcheck.
7. Provide closers with solid forged steel main arms and factory assembled heavy-duty forged forearms for parallel arm closers.
8. Pressure Relief Valve (PRV) Technology: Not permitted.
9. Finish for Closer Cylinders, Arms, Adapter Plates, and Metal Covers: Powder coating finish which has been certified to exceed 100 hours salt spray testing as described in ANSI Standard A156.4 and ASTM B117, or has special rust inhibitor (SRI).
10. Provide special templates, drop plates, mounting brackets, or adapters for arms as required for details, overhead stops, and other door hardware items interfering with closer mounting.

2.13 DOOR TRIM

- A. Manufacturers:
 1. Scheduled Manufacturer: Ives. No substitution.
- B. Requirements:
 1. Provide push plates 4 inches (102 mm) wide by 16 inches (406 mm) high by 0.050 inch (1 mm) thick and beveled 4 edges. Where width of door stile prevents use of 4 inches (102 mm) wide plate, adjust width to fit.
 2. Provide push bars of solid bar stock, diameter and length as scheduled. Provide push bars of sufficient length to span from center to center of each stile. Where required, mount back to back with pull.
 3. Provide offset pulls of solid bar stock, diameter and length as scheduled. Where required, mount back to back with push bar.
 4. Provide flush pulls as scheduled. Where required, provide back-to-back mounted model.
 5. Provide pulls of solid bar stock, diameter and length as scheduled. Where required, mount back to back with push bar.
 6. Provide pull plates 4 inches (102 mm) wide by 16 inches (406 mm) high by 0.050 inch (1 mm) thick, beveled 4 edges, and prepped for pull. Where width of door stile prevents use of 4 inches (102 mm) wide plate, adjust width to fit.
 7. Provide wire pulls of solid bar stock, diameter and length as scheduled.
 8. Provide decorative pulls as scheduled. Where required, mount back to back with pull.

2.14 PROTECTION PLATES

- A. Manufacturers:
 1. Scheduled Manufacturer: Ives. No substitution.
- B. Requirements:
 1. Provide kick plates, mop plates, and armor plates minimum of 0.050 inch (1 mm) thick, beveled four edges as scheduled. Furnish with sheet metal or wood screws, finished to match plates.
 2. Sizes of plates:
 - a. Kick Plates: 10 inches (254 mm) high by 2 inches (51 mm) less width of door on single doors, 1 inch (25 mm) less width of door on pairs
 - b. Mop Plates: 4 inches (102 mm) high by 2 inches (51 mm) less width of door on single doors, 1 inch (25 mm) less width of door on pairs
 - c. Armor Plates: 36 inches (914 mm) high by 2 inches (51 mm) less width of door on single doors, 1 inch (25 mm) less width of door on pairs

2.15 OVERHEAD STOPS AND OVERHEAD STOP/HOLDERS

- A. Manufacturers:
 1. Scheduled Manufacturers: Glynn-Johnson. No substitution.

- B. Requirements:
 - 1. Provide heavy duty concealed mounted overhead stop or holder as specified for exterior and interior vestibule single acting doors.
 - 2. Provide heavy duty concealed mounted overhead stop or holder as specified for double acting doors.
 - 3. Provide heavy or medium duty and concealed or surface mounted overhead stop or holder for interior doors as specified. Provide medium duty surface mounted overhead stop for interior doors and at any door that swings more than 140 degrees before striking wall, open against equipment, casework, sidelights, and where conditions do not allow wall stop or floor stop presents tripping hazard.
 - 4. Where overhead holders are specified provide friction type at doors without closer and positive type at doors with closer.

2.16 DOOR STOPS AND HOLDERS

- A. Manufacturers:
 - 1. Scheduled Manufacturer: Ives. No substitution.
- B. Provide door stops at each door leaf:
 - 1. Provide wall stops wherever possible. Provide convex type where mortise type locks are used and concave type where cylindrical type locks are used.
 - 2. Where a wall stop cannot be used, provide universal floor stops for low or high rise options.
 - 3. Where wall or floor stop cannot be used, provide medium duty surface mounted overhead stop.

2.17 THRESHOLDS, SEALS, DOOR SWEEPS, AUTOMATIC DOOR BOTTOMS, AND GASKETING

- A. Manufacturers:
 - 1. Scheduled Manufacturer: Zero International. No substitution.
- B. Requirements:
 - 1. Provide thresholds, weather-stripping (including door sweeps, seals, and astragals) and gasketing systems (including smoke, sound, and light) as specified and per architectural details. Match finish of other items.
 - 2. Smoke- and Draft-Control Door Assemblies: Where smoke- and draft-control door assemblies are required, provide door hardware that meets requirements of assemblies tested according to UL 1784 and installed in compliance with NFPA 105.
 - 3. Size of thresholds:
 - a. Saddle Thresholds: 1/2 inch (13 mm) high by jamb width by door width
 - b. Bumper Seal Thresholds: 1/2 inch (13 mm) high by 5 inches (127 mm) wide by door width
 - 4. Provide door sweeps, seals, astragals, and auto door bottoms only of type where resilient or flexible seal strip is easily replaceable and readily available.

2.18 SILENCERS

- A. Manufacturers:
 - 1. Scheduled Manufacturer: Ives. No substitution.
- B. Requirements:
 - 1. Provide "push-in" type silencers for hollow metal or wood frames.
 - 2. Provide one silencer per 30 inches (762 mm) of height on each single frame, and two for each pair frame.
 - 3. Omit where gasketing is specified.

2.19 FINISHES

- A. Finish: BHMA 626/652 (US26D); except:
 - 1. Hinges at Exterior Doors: BHMA 630 (US32D)
 - 2. Push Plates, Pulls, and Push Bars: BHMA 630 (US32D)
 - 3. Protection Plates: BHMA 630 (US32D)

4. Overhead Stops and Holders: BHMA 630 (US32D)
5. Door Closers: Powder Coat to Match
6. Wall Stops: BHMA 630 (US32D)
7. Latch Protectors: BHMA 630 (US32D)
8. Weatherstripping: Clear Anodized Aluminum
9. Thresholds: Mill Finish Aluminum

PART 3 EXECUTION

3.01 EXAMINATION

- A. Field verify existing conditions, existing doors and frames receiving new hardware. Verify that new hardware is compatible with existing door and frame preparation and existing conditions.
- B. Prior to installation of hardware, examine doors and frames, with Installer present, for compliance with requirements for installation tolerances, labeled fire-rated door assembly construction, wall and floor construction, and other conditions affecting performance.
- C. Examine roughing-in for electrical power systems to verify actual locations of wiring connections before electrified door hardware installation.
- D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 PREPARATION

- A. Where on-site modification of doors and frames is required:
 1. Carefully remove existing door hardware and components being reused. Clean, protect, tag, and store in accordance with storage and handling requirements specified herein.
 2. Field modify and prepare existing door and frame for new hardware being installed.
 3. When modifications are exposed to view, use concealed fasteners, when possible.
 4. Prepare hardware locations and reinstall in accordance with installation requirements for new door hardware and with:
 - a. Steel Doors and Frames: For surface applied door hardware, drill and tap doors and frames according to ANSI/SDI A250.6.
 - b. Wood Doors: DHI WDHS.5 "Recommended Hardware Reinforcement Locations for Mineral Core Wood Flush Doors."
 - c. Doors in rated assemblies: NFPA 80 for restrictions on on-site door hardware preparation.

3.03 INSTALLATION

- A. Mount door hardware units at heights to comply with the following, unless otherwise indicated or required to comply with governing regulations.
 1. Standard Steel Doors and Frames: ANSI/SDI A250.8.
 2. Custom Steel Doors and Frames: HMMA 831.
 3. Wood Doors: DHI WDHS.3, "Recommended Locations for Architectural Hardware for Wood Flush Doors."
- B. Install each hardware item in compliance with manufacturer's instructions and recommendations, using only fasteners provided by manufacturer.
- C. Do not install surface mounted items until finishes have been completed on substrate. Protect all installed hardware during painting.
- D. Set units level, plumb and true to line and location. Adjust and reinforce attachment substrate as necessary for proper installation and operation.
- E. Drill and countersink units that are not factory prepared for anchorage fasteners. Space fasteners and anchors according to industry standards.
- F. Install operating parts so they move freely and smoothly without binding, sticking, or excessive clearance.
- G. Hinges: Install types and in quantities indicated in door hardware schedule but not fewer than quantity recommended by manufacturer for application indicated or one hinge for every 30

inches (750 mm) of door height, whichever is more stringent, unless other equivalent means of support for door, such as spring hinges or pivots, are provided.

- H. Lock Cylinders: Install construction cores to secure building and areas during construction period.
 - 1. Replace construction cores with permanent cores as indicated in keying section.
 - 2. Furnish permanent cores to Owner for installation.
- I. Wiring: Coordinate with Division 26, ELECTRICAL sections for:
 - 1. Conduit, junction boxes and wire pulls.
 - 2. Connections to and from power supplies to electrified hardware.
 - 3. Connections to fire/smoke alarm system and smoke evacuation system.
 - 4. Connection of wire to door position switches and wire runs to central room or area, as directed by Architect.
 - 5. Testing and labeling wires with Architect's opening number.
- J. Key Control System: Tag keys and place them on markers and hooks in key control system cabinet, as determined by final keying schedule.
- K. Door Closers: Mount closers on room side of corridor doors, inside of exterior doors, and stair side of stairway doors from corridors. Mount closers so they are not visible in corridors, lobbies and other public spaces unless approved by Architect.
- L. Closer/Holders: Mount closer/holders on room side of corridor doors, inside of exterior doors, and stair side of stairway doors.
- M. Power Supplies: Locate power supplies as indicated or, if not indicated, above accessible ceilings or in equipment room, or alternate location as directed by Architect.
- N. Thresholds: Set thresholds in full bed of sealant complying with requirements specified in Division 07 Section "Joint Sealants."
- O. Stops: Provide floor stops for doors unless wall or other type stops are indicated in door hardware schedule. Do not mount floor stops where they may impede traffic or present tripping hazard.
- P. Perimeter Gasketing: Apply to head and jamb, forming seal between door and frame.
- Q. Meeting Stile Gasketing: Fasten to meeting stiles, forming seal when doors are closed.
- R. Door Bottoms: Apply to bottom of door, forming seal with threshold when door is closed.

3.04 FIELD QUALITY CONTROL

- A. Engage qualified manufacturer trained representative to perform inspections and to prepare inspection reports.
 - 1. Representative will inspect door hardware and state in each report whether installed work complies with or deviates from requirements, including whether door hardware is properly installed and adjusted.

3.05 ADJUSTING

- A. Initial Adjustment: Adjust and check each operating item of door hardware and each door to ensure proper operation or function of every unit. Replace units that cannot be adjusted to operate as intended. Adjust door control devices to compensate for final operation of heating and ventilating equipment and to comply with referenced accessibility requirements.
 - 1. Door Closers: Adjust sweep period to comply with accessibility requirements and requirements of authorities having jurisdiction.
- B. Occupancy Adjustment: Approximately three to six months after date of Substantial Completion, Installer's Architectural Hardware Consultant must examine and readjust each item of door hardware, including adjusting operating forces, as necessary to ensure proper function of doors and door hardware.

3.06 CLEANING AND PROTECTION

- A. Clean adjacent surfaces soiled by door hardware installation.

- B. Clean operating items as necessary to restore proper function and finish.
- C. Provide final protection and maintain conditions that ensure door hardware is without damage or deterioration at time of Substantial Completion.

3.07 DOOR HARDWARE SCHEDULE

- A. Hardware items are referenced in the following hardware. Refer to the above-specifications for special features, options, cylinders/keying, and other requirements.

3.08 HARDWARE SETS:

HARDWARE GROUP NO. 01

PROVIDE EACH SGL DOOR(S) WITH THE FOLLOWING:

3	EA	HINGE	5BB1HW 4.5 X 4.5 SEC - NRP AT OUTSWING DOORS	652	IVE
1	EA	PUSH PLATE	8200 6" X 16" TORX	630	IVE
1	EA	PULL PLATE	8303 10" 6" X 16" TORX	630	IVE
1	EA	SURFACE CLOSER	4040XP REG OR EDA - AS REQUIRED X TBTRX	689	LCN
1	EA	KICK PLATE	8400 10" X 1 1/2" LDW B-CS TKT X	630	IVE
1	EA	WALL STOP	WS401/402CCV	626	IVE
1	EA	GASKETING SET	188SBK PSA	BK	ZER

HARDWARE GROUP NO. 02

PROVIDE EACH PR DOOR(S) WITH THE FOLLOWING:

6	EA	HINGE	5BB1HW 4.5 X 4.5 SEC - NRP AT OUTSWING DOORS	652	IVE
1	SET	CONST LATCHING BOLT	FB51P 12"	630	IVE
1	EA	DUST PROOF STRIKE	DP2	626	IVE
1	EA	CLASSROOM LOCK	ND70TD RHO TORX	626	SCH
1	EA	FSIC CORE	23-030 EV C	626	SCH
1	EA	COORDINATOR	COR X FL X MB - AS REQUIRED	628	IVE
2	EA	SURFACE CLOSER	4040XP EDA TBTRX	689	LCN
2	EA	KICK PLATE	8400 10" X 1" LDW B-CS TKT X	630	IVE
2	EA	WALL STOP	WS401/402CCV	626	IVE
1	EA	ASTRAGAL - LENGTH AS REQUIRED	41AA	AA	ZER

HARDWARE GROUP NO. 03

PROVIDE EACH SGL DOOR(S) WITH THE FOLLOWING:

3	EA	HINGE	5BB1HW 4.5 X 4.5 SEC - NRP AT OUTSWING DOORS	652	IVE
1	EA	PASSAGE SET	L9010 06N TORX	630	SCH
1	EA	WALL STOP	WS401/402CCV	626	IVE

HARDWARE GROUP NO. 04

PROVIDE EACH SGL DOOR(S) WITH THE FOLLOWING:

3	EA	HINGE	5BB1HW 4.5 X 4.5 SEC - NRP AT OUTSWING DOORS	652	IVE
1	EA	PRIVACY LOCK	L9040 06N L583-363 L283-722	626	SCH
1	EA	SURFACE CLOSER	4040XP REG OR EDA - AS REQUIRED X TBTRX	689	LCN
1	EA	KICK PLATE	8400 10" X 1 1/2" LDW B-CS TKTX	630	IVE
1	EA	WALL STOP	WS401/402CCV	626	IVE
1	EA	GASKETING SET	188SBK PSA	BK	ZER

HARDWARE GROUP NO. 05

PROVIDE EACH SGL DOOR(S) WITH THE FOLLOWING:

3	EA	HINGE	5BB1HW 4.5 X 4.5 SEC - NRP AT OUTSWING DOORS	652	IVE
1	EA	PRIVACY LOCK	L9040 06N L583-363 L283-722	626	SCH
1	EA	OH STOP	90S SOC	630	GLY
1	EA	SURFACE CLOSER	4040XP REG OR EDA - AS REQUIRED X TBTRX	689	LCN
1	EA	KICK PLATE	8400 10" X 1 1/2" LDW B-CS TKTX	630	IVE
1	EA	GASKETING SET	188SBK PSA	BK	ZER

HARDWARE GROUP NO. 06

PROVIDE EACH SGL DOOR(S) WITH THE FOLLOWING:

3	EA	HINGE	5BB1HW 4.5 X 4.5 SEC - NRP AT OUTSWING DOORS	652	IVE
1	EA	CLASSROOM LOCK	ND70TD RHO TORX XN13-054	626	SCH
1	EA	FSIC CORE	23-030 EV C	626	SCH
1	EA	OH STOP	90S SOC	630	GLY
1	EA	SURFACE CLOSER	4040XP EDA TBTRX	689	LCN
1	EA	KICK PLATE	8400 10" X 1 1/2" LDW B-CS TKTX	630	IVE
1	EA	GASKETING SET	188SBK PSA	BK	ZER

HARDWARE GROUP NO. 07

PROVIDE EACH SGL DOOR(S) WITH THE FOLLOWING:

3	EA	HINGE	5BB1HW 4.5 X 4.5 SEC - NRP AT OUTSWING DOORS	652	IVE
1	EA	PASSAGE SET	ND10S RHO TORX	626	SCH
1	EA	SURFACE CLOSER	4040XP EDA TBTRX	689	LCN
1	EA	KICK PLATE	8400 10" X 1 1/2" LDW B-CS TKTX	630	IVE
1	EA	WALL STOP	WS401/402CCV	626	IVE
1	EA	GASKETING SET	188SBK PSA	BK	ZER

HARDWARE GROUP NO. 08

PROVIDE EACH SGL DOOR(S) WITH THE FOLLOWING:

3	EA	HINGE	5BB1HW 4.5 X 4.5 SEC - NRP AT OUTSWING DOORS	652	IVE
1	EA	STOREROOM LOCK	ND80RD RHO TORX	626	SCH
1	EA	FSIC CORE	23-030 EV C	626	SCH
1	EA	SURFACE CLOSER	4040XP REG OR EDA - AS REQUIRED X TBTRX	689	LCN
1	EA	KICK PLATE	8400 10" X 1 1/2" LDW B-CS TKTX	630	IVE
1	EA	WALL STOP	WS401/402CCV	626	IVE
3	EA	SILENCER	SR64	GRY	IVE

NOTE: ALT #2 @ 1072

HARDWARE GROUP NO. 09

PROVIDE EACH SGL DOOR(S) WITH THE FOLLOWING:

3	EA	HINGE	5BB1HW 4.5 X 4.5 SEC - NRP AT OUTSWING DOORS	652	IVE
1	EA	POWER TRANSFER	EPT10 CON	689	VON
1	EA	EU STOREROOM LOCK	ND80TDEU RHO TORX XN13-054 RX CON 12V/24V DC	626	SCH
1	EA	FSIC CORE	23-030 EV C	626	SCH
1	EA	SURFACE CLOSER	4040XP REG OR EDA - AS REQUIRED X TBTRX	689	LCN
1	EA	KICK PLATE	8400 10" X 1 1/2" LDW B-CS TKTX	630	IVE
1	EA	WALL STOP	WS401/402CCV	626	IVE
1	EA	GASKETING SET	188SBK PSA	BK	ZER
1	EA	WIRE HARNESS - IN DOOR - LENGTH AS REQUIRED	CON		SCH
1	EA	WIRE HARNESS CONNECTOR - IN FRAME - LENGTH AS REQUIRED	CON - 6W		SCH
1	EA	CREDENTIAL READER	PROVIDED BY OWNER		B/O
1	EA	DOOR CONTACT - AS REQUIRED	679-05 WD/HM	BLK	SCE
1	EA	POWER SUPPLY - AS REQUIRED	BY DIVISION 28		B/O
		NOTE:	FURNISH 5BB1HW 5" X 4.5" HINGES AT DOORS OVER 3'0" WIDE		

OPERATIONAL DESCRIPTION: ENTRANCE BY CREDENTIAL READER OR MANUAL KEY
OVER-RIDE. ALWAYS FREE EGRESS. FAIL SECURE.

HARDWARE GROUP NO. 10

PROVIDE EACH SGL DOOR(S) WITH THE FOLLOWING:

3	EA	HINGE	5BB1HW 4.5 X 4.5 SEC - NRP AT OUTSWING DOORS	652	IVE
1	EA	POWER TRANSFER	EPT10 CON	689	VON
1	EA	EL MORTISE LOCK	L9093TEL 06N 10-072 7/8" LIP TORX LX XL11-422 CON 12/24 VDC	630	SCH
1	EA	FSIC CORE	23-030 EV C	626	SCH
1	EA	SURFACE CLOSER	4040XP EDA TBTRX	689	LCN

1	EA	KICK PLATE	8400 10" X 1 1/2" LDW B-CS TKT	630	IVE
1	EA	WALL STOP	WS401/402CCV	626	IVE
1	EA	GASKETING SET	188SBK PSA	BK	ZER
1	EA	WIRE HARNESS - IN DOOR - LENGTH AS REQUIRED	CON		SCH
1	EA	WIRE HARNESS CONNECTOR - IN FRAME - LENGTH AS REQUIRED	CON - 6W		SCH
1	EA	CREDENTIAL READER	PROVIDED BY OWNER		B/O
1	EA	DOOR CONTACT - AS REQUIRED	679-05 WD/HM	BLK	SCE
1	EA	POWER SUPPLY - AS REQUIRED	BY DIVISION 28		B/O

OPERATIONAL DESCRIPTION: ENTRANCE BY CREDENTIAL READER OR MANUAL KEY OVER-RIDE. FAIL SAFE LOCK UPON FIRE ALARM ACTIVATION. DOOR LATCH MONITOR SWITCH IN LOCKSET. PANIC BUTTON CONTROL BY OTHERS.

HARDWARE GROUP NO. 11

PROVIDE EACH SGL DOOR(S) WITH THE FOLLOWING:

3	EA	HINGE	5BB1HW 4.5 X 4.5 SEC - NRP AT OUTSWING DOORS	652	IVE
1	EA	POWER TRANSFER	EPT10 CON	689	VON
1	EA	EU MORTISE LOCK	L9092TEU 06N TORX RX CON 12/24 VDC	630	SCH
1	EA	FSIC CORE	23-030 EV C	626	SCH
1	EA	SURFACE CLOSER	4040XP REG OR EDA - AS REQUIRED X TBTRX	689	LCN
1	EA	KICK PLATE	8400 10" X 1 1/2" LDW B-CS TKT	630	IVE
1	EA	WALL STOP	WS401/402CCV	626	IVE
1	EA	GASKETING SET	188SBK PSA	BK	ZER
1	EA	WIRE HARNESS - IN DOOR - LENGTH AS REQUIRED	CON		SCH
1	EA	WIRE HARNESS CONNECTOR - IN FRAME - LENGTH AS REQUIRED	CON - 6W		SCH
1	EA	BIOMETIRC READER	BY DIVISION 28		B/O
1	EA	CREDENTIAL READER	PROVIDED BY OWNER		B/O
1	EA	DOOR CONTACT - AS REQUIRED	679-05 WD/HM	BLK	SCE
1	EA	POWER SUPPLY - AS REQUIRED	BY DIVISION 28		B/O

OPERATIONAL DESCRIPTION: ENTRANCE BY CREDENTIAL READER AND BIOMETRIC READER, OR MANUAL KEY OVER-RIDE. ALWAYS FREE EGRESS. FAIL SECURE. VERIFY SEQUENCY OF OPERATION WITH SECURITY.

HARDWARE GROUP NO. 12

PROVIDE EACH SGL DOOR(S) WITH THE FOLLOWING:

3	EA	HINGE	5BB1HW 4.5 X 4.5 SEC	630	IVE
1	EA	POWER TRANSFER	EPT10 CON	689	VON

1	EA	ELEC FIRE EXIT HARDWARE	RX-LC-QEL-99-L-NL-F-06-SNB 24 VDC	626	VON
1	EA	RIM HOUSING	20-079	626	SCH
1	EA	FSIC CORE	23-030 EV C	626	SCH
1	EA	SURFACE CLOSER	4040XP SCUSH SRI TBTRX	689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS TKTX	630	IVE
1	EA	RAIN DRIP - AS REQUIRED	142AA	AA	ZER
1	SET	GASKETING	328AA JAMB SEAL SET	AA	ZER
1	EA	GASKETING	429AA HEAD SEAL MOUNT PRIOR TO ANY HEAD MOUNTED HARDWARE	AA	ZER
1	EA	DOOR SWEEP	39A	A	ZER
1	EA	HD THRESHOLD	655A-V3-226	A	ZER
1	EA	WIRE HARNESS - IN DOOR - LENGTH AS REQUIRED	CON		SCH
1	EA	WIRE HARNESS CONNECTOR - IN FRAME - LENGTH AS REQUIRED	CON - 6W		SCH
1	EA	CREDENTIAL READER	PROVIDED BY OWNER		B/O
1	EA	DOOR CONTACT - AS REQUIRED	679-05 WD/HM	BLK	SCE
1	EA	POWER SUPPLY - AS REQUIRED	PS904 900-4RL 900-BBK 120/240 VAC		VON

NOTE: ALTERNATE #1 ACCEPTED - DELETE RAIN DRIP @ 1049A, 1066A

NOTE: ALTERNATE #2 @ 1070; DELETE RAIN DRIP @ 1066A, 1066B, 1066C

OPERATIONAL DESCRIPTION: ENTRANCE BY CREDENTIAL READER OR MANUAL KEY
OVER-RIDE. ALWAYS FREE EGRESS. FAIL SECURE.

HARDWARE GROUP NO. 13

PROVIDE EACH PR DOOR(S) WITH THE FOLLOWING:

6	EA	HINGE	5BB1HW 4.5 X 4.5 SEC - NRP AT OUTSWING DOORS	652	IVE
1	EA	POWER TRANSFER	EPT10 CON	689	VON
1	SET	CONST LATCHING BOLT	FB51P 12"	630	IVE
1	EA	DUST PROOF STRIKE	DP2	626	IVE
1	EA	EU STOREROOM LOCK	ND80TDEU RHO 10-025 1 1/8" LIP TORX XN13-054 RX CON 12V/24V DC	626	SCH
1	EA	FSIC CORE	23-030 EV C	626	SCH
1	EA	COORDINATOR	COR X FL X MB - AS REQUIRED	628	IVE
2	EA	SURFACE CLOSER	4040XP EDA TBTRX	689	LCN
2	EA	KICK PLATE	8400 10" X 1" LDW B-CS TKTX	630	IVE
2	EA	WALL STOP	WS401/402CCV	626	IVE
1	EA	ASTRAGAL - LENGTH AS REQUIRED	41AA	AA	ZER
1	EA	WIRE HARNESS - IN DOOR - LENGTH AS REQUIRED	CON		SCH
1	EA	WIRE HARNESS CONNECTOR - IN FRAME - LENGTH AS REQUIRED	CON - 6W		SCH
1	EA	CREDENTIAL READER	PROVIDED BY OWNER		B/O

2	EA	DOOR CONTACT - AS REQUIRED	679-05 WD/HM	BLK	SCE
1	EA	POWER SUPPLY - AS REQUIRED	BY DIVISION 28		B/O

OPERATIONAL DESCRIPTION: ENTRANCE BY CREDENTIAL READER OR MANUAL KEY OVER-RIDE. ALWAYS FREE EGRESS. FAIL SECURE.

HARDWARE GROUP NO. 14

PROVIDE EACH SGL DOOR(S) WITH THE FOLLOWING:

3	EA	HINGE	5BB1HW 4.5 X 4.5 SEC - NRP AT OUTSWING DOORS	652	IVE
1	EA	POWER TRANSFER	EPT10 CON	689	VON
1	EA	ELEC FIRE EXIT HARDWARE	RX-LC-QEL-99-L-NL-F-06-SNB 24 VDC	626	VON
1	EA	RIM HOUSING	20-079	626	SCH
1	EA	FSIC CORE	23-030 EV C	626	SCH
1	EA	SURFACE CLOSER	4040XP EDA TBTRX	689	LCN
1	EA	KICK PLATE	8400 10" X 1 1/2" LDW B-CS TKT X	630	IVE
1	EA	WALL STOP	WS401/402CCV	626	IVE
1	EA	GASKETING SET	188SBK PSA	BK	ZER
1	EA	WIRE HARNESS - IN DOOR - LENGTH AS REQUIRED	CON		SCH
1	EA	WIRE HARNESS CONNECTOR - IN FRAME - LENGTH AS REQUIRED	CON - 6W		SCH
1	EA	CREDENTIAL READER	PROVIDED BY OWNER		B/O
1	EA	DOOR CONTACT - AS REQUIRED	679-05 WD/HM	BLK	SCE
1	EA	POWER SUPPLY - AS REQUIRED	PS904 900-4RL 900-BBK 120/240 VAC		VON

OPERATIONAL DESCRIPTION: ENTRANCE BY CREDENTIAL READER OR MANUAL KEY OVER-RIDE. ALWAYS FREE EGRESS. FAIL SECURE.

HARDWARE GROUP NO. 15

PROVIDE EACH SGL DOOR(S) WITH THE FOLLOWING:

3	EA	HINGE	5BB1HW 4.5 X 4.5 SEC - NRP AT OUTSWING DOORS	652	IVE
1	EA	POWER TRANSFER	EPT10 CON	689	VON
1	EA	EU MORTISE LOCK	L9095TEU 06L TORX RX LX CON 12/24 VDC	630	SCH
2	EA	FSIC CORE	23-030 EV C	626	SCH
1	EA	SURFACE CLOSER	4040XP EDA TBTRX	689	LCN
1	EA	KICK PLATE	8400 10" X 1 1/2" LDW B-CS TKT X	630	IVE
1	EA	WALL STOP	WS401/402CCV	626	IVE
1	EA	GASKETING SET	188SBK PSA	BK	ZER
1	EA	WIRE HARNESS - IN DOOR - LENGTH AS REQUIRED	CON		SCH

1	EA	WIRE HARNESS CONNECTOR - IN FRAME - LENGTH AS REQUIRED	CON - 6W		SCH
2	EA	CREDENTIAL READER	PROVIDED BY OWNER		B/O
1	EA	DOOR CONTACT - AS REQUIRED	679-05 WD/HM	BLK	SCE
1	EA	POWER SUPPLY - AS REQUIRED	BY DIVISION 28		B/O

OPERATIONAL DESCRIPTION: ENTRANCE BY CREDENTIAL READER OR MANUAL KEY OVER-RIDE EITHER SIDE. NO FREE EGRESS. FAIL SECURE. ELECTRIFIED LOCK HAS DOOR LATCH BOLT MONITOR.

HARDWARE GROUP NO. 16

PROVIDE EACH SL DOOR(S) WITH THE FOLLOWING:

1	EA	MORTISE CYLINDER HOUSING	20-059 X K510-730	626	SCH
1	EA	FSIC CORE	23-030 EV C	626	SCH

NOTE: ALTERNATE #2

NOTE: COORDINATE ALL HARDWARE WITH DOOR MANUFACTURER. VERIFY CYLINDER AND CAM REQUIREMENTS.

HARDWARE GROUP NO. 17

PROVIDE EACH RU DOOR(S) WITH THE FOLLOWING:

1	EA	DOOR CONTACT	674-OH	628	SCE
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NOTE: ALTERNATE #1 @ 1068A, 1068B

NOTE: ALTERNATE #2 @ 1077

NOTE: ALL OTHER HARDWARE BY DOOR SUPPLIER.
MONITOR ONLY.

HARDWARE GROUP NO. 18

PROVIDE EACH SGL DOOR(S) WITH THE FOLLOWING:

3	EA	HINGE	5BB1HW 4.5 X 4.5 SEC - NRP AT OUTSWING DOORS	652	IVE
1	EA	POWER TRANSFER	EPT10 CON	689	VON
1	EA	EU MORTISE LOCK	L9092TEU 06N TORX RX CON 12/24 VDC	630	SCH
1	EA	FSIC CORE	23-030 EV C	626	SCH
1	EA	SURFACE CLOSER	4040XP EDA TBTRX	689	LCN
1	EA	KICK PLATE	8400 10" X 1 1/2" LDW B-CS TKT	630	IVE
1	EA	WALL STOP	WS401/402CCV	626	IVE
1	EA	GASKETING SET	188SBK PSA	BK	ZER
1	EA	WIRE HARNESS - IN DOOR - LENGTH AS REQUIRED	CON		SCH
1	EA	WIRE HARNESS CONNECTOR - IN FRAME - LENGTH AS REQUIRED	CON - 6W		SCH

1	EA	CREDENTIAL READER	PROVIDED BY OWNER		B/O
1	EA	DOOR CONTACT - AS REQUIRED	679-05 WD/HM	BLK	SCE
1	EA	POWER SUPPLY - AS REQUIRED	BY DIVISION 28		B/O

OPERATIONAL DESCRIPTION: ENTRANCE BY CREDENTIAL READER OR MANUAL KEY OVER-RIDE. ALWAYS FREE EGRESS. FAIL SECURE.

HARDWARE GROUP NO. 19

PROVIDE EACH SGL DOOR(S) WITH THE FOLLOWING:

3	EA	HINGE	5BB1HW 4.5 X 4.5 SEC - NRP AT OUTSWING DOORS	652	IVE
1	EA	POWER TRANSFER	EPT10 CON	689	VON
1	EA	EU MORTISE LOCK	L9092TEU 06N TORX RX DPS CON 12/24 VDC	630	SCH
1	EA	SURFACE CLOSER	4040XP EDA TBTRX	689	LCN
1	EA	KICK PLATE	8400 10" X 1 1/2" LDW B-CS TKT X	630	IVE
1	EA	WALL STOP	WS401/402CCV	626	IVE
1	EA	GASKETING SET	188SBK PSA	BK	ZER
1	EA	WIRE HARNESS - IN DOOR - LENGTH AS REQUIRED	CON		SCH
1	EA	WIRE HARNESS CONNECTOR - IN FRAME - LENGTH AS REQUIRED	CON - 6W		SCH
1	EA	CREDENTIAL READER	PROVIDED BY OWNER		B/O
1	EA	DOOR CONTACT - AS REQUIRED	679-05 WD/HM	BLK	SCE
1	EA	POWER SUPPLY - AS REQUIRED	BY DIVISION 28		B/O

NOTE: ALTERNATE #1

OPERATIONAL DESCRIPTION: ENTRANCE BY CREDENTIAL READER OR MANUAL KEY OVER-RIDE. ALWAYS FREE EGRESS. FAIL SECURE.

NOTE: DOOR POSITION SWITCH IN LOCK TO INTERLOCK WITH ADJOINING DOOR. IF ONE DOOR OPEN, DEACTIVATES CREDENTIAL READER ON OTHER DOOR.

HARDWARE GROUP NO. 20

PROVIDE EACH SGL DOOR(S) WITH THE FOLLOWING:

3	EA	HINGE	5BB1HW 4.5 X 4.5 SEC - NRP AT OUTSWING DOORS	652	IVE
1	EA	POWER TRANSFER	EPT10 CON	689	VON
1	EA	EU MORTISE LOCK	L9095TEU 06L TORX RX LX CON 12/24 VDC	630	SCH
1	EA	FSIC CORE	23-030 EV C	626	SCH
1	EA	SURFACE CLOSER	4040XP EDA TBTRX	689	LCN
1	EA	KICK PLATE	8400 10" X 1 1/2" LDW B-CS TKT X	630	IVE
1	EA	WALL STOP	WS401/402CCV	626	IVE
1	EA	GASKETING SET	188SBK PSA	BK	ZER
1	EA	WIRE HARNESS - IN DOOR - LENGTH AS REQUIRED	CON		SCH

1	EA	WIRE HARNESS CONNECTOR - IN FRAME - LENGTH AS REQUIRED	CON - 6W		SCH
1	EA	CREDENTIAL READER	PROVIDED BY OWNER		B/O
1	EA	DOOR CONTACT - AS REQUIRED	679-05 WD/HM	BLK	SCE
1	EA	POWER SUPPLY - AS REQUIRED	BY DIVISION 28		B/O

NOTE: ALTERNATE #1

OPERATIONAL DESCRIPTION: INTERLOCK HARDWARE - INGRESS AND EGRESS BY CREDENTIAL READER EITHER SIDE OR MANUAL KEY OVER-RIDE. NO FREE EGRESS. FAIL SECURE.

NOTE: DOOR POSITION SWITCH IN LOCK TO INTERLOCK WITH ADJOINING DOOR. IF ONE DOOR OPEN, DEACTIVATES CREDENTIAL READER ON OTHER DOOR.

END OF SECTION

SECTION 08 87 20
ARCHITECTURAL WINDOW FILM

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Interior decorative window film.

1.02 RELATED REQUIREMENTS

- A. Section 08 43 13 - Aluminum-Framed Storefronts: Aluminum-Framed Storefronts to receive architectural window film.
- B. Section 08 80 00 - Glazing: General Glazing applications to receive architectural window film.

1.03 REFERENCE STANDARDS

- A. ASHRAE - American Society for Heating, Refrigeration, and Air Conditioning Engineers; Handbook of Fundamentals, 1997 Edition.
- B. ASTM E 84 - Standard Method of Test for Surface Burning Characteristics of Building Materials.
- C. ASTM E 308 - Standard Recommended Practice for Spectrophotometry and Description of Color in CIE 1931 System.
- D. ASTM E 903 - Standard Methods of Test for Solar Absorbance, Reflectance and Transmittance of Materials Using Integrating Spheres.
- E. ASTM G 26 - Standard Practice for Performing Accelerated Outdoor Weatherizing for Non-metallic Materials Using Concentrated Natural Sunlight.

1.04 PERFORMANCE REQUIREMENTS

- A. Fire Performance: Surface burning characteristics when tested in accordance ASTM E 84:
 - 1. Flame Spread: 25, maximum.
 - 2. Smoke Developed: 450, maximum.

1.05 SUBMITTALS

- A. See Section 01 30 00 - 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.
 - a. Selection Samples: For each finish product specified, two complete sets of color chips representing manufacturer's full range of available colors and patterns.
 - b. Verification Samples: For each finish product specified, two samples representing actual product, color, and patterns.

1.06 QUALITY ASSURANCE

- A. Manufacturer Qualifications: All primary products specified in this section will be supplied by a single manufacturer with a minimum of ten (10) years experience.
- B. Installer Qualifications: All products listed in this section are to be installed by a single installer with a minimum of five (5) years demonstrated experience in installing products of the same type and scope as specified.
 - 1. Provide documentation that the installer is authorized by the Manufacturer to perform Work specified in this section.
 - 2. Provide a commercial building reference list of (#) properties where the installer has applied window film. This list will include the following information:
 - a. Name of building.
 - b. The name and telephone number of a management contact.
 - c. Type of glass.
 - d. Type of film.
 - e. Amount of film installed.

- f. Date of completion.
- 3. Provide a Glass Stress Analysis of the existing glass and proposed glass/film combination as recommended by the film manufacturer.

1.07 MOCK-UPS

- A. Mock-Up: Provide a mock-up for evaluation of surface preparation techniques and application workmanship.
 - 1. Finish areas designated by Architect.
 - 2. Do not proceed with remaining work until workmanship, color, and sheen are approved by Architect.
 - 3. Refinish mock-up area as required to produce acceptable work.

1.08 DELIVERY, STORAGE, AND HANDLING

- A. Store products in manufacturer's unopened packaging until ready for installation.
- B. Store and dispose of hazardous materials, and materials contaminated by hazardous materials, in accordance with requirements of local authorities having jurisdiction.

1.09 PROJECT CONDITIONS

- A. Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's absolute limits.

1.10 WARRANTY

- A. At project closeout, provide to Owner or Owners Representative an executed current copy of the manufacturer's standard limited warranty against manufacturing defect, outlining its terms, conditions, and exclusions from coverage.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Basis of Design Manufacturer:
 - 1. 3M Window Film; Fasara - Glass Finishes Gradation: www.3m.com/us/arch_construct/scpd/windowfilm.
- B. Other Acceptable Manufacturers:
 - 1. Flexvue Films: www.flexvuefilms.com.
 - 2. Madico, Inc: www.madico.com.
 - 3. Substitutions: See Section 01 60 00 - Product Requirements.

2.02 GRADATION PATTERNED FILM

- A. 3M Window Film: Fasara - Glass Finishes Gradation:
 - 1. Adhesive Color: Clear.
 - 2. Adhesive Content: Solvent Acrylic.
 - 3. Adhesive Type: Pressure-sensitive.
 - 4. Application: Interior glass surfaces.
 - 5. Application Method: Wet.
 - 6. Application Surface: Flat.
 - 7. Backing: Acrylic Pressure Sensitive Adhesive.
 - 8. Cleaning: Water-based.
 - 9. Color: White.
 - 10. Design Pattern: Gradation.
 - a. Refer to Drawings for location of gradation percentages.
 - 11. Film Thickness: 3.7 mil.
 - 12. Film Type: Polyester.
 - 13. Opacity: Translucent.
 - 14. Overall Width: 50 inch, 60 inch.
 - 15. Performance Level: Premium.
 - 16. Removability: Removable with heat / adhesive remover.

17. Surface Finish: Matte.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Do not begin installation until substrates have been properly prepared.
- B. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

3.02 PREPARATION

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

3.03 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Cut film edges neatly and square at a uniform distance of 1/8 inch to 1/16 inch of window sealant. Use new blade tips after 3 to 4 cuts.
- C. Spray the slip solution, composed of one capful of baby shampoo or dishwashing liquid to 1 gallon of water, on window glass and adhesive to facilitate proper positioning of film.
- D. Apply film to glass and lightly spray film with slip solution.
- E. Squeegee from top to bottom of window. Spray slip solution to film and squeegee a second time.
- F. Bump film edge with lint-free towel wrapped around edge of a 5-way tool.
- G. Upon completion of film application, allow 30 days for moisture from film installation to dry thoroughly, and to allow film to dry flat with no moisture dimples when viewed under normal viewing conditions.

3.04 CLEANING AND PROTECTION

- A. Remove left over material and debris from Work area. Use necessary means to protect film before, during, and after installation.
- B. Touch-up, repair or replace damaged products before Substantial Completion.
- C. After application of film, wash film using common window cleaning solutions, including ammonia solutions, 30 days after application. Do not use abrasive type cleaning agents and bristle brushes to avoid scratching film. Use synthetic sponges or soft cloths.

END OF SECTION

SECTION 08 80 00

GLAZING

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Acoustical glass.
- B. Fire-rated glass.
- C. Insulated glass units.
- D. Glazing compounds and accessories.

1.02 RELATED REQUIREMENTS

- A. Section 07 90 05 - Joint Sealers: Sealants for other than glazing purposes.
- B. Section 08 11 13 - Hollow Metal Doors and Frames: Glazed lites in doors and borrowed lites.
- C. Section 08 14 16 - Flush Wood Doors: Glazed lites in doors.
- D. Section 08 43 13 - Aluminum-Framed Storefronts: Glazing furnished as part of storefront assembly.
- E. Section 08 87 20 - Architectural Window Film.
- F. Section 10 28 00 - Toilet, Bath, and Laundry Accessories: Mirrors.

1.03 REFERENCE STANDARDS

- A. 16 CFR 1201 - Safety Standard for Architectural Glazing Materials; Current Edition.
- B. ANSI Z97.1 - American National Standard for Safety Glazing Materials Used in Buildings - Safety Performance Specifications and Methods of Test; 2015.
- C. ASTM C864 - Standard Specification for Dense Elastomeric Compression Seal Gaskets, Setting Blocks, and Spacers; 2005 (Reapproved 2015).
- D. ASTM C920 - Standard Specification for Elastomeric Joint Sealants; 2018.
- E. ASTM C1036 - Standard Specification for Flat Glass; 2016.
- F. ASTM C1048 - Standard Specification for Heat-Strengthened and Fully Tempered Flat Glass; 2018.
- G. ASTM C1172 - Standard Specification for Laminated Architectural Flat Glass; 2014.
- H. ASTM C1193 - Standard Guide for Use of Joint Sealants; 2016.
- I. ASTM C1376 - Standard Specification for Pyrolytic and Vacuum Deposition Coatings on Flat Glass; 2015.
- J. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2020.
- K. ASTM E90 - Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements; 2009 (Reapproved 2016).
- L. ASTM E119 - Standard Test Methods for Fire Tests of Building Construction and Materials; 2020.
- M. ASTM E413 - Classification for Rating Sound Insulation; 2016.
- N. ASTM E1996 - Standard Specification for Performance of Exterior Windows, Curtain Walls, Doors, and Impact Protective Systems Impacted by Windborne Debris in Hurricanes; 2017.
- O. ASTM E2190 - Standard Specification for Insulating Glass Unit Performance and Evaluation; 2010.
- P. GANA (GM) - GANA Glazing Manual; 2008.
- Q. GANA (SM) - GANA Sealant Manual; 2008.
- R. GANA (LGRM) - Laminated Glazing Reference Manual; 2009.

- S. ICC (IBC) - International Building Code; 2018.
- T. IGMA TB-3001 - Guidelines for Sloped Glazing; 2001.
- U. IGMA TM-3000 - North American Glazing Guidelines for Sealed Insulating Glass Units for Commercial & Residential Use; 1990 (2016).
- V. ITS (DIR) - Directory of Listed Products; current edition.
- W. NFPA 257 - Standard on Fire Test for Window and Glass Block Assemblies; 2017.
- X. UL (DIR) - Online Certifications Directory; Current Edition.
- Y. UL 9 - Standard for Fire Tests of Window Assemblies; Current Edition, Including All Revisions.
- Z. UL 10B - Standard for Fire Tests of Door Assemblies; Current Edition, Including All Revisions.
- AA. UL 263 - Standard for Fire Tests of Building Construction and Materials; Current Edition, Including All Revisions.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Preinstallation Meeting: Convene a preinstallation meeting one week before starting work of this section; require attendance by each of the affected installers.

1.05 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data on Acoustical and Fire-Rated Glazing Types: Provide structural, physical and environmental characteristics, size limitations, special handling and installation requirements.
- 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 size of glass units.
- E. Samples: Submit 3" inch long bead of glazing sealant, color as selected.
- F. Certificate: Certify that products of this section meet or exceed specified requirements.
- G. Warranty Documentation: Submit manufacturer warranty and ensure that forms have been completed in Owner's name and registered with manufacturer.

1.06 QUALITY ASSURANCE

- A. Perform Work in accordance with GANA (GM), GANA (SM), GANA (LGRM), and IGMA TM-3000 for glazing installation methods. Maintain one copy on site.
- 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 with at least five years documented experience.
- D. Testing Agency Qualifications: Independent firm specializing in performing testing and inspections of the type specified in this section.

1.07 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.

1.08 WARRANTY

- A. See Section 01 78 00 - Closeout Submittals, for additional warranty requirements.
- B. Laminated Glass: Provide a five (5) year manufacturer warranty to include coverage for delamination, including providing products to replace failed units.

- C. Polycarbonate Sheet Glazing: Provide a five (5) year manufacturer warranty to include coverage for breakage, coating failure, abrasion resistance, including providing products to replace failed units.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Glass Fabricators:
 - 1. GGI - General Glass International: www.generalglass.com.
 - 2. JE Berkowitz, LP: www.jeberkowitz.com.
 - 3. Oldcastle Building Envelope: www.obe.com.
 - 4. Standard Bent Glass Corp: www.standardbent.com.
 - 5. Trulite Glass & Aluminum Solutions, LLC: www.trulite.com.
 - 6. Viracon, Inc: www.viracon.com.
 - 7. Substitutions: See Section 01 60 00 - Product Requirements.
- B. Laminated Glass Manufacturers:
 - 1. Guardian Industries Corp: www.sunguardglass.com.
 - 2. Pilkington North America Inc: www.pilkington.com/na.
 - 3. Viracon, Inc.: www.viracon.com.
 - 4. Substitutions: See Section 01 60 00 - Product Requirements.
- C. Fire-Resistance-Rated Glass: Provide products as required to achieve indicated fire-rating period.
 - 1. Basis of Design Manufacturer:
 - a. Technical Glass Products; FireLite Clear Ceramic with UltraHD Technology - Premium Surface Grade: www.fireglass.com.
 - 2. Other Acceptable Manufacturers:
 - a. SAFTIFIRST, a division of O'Keeffe's Inc: www.safti.com.
 - b. Vetrotech North America: www.vetrotechusa.com.
 - c. Substitutions: See Section 01 60 00 - Product Requirements.

2.02 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. 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 B or 16 CFR 1201 - Category I impact test requirements.
 - 2. Polyvinyl Butyral (PVB) Interlayer: 0.030 inch thick, minimum.

2.03 INSULATING GLASS UNITS

- A. Manufacturers:
 - 1. Fabricator certified by glass manufacturer for type of glass, coating, and treatment involved and capable of providing specified warranty.
 - 2. Basis of Design Manufacturer:
 - a. Vitro Architectural Glass; Solarban 60 (2) Clear + Clear: www.vitroglazings.com.
 - 3. Other Acceptable Manufacturers:
 - a. Guardian Industries Corp: www.sunguardglass.com.
 - b. Pilkington North America Inc: www.pilkington.com/na.
 - c. Viracon, Apogee Enterprises, Inc: www.viracon.com.
 - d. Viracon, Inc: www.viracon.com.
 - e. Substitutions: See Section 01 60 00 - 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. Spacer Color: Black.
4. Edge Seal:
 - a. Dual-Sealed System: Provide polyisobutylene sealant as primary seal applied between spacer and glass panes, and silicone, polysulfide, or polyurethane sealant as secondary seal applied around perimeter.
5. Color: Black.
6. Purge interpane space with dry air, hermetically sealed.
- C. Type E-1 - Insulating Glass Units: Vision glass, double glazed.
 1. Applications: Exterior glazing unless otherwise indicated.
 2. Space between lites filled with argon.
 3. Outboard Lite: Fully tempered float glass, 1/4 inch thick, minimum.
 - a. Tint: Clear.
 4. Inboard Lite: Fully tempered float glass, 1/4 inch thick, minimum.
 - a. Tint: Clear.
 - b. Coating: Low-E (passive type), on #3 surface.
 5. Total Thickness: 1 inch.
 6. Thermal Transmittance (U-Value), Winter - Center of Glass: 0.29, nominal.
 7. Visible Light Transmittance (VLT): 70 percent, nominal.
 8. Shading Coefficient: 0.45, nominal.
 9. Solar Heat Gain Coefficient (SHGC): 39 percent, nominal.
 10. Visible Light Reflectance, Outside: 11 percent, nominal.
 11. Glazing Method: Dry glazing method, gasket glazing.

2.04 GLAZING UNITS

- A. Type I-1 - Glazing: Laminated glass, 2-Ply.
 1. Applications: Interior Glazing.
 2. Tint: Clear.
 3. Thickness: Two 0.125 inch lites to achieve a total thickness of 1/4" inch.
 4. Outer Lite: Annealed glass.
 5. Interlayer, Inboard Side: Polyvinyl butyral (PVB), thickness as required to meet performance criteria.
 6. Inside Lite: Annealed glass.
- B. Type I-2A - Fire-Resistance-Rated Glazing: Type, thickness, and configuration of glazing that contains flame, smoke, and blocks radiant heat, as required to achieve indicated fire-rating period.
 1. Applications:
 - a. Glazing in fire-rated door assembly.
 - b. Glazing in sidelites, borrowed lites, and other glazed openings in fire-rated wall assemblies.
 - c. Other locations as indicated on drawings.
 2. Provide products listed by ITS (DIR) or UL (DIR) and approved by authorities having jurisdiction.
 3. Safety Glazing Certification: 16 CFR 1201 Category II.
 4. Glazing Method: As required for fire rating.
 5. Fire-Rating Period: 45 minutes.
 6. Markings for Fire-Resistance-Rated Glazing Assemblies: Provide permanent markings on fire-resistance-rated glazing in compliance with ICC (IBC), local building code, and authorities having jurisdiction.
- C. Type I-2B - Fire-Resistance-Rated Glazing: Type, thickness, and configuration of glazing that contains flame, smoke, and blocks radiant heat, as required to achieve indicated fire-rating period.

1. Applications:
 - a. Glazing in fire-rated door assembly.
 - b. Glazing in sidelites, borrowed lites, and other glazed openings in fire-rated wall assemblies.
 - c. Other locations as indicated on drawings.
2. Provide products listed by ITS (DIR) or UL (DIR) and approved by authorities having jurisdiction.
3. Safety Glazing Certification: 16 CFR 1201 Category II.
4. Glazing Method: As required for fire rating.
5. Fire-Rating Period: 90 minutes.
6. Markings for Fire-Resistance-Rated Glazing Assemblies: Provide permanent markings on fire-resistance-rated glazing in compliance with ICC (IBC), local building code, and authorities having jurisdiction.

2.05 GLAZING COMPOUNDS

- A. Glazing Putty: Polymer modified latex recommended by manufacturer for outdoor use, knife grade consistency; grey color.
- B. 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.
- C. Silicone Sealant: Single component; neutral curing; capable of water immersion without loss of properties; non-bleeding, non-staining; ASTM C920, Type S, Grade NS, Class 25, Uses M, A, and G; with cured Shore A hardness range of 15 to 25; color as selected.
- D. 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. BASF Corporation: www.basf.com/us/en.html.
 6. Substitutions: See Section 01 60 00 - Product Requirements.

2.06 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 by width of glazing rabbet space minus 1/16 inch by height to suit glazing method and pane weight and area.
- B. Spacer Shims: Neoprene, 50 to 60 Shore A durometer hardness; ASTM C864 Option II. Minimum 3 inch long by one half the height of the glazing stop by thickness to suit application, self adhesive on one face.
- C. Glazing Tape, Back Bedding Mastic Type: Preformed, butyl-based, 100 percent solids compound with integral resilient spacer rod applicable to application indicated; 5 to 30 cured Shore A durometer hardness; coiled on release paper; black color.
 1. Width: As required for application.
 2. Thickness: As required for application.
 3. Spacer Rod Diameter: As required for application.
- D. Glazing Splines: Resilient silicone extruded shape to suit glazing channel retaining slot; ASTM C864 Option II; color black.
- E. Glazing Clips: Manufacturer's standard type.

2.07 SOURCE QUALITY CONTROL

- A. See Section 01 40 00 - Quality Requirements, for additional 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 within maximum of 24 hours 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, etc.

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 INSTALLATION - DRY GLAZING METHOD (TAPE AND TAPE)

- A. Application - Interior Glazed: Set glazing infills from the interior of the building.
- B. Cut glazing tape to length and set against permanent stops, projecting 1/16 inch above sight line.
- C. Place setting blocks at 1/4 points with edge block no more than 6 inch from corners.
- D. Rest glazing on setting blocks and push against tape for full contact at perimeter of pane or unit.
- E. Place glazing tape on free perimeter of glazing in same manner described above.
- F. Install removable stop without displacement of tape. Exert pressure on tape for full continuous contact.
- G. Carefully trim protruding tape with knife.

3.06 FIELD QUALITY CONTROL

- A. See Section 01 40 00 - Quality Requirements, for additional requirements.

3.07 CLEANING

- A. See Section 01 74 19 - Construction Waste Management and Disposal, for additional requirements.
- B. Remove excess glazing materials from finish surfaces immediately after application using solvents or cleaners recommended by manufacturers.
- C. Remove non-permanent labels immediately after glazing installation is complete.
- D. Clean glass and adjacent surfaces after sealants are fully cured.
- E. 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.

3.08 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 05 61

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. Resilient tile.
 - 2. Fluid-applied flooring.
 - 3. Carpet tile.
 - 4. Entry carpet tile.
- B. Removal of existing floor coverings.
- C. Preparation of newly patched and existing concrete floor slabs for installation of floor coverings.
- D. Testing of concrete floor slabs for moisture and alkalinity (pH).
- E. 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.
- F. Patching compound.
- G. Remedial floor coatings.

1.02 RELATED REQUIREMENTS

- A. Section 01 40 00 - Quality Requirements: Additional requirements relating to testing agencies and testing.
- B. Section 01 74 19 - Construction Waste Management and Disposal: Handling of existing floor coverings removed.
- C. Section 03 30 00 - Cast-in-Place Concrete: Moisture emission reducing curing and sealing compound for slabs to receive adhered flooring, to prevent moisture content-related flooring failures; to remain in place, not to be removed.
- D. Section 03 30 06 - Waterproofing Admixture for Cast-in-Place Concrete.
- E. Section 03 54 00 - Cast Underlayment: Self-leveling underlayment applied as remediation treatment.
- F. Section 09 65 00 - Resilient Flooring.
- G. Section 09 67 00 - Fluid-Applied Flooring.
- H. Section 09 68 13 - Tile Carpeting.

1.03 REFERENCE STANDARDS

- A. ASTM C109/C109M - Standard Test Method for Compressive Strength of Hydraulic Cement Mortars (Using 2-in. or (50-mm) Cube Specimens); 2020a.
- B. ASTM F710 - Standard Practice for Preparing Concrete Floors to Receive Resilient Flooring; 2019, with Editorial Revision (2020).
- C. ASTM F1869 - Standard Test Method for Measuring Moisture Vapor Emission Rate of Concrete Subfloor Using Anhydrous Calcium Chloride; 2016a.
- D. ASTM F2170 - Standard Test Method for Determining Relative Humidity in Concrete Floor Slabs Using in situ Probes; 2019a.
- E. RFCI (RWP) - Recommended Work Practices for Removal of Resilient Floor Coverings; 2011.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Coordinate scheduling of cleaning and testing, so that preliminary cleaning has been completed for at least 24 hours prior to testing.

1.05 SUBMITTALS

- A. Visual Observation Report: For existing floor coverings to be removed.
- 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. Manufacturer's qualification statement.
 - 2. Manufacturer's statement of compatibility with types of flooring applied over remedial product.
 - 3. Test reports indicating compliance with specified performance requirements, performed by nationally recognized independent testing agency.
 - 4. Manufacturer's installation instructions.
 - 5. 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.
- F. Copy of RFCI (RWP).

1.06 QUALITY ASSURANCE

- A. Moisture and alkalinity (pH) testing shall be performed by an independent testing agency employed and paid by Contractor.
- B. 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.
- C. 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.

1.07 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.

1.08 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. Patching Compound: Floor covering manufacturer's recommended product, suitable for conditions, and compatible with adhesive and floor covering. In the absence of any recommendation from flooring manufacturer, provide a product with the following characteristics:
 - 1. Cementitious moisture-, mildew-, and alkali-resistant compound, compatible with floor, floor covering, and floor covering adhesive, and capable of being feathered to nothing at edges.
 - 2. Compressive Strength: 3000 psi, minimum, after 28 days, when tested in accordance with ASTM C109/C109M or ASTM C472, whichever is appropriate.
- B. Alternate Flooring Adhesive: Floor covering manufacturer's recommended product, suitable for the moisture and pH conditions present; low-VOC. In the absence of any recommendation from flooring manufacturer, provide a product recommended by adhesive manufacturer as suitable for substrate and floor covering and for conditions present.
- C. Remedial Floor Coating: Single- or multi-layer coating or coating/overlay combination intended by its manufacturer to resist water vapor transmission to degree sufficient to meet flooring manufacturer's emission limits, resistant to the level of alkalinity (pH) found, and suitable for adhesion of flooring without further treatment.
 - 1. Thickness: As required for application and in accordance with manufacturer's installation instructions.

PART 3 EXECUTION

3.01 EXISTING CONCRETE SLAB PREPARATION

- A. Perform following operations in the order indicated:
 - 1. Existing concrete slabs (on-grade and elevated) with existing floor coverings:
 - a. Visual observation of existing floor covering, for adhesion, water damage, alkaline deposits, and other defects.
 - b. Removal of existing floor covering.
 - 2. Preliminary cleaning.
 - 3. 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.
 - 4. Internal relative humidity tests; in same locations as moisture vapor emission tests, unless otherwise indicated.
 - 5. Alkalinity (pH) tests; in same locations as moisture vapor emission tests, unless otherwise indicated.
 - 6. Specified remediation, if required.
 - 7. Patching, smoothing, and leveling, as required.
 - 8. Other preparation specified.
 - 9. Adhesive bond and compatibility test.
 - 10. Protection.

3.02 NEW CONCRETE SLAB PATCHING FROM PLUMBING / ELECTRICAL INSTALLATION PREPARATION

- A. Perform following operations in the order indicated:
 - 1. New concrete slab patching from plumbing / electrical installation:
 - a. Confirm newly poured concrete has waterproofing admixture in mix design.

2. Preliminary cleaning.
3. 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.
4. Internal relative humidity tests; in same locations as moisture vapor emission tests, unless otherwise indicated.
5. Alkalinity (pH) tests; in same locations as moisture vapor emission tests, unless otherwise indicated.
6. Specified remediation, if required.
7. Patching, smoothing, and leveling, as required.
8. Other preparation specified.
9. Adhesive bond and compatibility test.
10. Protection.

3.03 REMOVAL OF EXISTING FLOOR COVERINGS

- A. Comply with local, State, and federal regulations and recommendations of RFCI Recommended Work Practices for Removal of Resilient Floor Coverings, as applicable to floor covering being removed.
- B. Dispose of removed materials in accordance with local, State, and federal regulations and as specified.

3.04 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.

3.05 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.

3.06 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.

3.07 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. 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.

3.08 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.

3.09 ADHESIVE BOND AND COMPATIBILITY TESTING

- A. Comply with requirements and recommendations of floor covering manufacturer.

3.10 APPLICATION OF REMEDIAL FLOOR COATING

- A. Comply with requirements and recommendations of coating manufacturer.

3.11 PROTECTION

- A. Cover prepared floors with building paper or other durable covering.

END OF SECTION

SECTION 09 21 16
GYPSUM BOARD ASSEMBLIES

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Metal stud wall framing.
- B. Metal channel ceiling framing.
- C. Acoustic insulation.
- D. Gypsum sheathing.
- E. Cementitious backer board for interior applications.
- F. Gypsum wallboard.
- G. Abuse resistant wallboard.
- H. Joint treatment and accessories.
- I. Security mesh for security.

1.02 RELATED REQUIREMENTS

- A. Section 06 10 00 - Rough Carpentry: Blocking and sheathing .
- B. Section 07 84 00 - Firestopping: Top-of-wall assemblies at fire-resistance-rated walls.
- C. Section 07 90 05 - Joint Sealers: Sealing acoustical gaps in construction other than gypsum board or plaster work.
- D. Section 09 51 00 - Acoustical Ceilings.
- E. Section 09 91 23 - Interior Painting.

1.03 REFERENCE STANDARDS

- A. AISI S100-12 - North American Specification for the Design of Cold-Formed Steel Structural Members; 2012.
- B. AISI SG02-6 - 2001 edition of the Cold-Formed Steel Framing Header Design; American Iron and Steel Institute; 2001.
- C. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2020.
- D. ASTM C 36 - Standard Specification for Gypsum Wallboard; 2001.
- E. ASTM C475/C475M - Standard Specification for Joint Compound and Joint Tape for Finishing Gypsum Board; 2015.
- F. ASTM C645 - Standard Specification for Nonstructural Steel Framing Members; 2014, with Editorial Revision (2015).
- G. ASTM C665 - Standard Specification for Mineral-Fiber Blanket Thermal Insulation for Light Frame Construction and Manufactured Housing; 2017.
- H. ASTM C754 - Standard Specification for Installation of Steel Framing Members to Receive Screw-Attached Gypsum Panel Products; 2017.
- I. ASTM C840 - Standard Specification for Application and Finishing of Gypsum Board; 2017a.
- J. 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; 2015.
- K. 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; 2016.
- L. ASTM C1047 - Standard Specification for Accessories For Gypsum Wallboard and Gypsum Veneer Base; 2014a.
- M. ASTM C1396/C1396M - Standard Specification for Gypsum Board; 2017.

- N. ASTM C1629/C1629M - Standard Classification for Abuse-Resistant Nondecorated Interior Gypsum Panel Products and Fiber-Reinforced Cement Panels; 2015.
- O. ASTM D3273 - Standard Test Method for Resistance to Growth of Mold on the Surface of Interior Coatings in an Environmental Chamber; 2016.
- P. ASTM E72 - Standard Test Methods of Conducting Strength Tests of Panels for Building Construction; 2010.
- Q. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2020.
- R. ASTM E90 - Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements; 2009 (Reapproved 2016).
- S. GA-216 - Application and Finishing of Gypsum Panel Products; 2016.
- T. GA-224 - Installation of Predecorated Gypsum Board; Gypsum Association; 2008.
- U. GA-600 - Fire Resistance Design Manual; 2015.
- V. ICC (IBC) - International Building Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

1.04 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements for submittal procedures.
- B. Product Data: Provide data on metal framing, gypsum board, accessories, joint finishing system, and security mesh.
- C. Product Data: Provide manufacturer's data on partition head to structure connectors, showing compliance with requirements.
- D. Test Reports: For stud framing products that do not comply with ASTM C645 or ASTM C754, provide independent laboratory reports showing maximum stud heights at required spacings and deflections.

1.05 QUALITY ASSURANCE

- A. Comply with stud sizes as indicated on drawings. Design shall accommodate loads by increasing stud material gage, the addition of bridging, strapping or other acceptable reinforcing as per AISI. Contact Architect immediately with regard to any design limitations based on stud size.
- B. Perform in accordance with ASTM C 840. Comply with requirements of GA-600 for fire-rated assemblies.
- C. Installer Qualifications: Company specializing in performing gypsum board installation and finishing, with minimum five years of experience.

PART 2 PRODUCTS

2.01 METAL FRAMING MATERIALS

- A. Manufacturers - Metal Framing, Connectors, and Accessories:
 - 1. Clarkwestern Dietrich Building Systems LLC: www.clarkdietrich.com.
 - 2. Jaimes Industries: www.jaimesind.com.
 - 3. ClarkDietrich Metal Framing: www.clarkdietrich.com.
 - 4. Marino: www.marinoware.com.
 - 5. Phillips Manufacturing Co: www.phillipsmfg.com/#sle.
 - 6. Steel Construction Systems: www.steelconsystems.com.
 - 7. The Steel Network Inc: www.SteelNetwork.com.
 - 8. Telling Industries: www.tellingindustries.com.
 - 9. Substitutions: See Section 01 60 00 - Product Requirements.
- B. Metal Framing Connectors and Accessories:
 - 1. Same manufacturer as framing.

2. Bridging may be used to achieve design ratings provided that installed assemblies will not interfere with MEP systems.
 3. Header and stud joining clips.
 4. Substitutions: See Project Manual - Volume 1: Section 01 62 00 - Product Substitutions.
- C. Non-Loadbearing Framing System Components: Comply with system description above; Design wall framing components to withstand listed design loads for wall type and actual loads of face materials to be applied. All framing to conform to specified standards and to be composed of the following: ASTM C 645; galvanized sheet steel, of minimum size and properties necessary to comply with ASTM C 754 for the spacing indicated unless exceeded herein, with maximum deflection of wall framing of L/360 at 5 psf. Abutting partition and corner details of ASTM C 754 shall be superceded as described herein. All interior framing shall be a minimum of 0.346 inches in thickness unless design considerations require increased thicknesses.
1. Exception: The minimum metal thickness and section properties requirements of ASTM C 645 are waived provided steel of 40 ksi minimum yield strength is used, the metal is continuously dimpled, the effective thickness is at least twice the base metal thickness, and maximum stud heights are determined by testing in accordance with ASTM E 72 using assemblies specified by ASTM C 754.
 2. Studs: C shaped , SG web section by the Steel Network, HDS section by Dietrich,
 3. Runners: U shaped, sized to match studs.
 4. Ceiling Channels: C-shaped.
 5. Furring Members: Hat-shaped sections, minimum depth of 7/8 inch.
 6. Resilient Furring Channels: Single leg configuration; 1/2 inch channel depth.
 - a. Products:
 - 1) Same manufacturer as other framing materials.
 - 2) Substitutions: See Section 01 60 00 - Product Requirements.
- D. Ceiling Hangers: Type and size as specified in ASTM C754 for spacing required.
- E. Partition Head to Structure Connections: Provide mechanical anchorage devices that accommodate deflection using slotted holes, screws, and anti-friction bushings, preventing 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 S100-12.
 2. Material: ASTM A653/A653M steel sheet, SS Grade 50/340, with G60/Z180 hot-dipped galvanized coating.
 3. Provide components UL-listed for use in UL-listed fire-resistance-rated head of partition joint systems indicated on drawings.
 4. Deflection and Firestop Track:
 - a. Provide mechanical anchorage devices as described above that accommodate deflection while maintaining the fire-rating of the wall assembly.
- F. Barrier Mesh for Security:
1. Basis of Design Manufacturer
 - a. ClarkDietrich; BM75 with BM-Clips: www.clarkdietrich.com.
 2. Other Acceptable Manufacturers:
 - a. Same manufacturers as framing.
 - b. Substitutions: See Section 01 60 00 - Product Requirements.
 3. Material: Type II, Class 2 - Galvanized complying to ASTM F1267 & A1011.
 4. Sheet Size: 48 inches X 96 inches.
 5. Attachment Method: BM-Clip barrier mesh clips, high-strength steel clips.
 - a. Size: 2.75 inches long X 1.5 inches wide
 - b. Application: Used to attach barrier mesh to framing members.
 6. Nominal Gauge: 16 gauge.
 7. Overall Thickness: .048 inches.
 8. Bond Size Center-to-Center: .923 inches X 2.10 inches.
 9. Weight: 47 lbs/100 sq. ft.

10. Percent of Open Area: 76%.
- G. Grid Suspension Systems: Steel grid system of main tees and support bars connected to structure using hanging wire.
 1. Products:
 - a. Same manufacturer as other framing materials.
 - b. Substitutions: See Section 01 60 00 - Product Requirements.

2.02 BOARD MATERIALS

- A. Manufacturers - Gypsum-Based Board:
 1. CertainTeed Corporation: www.certainteed.com.
 2. Georgia-Pacific Gypsum: www.gpgypsum.com.
 3. National Gypsum Company: www.nationalgypsum.com.
 4. USG Corporation: www.usg.com.
 5. Substitutions: See Section 01 60 00 - Product Requirements.
- B. Abuse Resistant Wallboard:
 1. Application: First 4 feet of all interior gypsum board partitions.
 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 2, 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. Products:
 - a. Georgia-Pacific Gypsum; DensArmor Plus Abuse-Resistant.
 - b. National Gypsum Company; Gold Bond Hi-Abuse XP Gypsum Board.
 - c. USG Corporation; Fiberock Brand Panels--VHI Abuse-Resistant.
 - d. Substitutions: See Section 01 60 00 - Product Requirements.
- C. Ceiling Board: Special sag resistant gypsum ceiling board as defined in ASTM C1396/C1396M; sizes to minimize joints in place; ends square cut.
 1. Application: Ceilings, unless otherwise indicated.
 2. Thickness: 1/2 inch.
 3. Edges: Tapered.
 4. Products:
 - a. Same as wallboard.
 - b. Substitutions: See Section 01 60 00 - Product Requirements.

2.03 CEMENTITIOUS BACKING PANELS

- A. Manufacturers
 1. Custom Building Products; www.custombuildingproducts.com
 2. FinPan, Inc.; www.finpan.com
 3. United States Gypsum Co; www.usg.com
 4. Substitutions: See Section 01600 - Product Requirements.
- B. Cementitious Backer Board for interior applications: Meeting or exceeding ASTM C1186 Type A, Grade II aggregated Portland cement panels with glass fiber mesh embedded in front and back surfaces, 5/8 inch thick.
- C. Application: Vertical surfaces behind thinset tile in wet areas

2.04 GYPSUM WALLBOARD ACCESSORIES

- A. Acoustic Insulation: ASTM C 665; preformed glass fiber, friction fit type, unfaced. Thickness of full depth of stud unless indicated otherwise.
- B. Acoustic Sealant: See Section 07 90 05 - Joint Sealers.
- C. Finishing Accessories: ASTM C1047, galvanized steel, rolled zinc, or rigid plastic, unless noted otherwise.
 - 1. Types: As detailed or required for finished appearance.
 - 2. Special Shapes: In addition to conventional cornerbead and control joints.
 - a. Molding at Exposed Panel Edges:
 - 1) J-Type Reveal - JDM Series as manufactured by Fry-Reglet Corporation: www.fryreglet.com.
 - b. Reveal Molding at Exposed Panel Edges:
 - 1) Z-Type Reveal - DRMZ Series as manufactured by Fry-Reglet Corporation: www.fryreglet.com.
 - c. Extruded aluminum molding at transition between vertical drywall fascia and suspended acoustical tile ceiling system.
 - 1) Product: Acoustical Molding manufactured by Fry-Reglet Corporation: www.fryreglet.com.
 - 3. Products:
 - a. Fry-Reglet Corporation: www.fryreglet.com.
 - b. Phillips Manufacturing Co: www.phillipsmfg.com.
 - c. Trim-tex, Inc: www.trim-tex.com.
 - d. Substitutions: See Section 01 60 00 - Product Requirements.
- D. Beads and Joint Accessories: ASTM C1047, galvanized steel or rolled zinc, unless noted otherwise.
 - 1. Corner Beads: Low profile, for 90 degree outside corners.
 - a. Products:
 - 1) Fry-Reglet Corporation: www.fryreglet.com.
 - 2) Phillips Manufacturing Co: www.phillipsmfg.com.
 - 3) Trim-Tex, Inc.: www.trim-tex.com.
 - 4) Substitutions: See Section 01 60 00 - Product Requirements.
- E. Joint Materials for gypsum based products: ASTM C 475 and as recommended by gypsum board manufacturer for project conditions. Lack of control or expansion joints on drawings does not remove the Contractor's responsibility for providing such.
 - 1. Paper Tape: 2 inch wide, creased paper tape for joints and corners, except as otherwise indicated.
 - 2. Ready-mixed vinyl-based joint compound.
- F. Joint Materials for cement boards: As recommended by board manufacturer for project conditions.
- G. 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.
- H. 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.
- I. Anchorage to Substrate: Tie wire, nails, screws, and other metal supports, of type and size to suit application; to rigidly secure materials in place.

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: Comply with ASTM C 754 and manufacturer's instructions unless exceeded herein.
- 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.
 - 3. Install bracing as required at exterior locations to resist wind uplift.
- C. Studs: Space studs at 16 inches on center.
 - 1. Extend partition framing to structure in all 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.
 - 4. Extend stud framing through ceiling to structure above. Maintain clearance under structural building members to avoid deflection transfer to studs. Provide extended leg ceiling runners.
- D. T intersections: Construct T intersections by using minimum of three studs with top, bottom and intermediate blocking or four full studs. Lock all walls/members together by fastening framing members together at 16 inches on center vertically. Walls secured through Gypsum materials only as per ASTM C 754 shall not be permitted.
- E. Corners: Construct corners using minimum of three studs with top, bottom and intermediate blocking or four full studs. Lock all walls/members together by fastening framing members together at 16 inches on center vertically. Walls secured through Gypsum materials only as per ASTM C 754 shall not be permitted.
- F. Openings: Install minimum double studs at wall opening sides, at door and window jambs and all other openings. For openings larger than 48 inches, provide composite box header or other acceptable designed header capable of supporting materials above opening without deflection or damage to finished surface.
- G. Standard Wall Furring: Install at concrete walls scheduled to receive gypsum board, not more than 4 inches from floor and ceiling lines and abutting walls. Secure in place on alternate channel flanges at maximum 24 inches on center.
 - 1. Orientation: Horizontal.
 - 2. Spacing: At 16 inches on center.
- H. Blocking: Install wood blocking for support of:
 - 1. Framed openings.
 - 2. Wall-mounted cabinets.
 - 3. Toilet accessories.
 - 4. Markerboards and tackboards.
 - 5. Wall-mounted door hardware.
 - 6. Plastic laminate casework.

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. Install all accessories with manufacturer
- C. Install gypsum board to structure above on both sides of wall in all locations to maintain acoustic properties of partitions.
- D. 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. Seal around all penetrations by conduit, pipe, ducts, and rough-in boxes, except where firestopping is provided.

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: Install gypsum board in most economical direction, with ends and edges occurring over firm bearing.
 1. Exception: Tapered edges to receive joint treatment at right angles to framing.
- C. Installation on Metal Framing: Use screws for attachment of gypsum board except face layer of nonrated double-layer assemblies, which may be installed by means of adhesive lamination.

3.05 INSTALLATION OF TRIM AND ACCESSORIES

- A. Control Joints: Place control joints consistent with lines of building spaces and as indicated. Lack of control or expansion joints on drawings does not remove the Contractor's responsibility for providing such. In the event no control joints are shown, contact the Architect for direction prior to commencing Work. The following general guidelines shall be considered.
 1. Not more than 30 feet apart on walls and ceilings over 50 feet long.
 2. At exterior soffits, not more than 30 feet apart in both directions.
 3. Secure all metal trim and accessories governed by ASTM C 1047 with screw fasteners at intervals recommended by manufacturer, but in no case greater than 12 inches on center.
- B. Corner Beads: Install at external corners, using longest practical lengths. Fasten corner beads with screws placed at 16 inches on center vertically minimum; crimping or stapling is not permissible.
- C. Edge Trim: Install at locations where gypsum board abuts dissimilar materials and as indicated. Fasten edge trim beads with screws placed at 16 inches on center vertically minimum; crimping or stapling is not permissible.

3.06 JOINT TREATMENT

- A. Stabilize building moisture level prior to finishing joints and allow materials to sufficiently acclimate and stabilize prior to treating joints to prevent cracking due to high moisture content. Cracked joints, corners or other intersections shall be repaired at no cost to Owner.
- B. Paper Faced Gypsum Board: Use paper joint tape, bedded with ready-mixed vinyl-based joint compound and finished with ready-mixed vinyl-based joint compound.
- C. Finish gypsum board in accordance with levels defined in ASTM C840, as follows:
 1. Level 5: Walls and ceilings to receive marker board surfaces.
 2. Level 4: Walls and ceilings to receive flat or eggshell paint finish, unless otherwise indicated.
 3. Level 1: Wall areas above finished ceilings, whether or not accessible in the completed construction.
 4. Level 0: Temporary partitions.
- D. 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 surfaces behind adhesive applied ceramic tile and fixed cabinetry.
 3. Taping, filling, and sanding are not required at base layer of double-layer applications.
- E. 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.
- F. Fill and finish joints and corners of cementitious backing board as recommended by manufacturer.

3.07 TOLERANCES

- A. Maximum Variation of Finished Gypsum Board Surface from True Flatness: 1/8 inch in 10 feet in any direction.

3.08 FINISH LEVEL SCHEDULE

- A. Level 0: Temporary partitions.
- B. Level 1: Above finished ceilings concealed from view.
- C. Level 2: Areas concealed by cabinetry, lockers, or similar.
- D. Level 4: Walls and ceilings scheduled to receive flat or eggshell paint finish.
- E. Level 5: Walls and ceilings scheduled to receive marker board surfaces.

END OF SECTION

SECTION 09 51 00
ACOUSTICAL CEILINGS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Suspended metal grid ceiling system.
- B. Acoustical units.

1.02 RELATED REQUIREMENTS

- A. Section 04 20 02 - Single-Wythe Unit Masonry.
- B. Section 07 90 05 - Joint Sealers: Acoustical sealant.
- C. Section 09 21 16 - Gypsum Board Assemblies.
- D. Division 23: All air diffusion outlets and inlets in ceiling system.
- E. Division 26: Light fixtures in ceiling system.
- F. Division 28: Fire alarm components in ceiling system.

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; 2020.
- B. ASTM C423 - Standard Test Method for Sound Absorption and Sound Absorption Coefficients by the Reverberation Room Method; 2017.
- C. ASTM C635/C635M - Standard Specification for the Manufacture, Performance, and Testing of Metal Suspension Systems for Acoustical Tile and Lay-in Panel Ceilings; 2017.
- D. ASTM C636/C636M - Standard Practice for Installation of Metal Ceiling Suspension Systems for Acoustical Tile and Lay-In Panels; 2013.
- E. ASTM E580/E580M - Standard Practice for Installation of Ceiling Suspension Systems for Acoustical Tile and Lay-in Panels in Areas Subject to Earthquake Ground Motions; 2020.
- F. ASTM E795 - Standard Practices for Mounting Test Specimens During Sound Absorption Tests; 2016.
- G. ASTM E1264 - Standard Classification for Acoustical Ceiling Products; 2014.
- H. ASTM E1414/E1414M - Standard Test Method for Airborne Sound Attenuation Between Rooms Sharing a Common Ceiling Plenum; 2016.

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 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide data on suspension system components and acoustical units.
- C. Samples: Submit two samples 6 by 6 inch in size illustrating material and finish of acoustical units.
- D. Manufacturer's Installation Instructions: Indicate special procedures and perimeter conditions requiring special attention.
- E. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
 - 1. See Section 01 60 00 - Product Requirements, for additional provisions.
 - 2. Extra Acoustical Units: 100 sq ft of each type and size.

1.06 QUALITY ASSURANCE

- A. Designer Qualifications for Seismic Design: Perform under direct supervision of a Professional Structural Engineer experienced in design of this work and licensed at the State in which the Project is located.
- B. Suspension System Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum five years documented experience.
- C. Acoustical Unit Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum five 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. USG Corporation: www.usg.com/ceilings.
 - 2. Substitutions: Not permitted.
- B. Suspension Systems:
 - 1. Basis of Design Manufacturer:
 - a. USG Corporation: www.usg.com/ceilings.
 - 2. Other Acceptable Manufacturers:
 - a. Chicago Metallic Corporation: www.chicagometallic.com.
 - b. Rockfon, LLC: www.rockfon.com.
 - c. Substitutions: See Section 01 60 00 - Product Requirements.

2.02 ACOUSTICAL UNITS

- A. Acoustical Panels, Type ACT-1: Painted mineral fiber, with the following characteristics:
 - 1. Classification: ASTM E1264 Type III.
 - a. Form: 1, nodular.
 - b. Pattern: "G" - smooth.
 - 2. Size: 24 by 24 inches.
 - 3. Thickness: 5/8 inches.
 - 4. Light Reflectance: 86 percent, determined in accordance with ASTM E1264.
 - 5. NRC: 0.55, determined in accordance with ASTM E1264.
 - 6. Ceiling Attenuation Class (CAC): 35, determined in accordance with ASTM E1264.
 - 7. Panel Edge: SLT reveal..
 - 8. Color: White.
 - 9. Suspension System Types:
 - a. Type ACT-1: All locations except Locker Rooms / Toilets with showers.
 - b. Type ACT-2: High humidity locations (Locker Rooms / Toilets with showers).
 - 10. Suspension System: Semi-concealed.
 - 11. Products:
 - a. USG Corporation; Astro Acoustical Panels with "ClimaPlus": www.usg.com/ceilings.
 - b. Substitutions: Not permitted.

2.03 SUSPENSION SYSTEM(S)

- A. Metal Suspension Systems - General: Complying with ASTM C635/C635M; die cut and interlocking components, with stabilizer bars, clips, and splices as required.
 - 1. Materials:
 - a. Steel Grid: ASTM A653/A653M, G30 coating, unless otherwise indicated.
- B. Exposed Suspension System, Type ACT-2: Stainless steel grid and cap.
 - 1. Application(s): High humidity locations (Locker Rooms / Toilets with showers)..

2. Structural Classification: Intermediate-duty, when tested in accordance with ASTM C635/C635M.
3. Profile: Tee; 15/16 inch face width.
4. Finish: Manufacturer's standard brushed finish.
5. Color: White.
6. Products:
 - a. Basis of Design Manufacturer:
 - 1) USG Corporation; Donn Brand DXSS 15/16 inch Acoustical Suspension System: www.usg.com/ceilings.
 - b. Other Acceptable Manufacturers:
 - 1) Chicago Metallic Corporation: www.chicagometallic.com.
 - 2) Rockfon, LLC: www.rockfon.com.
 - 3) Substitutions: See Section 01 60 00 - Product Requirements.
- C. Exposed Suspension System, Type ACT-1: Hot-dipped galvanized steel grid and cap.
 1. Application(s): All locations except for Toilet Rooms / Locker Rooms with showers..
 2. Structural Classification: Intermediate-duty, when tested in accordance with ASTM C635/C635M.
 3. Profile: Tee; 15/16 inch face width.
 4. Finish: Baked enamel.
 5. Products:
 6. Basis of Design Manufacturer:
 - a. USG Corporation; Donn Brand DX/DXL 15/16 inch Acoustical Suspension System: www.usg.com/ceilings.
 7. Other Acceptable Manufacturers:
 - a. Chicago Metallic Corporation: www.chicagometallic.com.
 - b. Rockfon, LLC: www.rockfon.com.
 - c. Substitutions: See Section 01 60 00 - Product Requirements.

2.04 ACCESSORIES

- A. Support Channels and Hangers: Galvanized steel; size and type to suit application 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. Size: As required for installation conditions.
 2. Angle Molding: L-shaped, for mounting at same elevation as face of grid.
- D. Metal Edge Trim for "Cloud" Suspension Systems: Steel or extruded aluminum; provide attachment clips, splice plates, and preformed corner pieces for complete trim system.
 1. Trim Height: 6 inch.
 2. Finish: Baked enamel.
 3. Color: White.
 4. Products:
 - a. Basis of Design Manufacturer:
 - 1) USG Corporation; Compasso Suspension Trim: www.usg.com/ceilings.
 - b. Other Acceptable Manufacturers:
 - 1) Chicago Metallic Corporation: www.chicagometallic.com.
 - 2) Rockfon, LLC: www.rockfon.com.
 - 3) Substitutions: See Section 01 60 00 - Product Requirements.
- 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. Install suspension system in accordance with ASTM C636/C636M, ASTM E580/E580M, and manufacturer's instructions and as supplemented in this section.
- B. Rigidly secure system, including integral mechanical and electrical components, for maximum deflection of 1:360.
- C. Locate system on room axis according to reflected plan.
- D. Perimeter Molding: Install at intersection of ceiling and vertical surfaces and at junctions with other interruptions.
 - 1. Use longest practical lengths.
- E. 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.
- F. Where ducts or other equipment prevent the regular spacing of hangers, reinforce the nearest affected hangers and related carrying channels to span the extra distance.
- G. Do not support components on main runners or cross runners if weight causes total dead load to exceed deflection capability.
- H. Support fixture loads using supplementary hangers located within 6 inches of each corner, or support components independently.
- I. 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.
- F. Where round obstructions occur, provide preformed closures to match perimeter molding.

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 65 00
RESILIENT FLOORING

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Resilient tile flooring.
- B. Resilient base.
- C. Installation accessories.

1.02 RELATED REQUIREMENTS

- A. Section 03 54 00 - Cast Underlayment.
- B. Section 09 05 61 - Common Work Results for Flooring Preparation: Removal of existing floor coverings, cleaning, and preparation.
- C. Section 09 68 13 - Tile Carpeting.

1.03 REFERENCE STANDARDS

- A. ASTM D6329 - Standard Guide for Developing Methodology for Evaluating the Ability of Indoor Materials to Support Microbial Growth Using Static Environmental Chambers; 1998 (Reapproved 2015).
- B. ASTM E90 - Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements; 2009 (Reapproved 2016).
- C. ASTM E492 - Standard Test Method for Laboratory Measurement of Impact Sound Transmission Through Floor-Ceiling Assemblies Using the Tapping Machine; 2009.
- D. ASTM E648 - Standard Test Method for Critical Radiant Flux of Floor-Covering Systems Using a Radiant Heat Energy Source; 2014c.
- E. ASTM E2179 - Standard Test Method for Laboratory Measurement of the Effectiveness of Floor Coverings in Reducing Impact Sound Transmission Through Concrete Floors; 2003 (Reapproved 2009).
- F. ASTM F710 - Standard Practice for Preparing Concrete Floors to Receive Resilient Flooring; 2019, with Editorial Revision (2020).
- G. ASTM F970 - Standard Test Method for Static Load Limit; 2007 (Reapproved 2011).
- H. ASTM F1066 - Standard Specification for Vinyl Composition Floor Tile; 2004 (Reapproved 2014).
- I. ASTM F1700 - Standard Specification for Solid Vinyl Tile; 2013a.
- J. ASTM F1861 - Standard Specification for Resilient Wall Base; 2008 (Reapproved 2012).
- K. NFPA 253 - Standard Method of Test for Critical Radiant Flux of Floor Covering Systems Using a Radiant Heat Energy Source; 2015.
- L. RFCI (RWP) - Recommended Work Practices for Removal of Resilient Floor Coverings; 2011.

1.04 SUBMITTALS

- A. See Section 01 30 00 - 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. Verification Samples: Submit two samples, 6 by 6 inch in size illustrating color and pattern for each resilient flooring product specified.
- D. Concrete Testing Standard: Submit a copy of a ASTM F710.
- E. Concrete Subfloor Test Report: Submit a copy of the moisture and alkalinity (pH) test reports.
- F. Certification: Prior to installation of flooring, submit written certification by flooring manufacturer and adhesive manufacturer that condition of subfloor is acceptable.

- G. Maintenance Data: Include maintenance procedures, recommended maintenance materials, and suggested schedule for cleaning, stripping, and re-waxing.
- H. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
 - 1. See Project Manual - Volume 1: Section 01 60 00 - Product Requirements, for additional provisions.
 - 2. Extra Flooring Material: 50 square feet of each type and color.
 - 3. Extra Wall Base: 50 linear feet of each type and color.

1.05 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing specified flooring with minimum five years documented experience.
- B. Installer Qualifications: Company specializing in installing specified flooring with minimum five years documented experience.

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 55 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 48 hours prior to installation in area of installation at a temperature of 70 degrees F to achieve temperature stability. Thereafter, maintain conditions above 55 degrees F.

PART 2 PRODUCTS

2.01 TILE FLOORING

- A. Vinyl Composition Tile - Type VCT-GY, VCT-PL, and VCT-YL: Homogeneous, with color extending throughout thickness.
 - 1. Manufacturers:
 - a. Armstrong World Industries, Inc; Standard Excelon Imperial Texture: www.armstrong.com.
 - b. Substitutions: Not permitted.
 - 2. Minimum Requirements: Comply with ASTM F1066, of Class corresponding to type specified.
 - 3. Critical Radiant Flux (CRF): Minimum 0.45 watt per square centimeter, when tested in accordance with ASTM E 648 or NFPA 253.
 - 4. Size: 12 by 12 inch.
 - 5. Thickness: 0.125 inch.
 - 6. Colors:
 - a. VCT-GY: Field Color - Blue/Grey 51903.
 - b. VCT-PL: Accent Color - Tiger Eyes 57533.
 - c. VCT-YL: Accent Color - Golden 51878.

2.02 RESILIENT BASE

- A. Resilient Base (Type RWB-1): ASTM F1861, Type TS rubber, vulcanized thermoset; top set Style B, Cove.
 - 1. Manufacturers:
 - a. Johnsonite, a Tarkett Company: www.johnsonite.com.
 - b. Substitutions: Not permitted.
 - 2. Height: 4 inch.
 - 3. Thickness: 0.125 inch.

4. Finish: Satin.
5. Length: Roll.
6. Color: Black 40.

2.03 ACCESSORIES

- A. Subfloor Filler: White premix latex; type recommended by adhesive material manufacturer.
- B. Primers, Adhesives, and Seam Sealer: Waterproof; types recommended by flooring manufacturer.
- C. Moldings, Transition and Edge Strips: Rubber.
 1. Manufacturers:
 - a. Johnsonite, a Tarkett Company: www.johnsonite.com.
 - b. Substitutions: Not permitted.
- D. Profile: As required to fit situation and as shown on the Drawings.
- E. Color: Grey 48.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that surfaces are flat to tolerances acceptable to flooring manufacturer, free of cracks that might telegraph through flooring, clean, dry, and free of curing compounds, surface hardeners, and other chemicals that might interfere with bonding of flooring to substrate.
- 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 resilient base.
- C. 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 05 61.
 2. Obtain instructions if test results are not within limits recommended by resilient flooring manufacturer and adhesive materials manufacturer.

3.02 PREPARATION

- A. Prepare floor substrates for installation of flooring in accordance with Section 09 05 61.
- B. Remove subfloor ridges and bumps. Fill minor low spots, cracks, joints, holes, and other defects with subfloor filler to achieve smooth, flat, hard surface.
- C. Prohibit traffic until filler is fully cured.

3.03 INSTALLATION - GENERAL

- A. Starting installation constitutes acceptance of substrate conditions.
- B. Install in accordance with manufacturer's written instructions.
- C. Adhesive-Applied Installation:
 1. Spread only enough adhesive to permit installation of materials before initial set.
 2. Fit joints and butt seams tightly.
 3. Set flooring in place, press with heavy roller to attain full adhesion.
- D. Where type of floor finish, pattern, or color are different on opposite sides of door, terminate flooring under centerline of door.
- E. Install edge strips at unprotected or exposed edges, where flooring terminates, and where indicated.
- F. Scribe flooring to walls, columns, cabinets, floor outlets, and other appurtenances to produce tight joints.
- G. Install flooring in recessed floor access covers, maintaining floor pattern.

3.04 INSTALLATION - TILE FLOORING

- A. Mix tile from container to ensure shade variations are consistent when tile is placed, unless otherwise indicated in manufacturer's installation instructions.

- B. Lay flooring with joints and seams parallel to building lines to produce symmetrical pattern.
- C. Install square tile to ashlar pattern. Allow minimum 1/2 full size tile width at room or area perimeter.
- D. Install loose-laid tile, fit interlocking edges tightly.

3.05 INSTALLATION - RESILIENT BASE

- A. Fit joints tightly and make vertical. Maintain minimum dimension of 18 inches between joints.
- B. 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.
- C. Install base on solid backing. Bond tightly to wall and floor surfaces.
- D. Scribe and fit to door frames and other interruptions.

3.06 CLEANING

- A. Remove excess adhesive from floor, base, and wall surfaces without damage.
- B. Clean in accordance with manufacturer's written instructions.

3.07 PROTECTION

- A. Prohibit traffic on resilient flooring for 48 hours after installation.

END OF SECTION

SECTION 09 67 00
FLUID-APPLIED FLOORING

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Fluid-applied flooring and base.

1.02 RELATED REQUIREMENTS

- A. Section 07 90 05 - Joint Sealers: Sealing joints between fluid-applied flooring and adjacent construction and fixtures.
- B. Section 09 05 61 - Common Work Results for Flooring Preparation.
- C. Division 22: Recessed plumbing access cover frames.

1.03 REFERENCE STANDARDS

- A. ANSI/ESD STM7.1 - Standard Test Method for the Protection of Electrostatic Discharge Susceptible Items - Floor Materials - Resistive Characterization of Materials; 2013.
- B. ASTM D570 - Standard Test Method for Water Absorption of Plastics; 1998 (Reapproved 2010).
- C. ASTM D638 - Standard Test Method for Tensile Properties of Plastics; 2014.
- D. ASTM D695 - Standard Test Method for Compressive Properties of Rigid Plastics; 2015.
- E. ASTM D905 - Standard Test Method for Strength Properties of Adhesive Bonds in Shear by Compression Loading; 2008 (Reapproved 2013).
- F. ASTM D4060 - Standard Test Method for Abrasion Resistance of Organic Coatings by the Taber Abraser; 2014.
- G. ASTM E96/E96M - Standard Test Methods for Water Vapor Transmission of Materials; 2016.
- H. ASTM E648 - Standard Test Method for Critical Radiant Flux of Floor-Covering Systems Using a Radiant Heat Energy Source; 2014c.
- I. ASTM F710 - Standard Practice for Preparing Concrete Floors to Receive Resilient Flooring; 2019, with Editorial Revision (2020).
- J. ASTM F1869 - Standard Test Method for Measuring Moisture Vapor Emission Rate of Concrete Subfloor Using Anhydrous Calcium Chloride; 2016a.
- K. ICRI 310.2R - Selecting and Specifying Concrete Surface Preparation for Sealers, Coatings, Polymer Overlays, and Concrete Repair; 2013.

1.04 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide data on specified products, describing physical and performance characteristics; sizes, patterns and colors available.
- C. Samples: Submit two samples, 6 by 6 inches in size illustrating color and pattern for each floor material for each color specified.
- D. Manufacturer's Installation Instructions: Indicate special procedures.
- E. Maintenance Data: Include maintenance procedures, recommended maintenance materials, procedures for stain removal, repairing surface, and suggested schedule for cleaning.
- F. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
 - 1. See Section 01 60 00 - Product Requirements, for additional provisions.
 - 2. Extra Top Coat Materials: 2 gallons.

1.05 QUALITY ASSURANCE

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

- B. Applicator Qualifications: Company specializing in performing the work of this section.
 - 1. Minimum five years of documented experience.
 - 2. Approved by manufacturer.
- C. Supervisor Qualifications: Trained by product manufacturer, under direct full time supervision of manufacturer's own foreman.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Store resin materials in a dry, secure area.
- B. Store materials for three days prior to installation in area of installation to achieve temperature stability.

1.07 FIELD CONDITIONS

- A. Maintain minimum temperature in storage area of 55 degrees F.
- B. Store materials in area of installation for minimum period of 24 hours prior to installation.
- C. Maintain ambient temperature required by manufacturer 72 hours prior to, during, and 24 hours after installation of materials.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Fluid-Applied Flooring:
 - 1. Basis of Design Manufacturer:
 - a. Sherwin-Williams Company: General Polymers Brand; Ceramic Carpet #400
Decorative Broadcast: www.generalpolymers.com.
 - 2. Other Acceptable Manufacturers:
 - a. Crossfield Products Corp: www.crossfieldproducts.com.
 - b. Elite Crete Systems: www.elitecrete.com.
 - c. Flowcrete Americas: www.flowcreteamericas.com.
 - d. Key Resin Company: www.keyresin.com.
 - e. PPG Paints Megaseal Fluid Applied Flooring: www.ppgpaints.com.
 - f. Substitutions: See Section 01 60 00 - Product Requirements.

2.02 FLUID-APPLIED FLOORING SYSTEMS

- A. Fluid-Applied Flooring Type RES / RESB: Epoxy base coat(s), with broadcast aggregate.
 - 1. Aggregate: Quartz granules.
 - 2. Top Coat: Polyurethane.
 - a. Number of Top Coats: Two
 - 3. System Thickness: 1/8 inch, nominal, when dry.
 - 4. Texture: Slip resistant.
 - 5. Sheen: High gloss.
 - 6. Color: Ceramic Carpet #400 - "Riverstone 340" as manufactured by General Polymers.
 - 7. Hardness at 24 hours, Shore D ASTM D 2240: 70/65.
 - 8. Compressive Strength ASTM C 579: 12,000 psi.
 - 9. Tensile Strength ASTM C 307: 2,500 psi.
 - 10. Abrasion Resistance ASTM D 4060, CS-17 Wheel, 1,000 cycles: 90-100 mgs lost.
 - 11. Flexural Strength ASTM C 580: 4,500 psi.
 - 12. Adhesion ACI 503R: 300 psi concrete failure.
 - 13. Flammability: Self-extinguishing over concrete.
 - 14. Resistance to Elevated Temperatures MIL-D-3134J: No slip of flow at required temperature of 158 degrees F.
 - 15. Impact Resistance MIL-D-3134J: Withstands 16 ft. lbs. without cracking, delamination or chipping.

2.03 ACCESSORIES

- A. Base Caps: Extruded mill finished aluminum with projecting base of 3/16 inch.

1. Product: SHIENE - E45 as manufactured by Schluter Systems: www.schluter.com.
- B. Cant Strips: Molded of flooring resin material.
- C. Subfloor Filler: Type recommended by fluid-applied flooring manufacturer.
- D. Primer: Type recommended by fluid-applied flooring manufacturer.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that subfloor surfaces are smooth and flat within the tolerances specified for that type of work and are ready to receive flooring.
- 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 flooring.
- C. Verify that subfloor surfaces are dust-free and free of substances that could impair bonding of materials to subfloor surfaces.
- D. Verify that wood subfloors have 12 percent maximum moisture content.
- E. Verify that concrete sub-floor surfaces are ready for flooring installation by testing for moisture emission rate and alkalinity; obtain instructions if test results are not within the following limits:
 1. Moisture emission rate: Not greater than 3 lb per 1000 sq ft per 24 hours, tested according to ASTM F1869.
 2. Alkalinity: pH range of 5 to 9, tested according to ASTM F710.
- F. Verify that required floor-mounted utilities are in correct location.

3.02 PREPARATION

- A. Remove subfloor ridges and bumps. Fill low spots, cracks, joints, holes, and other defects with subfloor filler.
- B. Apply, trowel, and float filler to achieve smooth, flat, hard surface. Grind irregularities above the surface level. Prohibit traffic until filler is cured.
- C. Vacuum clean substrate.
- D. Apply primer to surfaces required by flooring manufacturer.

3.03 INSTALLATION - ACCESSORIES

- A. Install cant strips at base of walls where flooring is to be extended up wall as base.
- B. Install terminating cap strip at top of base; attach securely to wall substrate.

3.04 INSTALLATION - FLOORING

- A. Apply in accordance with manufacturer's instructions.
- B. Apply each coat to minimum thickness indicated.
- C. Finish to smooth level surface.
- D. Cove at vertical surfaces.

3.05 FIELD QUALITY CONTROL

- A. See Section 01 40 00 - Quality Requirements, for additional requirements.
- B. Test installed floor surface in accordance with ANSI/ESD STM7.1 .

3.06 PROTECTION

- A. Prohibit traffic on floor finish for 48 hours after installation.
- B. Barricade area to protect flooring until fully cured.

END OF SECTION

SECTION 09 68 13
TILE CARPETING

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Entry carpet tile, fully adhered.
- B. Carpet tile, fully adhered.

1.02 RELATED REQUIREMENTS

- A. Section 03 54 00 - Cast Underlayment.
- B. Section 09 05 61 - Common Work Results for Flooring Preparation: Removal of existing floor coverings, cleaning, and preparation.
- C. Section 09 65 00 - Resilient Flooring.

1.03 REFERENCE STANDARDS

- A. ASTM D2859 - Standard Test Method for Ignition Characteristics of Finished Textile Floor Covering Materials; 2016.
- B. ASTM E648 - Standard Test Method for Critical Radiant Flux of Floor-Covering Systems Using a Radiant Heat Energy Source; 2014c.
- C. ASTM F710 - Standard Practice for Preparing Concrete Floors to Receive Resilient Flooring; 2019, with Editorial Revision (2020).
- D. ASTM F1869 - Standard Test Method for Measuring Moisture Vapor Emission Rate of Concrete Subfloor Using Anhydrous Calcium Chloride; 2016a.
- E. ASTM F2170 - Standard Test Method for Determining Relative Humidity in Concrete Floor Slabs Using in situ Probes; 2019a.
- F. CRI 104 - Standard for Installation of Commercial Carpet; 2015.
- G. NFPA 253 - Standard Method of Test for Critical Radiant Flux of Floor Covering Systems Using a Radiant Heat Energy Source; 2015.

1.04 SUBMITTALS

- A. See Section 01 30 00 - 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. Verification Samples: Submit two samples, 6 by 6 inch in size illustrating color and pattern for each carpet tile product specified.
- D. Concrete Testing Standard: Submit a copy of a ASTM F710.
- E. Concrete Subfloor Test Report: Submit a copy of the moisture and alkalinity (pH) test reports.
- F. Certification: Prior to installation of flooring, submit written certification by flooring manufacturer and adhesive manufacturer that condition of subfloor is acceptable.
- G. Maintenance Data: Include maintenance procedures, recommended maintenance materials, and suggested schedule for cleaning.
- H. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
 - 1. See Section 01 60 00 - Product Requirements, for additional provisions.
 - a. Extra Carpet Tiles: Quantity equal to 5 percent of total installed of each color and pattern installed.

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 with minimum five years documented experience and approved by carpet tile manufacturer.

1.06 FIELD CONDITIONS

- A. Store materials in area of installation for minimum period of 24 hours prior to installation.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Tile Carpeting:
 - 1. Interface, Inc: www.interface.com.
 - 2. Substitutions: Not permitted.

2.02 MATERIALS

- A. Tile Carpeting, Type CPTT: Tufted Textured Loop, manufactured in one color dye lot.
 - 1. Product: Ice Breaker - 1473002500 manufactured by Interface.
 - 2. Tile Size: 19.69 by 19.69 inch, nominal.
 - 3. Pile Height: 0.13 inch.
 - 4. Pile Thickness: 0.071 inch.
 - 5. Color: 105773 Jetmist.
 - 6. Yarn System: Post-consumer content nylon.
 - 7. Dye Method: 100% solution dyed.
 - 8. Soil/Stain Protection: Protect
 - 9. Gauge: 1/12 inch.
 - 10. Stitches: 9 per inch.
 - 11. Backing Material: ReadyBac.
 - 12. Total Face Weight: 17 oz/sq yd.
- B. Tile Carpeting, Type CPTT-A: Tufted Textured Loop, manufactured in one color dye lot.
 - 1. Product: Ice Breaker - 1473002500 manufactured by Interface.
 - 2. Tile Size: 19.69 by 19.69 inch, nominal.
 - 3. Pile Height: 0.13 inch.
 - 4. Pile Thickness: 0.071 inch.
 - 5. Color: 105770 Concrete.
 - 6. Yarn System: Post-consumer content nylon.
 - 7. Dye Method: 100% Solution dyed.
 - 8. Soil/Stain Protection: Protect
 - 9. Gauge: 1/12 inch.
 - 10. Stitches: 9 per inch.
 - 11. Backing Material: ReadyBac.
 - 12. Total Face Weight: 17 oz/sq yd.
- C. Tile Carpeting, Type E-CPTT: Tufted Textured Loop, manufactured in one color dye lot.
 - 1. Product: SR899 manufactured by Interface.
 - 2. Tile Size: 19.69 by 19.69 inch, nominal.
 - 3. Pile Height: 0.20 inch.
 - 4. Pile Thickness: 0.143 inch.
 - 5. Color: Onyx 104941.
 - 6. Yarn System: 100% recycled content nylon.
 - 7. Dye Method: 100% solution dyed.
 - 8. Soil/Stain Protection: Protect
 - 9. Gauge: 1/12 inch.
 - 10. Stitches: 10 per inch.
 - 11. Backing Material: ReadyBac.
 - 12. Total Face Weight: 26 oz/sq yd.

2.03 ACCESSORIES

- A. Subfloor Filler: White premix latex; type recommended by flooring material manufacturer.

- B. Primers, Adhesives, and Seam Sealer: Waterproof; types recommended by flooring manufacturer.
- C. Moldings, Transition and Edge Strips: Rubber.
 - 1. Manufacturers:
 - a. Johnsonite ,a Tarkett Company: www.johnsonite.com.
 - b. Substitutions: Not permitted.
- D. Edge Strips: Rubber, Grey 48 color.
- E. Adhesives:
 - 1. Compatible with materials being adhered; maximum VOC content of 50 g/L; CRI (GLP) certified.
- F. Carpet Tile Adhesive: Recommended by carpet tile manufacturer; releasable type.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that surfaces are flat to tolerances acceptable to flooring manufacturer, free of cracks that might telegraph through flooring, clean, dry, and free of curing compounds, surface hardeners, and other chemicals that might interfere with bonding of flooring to substrate.
- 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 resilient base.
- 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 05 61.
 - 2. Obtain instructions if test results are not within limits recommended by flooring material manufacturer and adhesive materials manufacturer.

3.02 PREPARATION

- A. Prepare floor substrates for installation of flooring in accordance with Section 09 05 61.
- B. Remove subfloor ridges and bumps. Fill minor low spots, cracks, joints, holes, and other defects with subfloor filler to achieve smooth, flat, hard surface.
- C. Prohibit traffic until filler is fully cured.

3.03 INSTALLATION

- A. Starting installation constitutes acceptance of subfloor conditions.
- B. Install carpet tile in accordance with manufacturer's instructions.
- C. Blend carpet from different cartons to ensure minimal variation in color match.
- D. Cut carpet tile clean. Fit carpet tight to intersection with vertical surfaces without gaps.
- E. Lay carpet tile in square pattern, with pile direction parallel to next unit, set parallel to building lines.
- F. Locate change of color or pattern between rooms under door centerline.
- G. Fully adhere carpet tile to substrate.
- H. Trim carpet tile neatly at walls and around interruptions.
- I. 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 91 23
INTERIOR PAINTING

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Surface preparation.
- B. Field application of paints.
- C. Scope: Finish interior surfaces exposed to view, unless fully factory-finished and unless otherwise indicated.
- D. Do Not Paint or Finish the Following Items:
 - 1. Items factory-finished unless otherwise indicated; materials and products having factory-applied primers are not considered factory finished.
 - 2. Items indicated to receive other finishes.
 - 3. Items indicated to remain unfinished.
 - 4. Fire rating labels, equipment serial number and capacity labels, bar code labels, and operating parts of equipment.
 - 5. Stainless steel, anodized aluminum, bronze, terne coated stainless steel, and lead items.
 - 6. Floors, unless specifically indicated.
 - 7. Glass.
 - 8. Decorative ground face masonry units.
 - 9. Concealed pipes, ducts, and conduits.

1.02 RELATED REQUIREMENTS

- A. Section 03 35 11 - Concrete Floor Finishes.
- B. Section 05 50 00 - Metal Fabrications: Shop-primed items.
- C. Section 08 11 13 - Hollow Metal Frames and Frames.
- D. Section 09 21 15 - Gypsum Board Assemblies.
- E. Section 09 96 00 - High Performance Coating.

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; current edition.
- B. ASTM D16 - Standard Terminology for Paint, Related Coatings, Materials, and Applications; 2016.
- C. ASTM D4442 - Standard Test Methods for Direct Moisture Content Measurement of Wood and Wood-Based Materials; 2020.
- D. MPI (APL) - Master Painters Institute Approved Products List; Master Painters and Decorators Association; Current Edition.
- E. MPI (APSM) - Master Painters Institute Architectural Painting Specification Manual; Current Edition.
- F. SCAQMD 1113 - Architectural Coatings; 1977 (Amended 2016).
- G. SSPC V1 (PM1) - Good Painting Practice: Painting Manual, Volume 1; 2016.
- H. SSPC V2 (PM2) - Systems and Specifications: Steel Structures Painting Manual, Volume 2; 2015.
- I. SSPC-SP 1 - Solvent Cleaning; 2015, with Editorial Revision (2016).
- J. SSPC-SP 2 - Hand Tool Cleaning; 2018.
- K. SSPC-SP 6 - Commercial Blast Cleaning; 2007.

1.05 SUBMITTALS

- A. See Section 01 30 00 - 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. MPI product number (e.g. MPI #47).
 - 3. Cross-reference to specified paint system(s) product is to be used in; include description of each system.
 - 4. Manufacturer's installation instructions.
 - 5. If proposal of substitutions is allowed under submittal procedures, explanation of substitutions proposed.
- C. Samples: Submit three 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.
- D. Certification: By manufacturer that paints and finishes comply with VOC limits specified.
- E. Manufacturer's Instructions: Indicate special surface preparation procedures.
- F. Maintenance Data: Submit data including finish schedule showing where each product/color/finish was used, product technical data sheets, material safety data sheets (MSDS), care and cleaning instructions, touch-up procedures, repair of painted and finished surfaces, and color samples of each color and finish used.
- G. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
 - 1. See Project Manual - Volume 1: Section 01 60 00 - Product Requirements, for additional provisions.
 - 2. Extra Paint and Finish Materials: 1 gallon of each color; from the same product run, store where directed.
 - 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 five years documented experience.
- B. Applicator Qualifications: Company specializing in performing the type of work specified with minimum five years experience and approved by manufacturer.

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. Follow manufacturer's recommended procedures for producing best results, including testing of substrates, moisture in substrates, and humidity and temperature limitations.
- B. 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.
- C. Minimum Application Temperatures for Paints: 50 degrees F for interiors unless required otherwise by manufacturer's instructions.
- D. Provide lighting level of 80 ft candles measured mid-height at substrate surface.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Provide paints and finishes used in any individual system from the same manufacturer; no exceptions.
- B. Paints:
 - 1. Basis of Design Manufacturer:
 - a. Sherwin-Williams Company: www.sherwin-williams.com.
 - 2. Other Acceptable Manufacturers:
 - a. Not permitted.

2.02 PAINTS AND FINISHES - GENERAL

- A. Paints and Finishes: Ready mixed, unless intended to be a field-catalyzed paint.
 - 1. Where MPI paint numbers are specified, provide products listed in Master Painters Institute Approved Product List, current edition available at www.paintinfo.com, for specified MPI categories, except as otherwise indicated.
 - 2. Provide paints and finishes of a soft paste consistency, capable of being readily and uniformly dispersed to a homogeneous coating, with good flow and brushing properties, and capable of drying or curing free of streaks or sags.
 - 3. Provide materials that are compatible with one another and the substrates indicated under conditions of service and application, as demonstrated by manufacturer based on testing and field experience.
 - 4. For opaque finishes, tint each coat including primer coat and intermediate coats, one-half shade lighter than succeeding coat, with final finish coat as base color.
 - 5. Supply each paint material in quantity required to complete entire project's work from a single production run.
 - 6. Do not reduce, thin, or dilute paint or finishes or add materials unless such procedure is specifically described in manufacturer's product instructions.
- B. Volatile Organic Compound (VOC) Content:
 - 1. Provide paints and finishes that comply with the most stringent requirements specified in the following:
 - a. 40 CFR 59, Subpart D--National Volatile Organic Compound Emission Standards for Architectural Coatings.
 - 2. Determination of VOC Content: Testing and calculation in accordance with 40 CFR 59, Subpart D (EPA Method 24), exclusive of colorants added to a tint base and water added at project site; or other method acceptable to authorities having jurisdiction.
- C. Flammability: Comply with applicable code for surface burning characteristics.
- D. Colors: As indicated on drawings.
 - 1. Allow for minimum of three colors for each system, unless otherwise indicated, without additional cost to Owner.
 - 2. Extend colors to surface edges; colors may change at any edge as directed by Architect.
 - 3. In utility areas, finish equipment, piping, conduit, and exposed duct work in colors according to the color schedule.

2.03 PAINT SYSTEMS - INTERIOR

- A. Paint I-OP - Interior Surfaces to be Painted, Unless Otherwise Indicated: Including gypsum board.
 - 1. Two top coats and one coat primer.
 - 2. Top Coat(s): Institutional Low Odor/VOC Interior Latex; MPI #143, 144, 145, or 146.
 - a. Basis of Design Product:
 - 1) Sherwin-Williams ProMar 200 Zero VOC Interior Latex, Low Sheen. (MPI #144)
 - 3. Top Coat Sheen:
 - a. Flat: MPI gloss level 1; use this sheen for ceilings and other overhead surfaces.
 - b. Eggshell: MPI gloss level 3; use this sheen at gypsum board walls.

4. Primer: Sherwin-Williams ProMar 200 Zero VOC Interior Latex Primer.
- B. Paint I-OP-MD-DT - Medium Duty Door/Trim: For surfaces subject to frequent contact by occupants, including metals:
 1. Medium duty applications include door frames.
 2. Two top coats and one coat primer.
 3. Top Coat(s): Interior High Performance Acrylic Latex; MPI #153.
 - a. Basis of Design Product:
 - 1) Sherwin-Williams SHER-CRYL HPA High Performance Acrylic, Semi-Gloss.
 - 2) Substitutions: Not permitted.
 4. Top Coat Sheen:
 - a. Semi-Gloss: MPI gloss level 5; use this sheen at all locations.
 5. Primer: Sherwin Williams Pro Industrial Pro-Cryl Primer.
- C. Paint I-OP-MD-WC - Medium Duty: Including uncoated steel, shop primed steel, and galvanized steel.
 1. Top Coat(s): Interior High Performance Acrylic Latex; MPI #153.
 - a. Basis of Design Product:
 - 1) Sherwin-Williams SHER-CRYL HPA High Performance, Semi-Gloss.
 2. Top Coat Sheen:
 - a. Semi-Gloss: MPI gloss level 5; use this sheen at all locations.
 3. Primer: Sherwin Williams Pro Industrial Pro-Cryl Primer.
- D. Paint I-OP-DF - Dry Fall: Metals; exposed structure and overhead-mounted services in utilitarian spaces, including shop primed steel deck, structural steel, metal fabrications, galvanized ducts, galvanized conduit, and galvanized piping.
 1. Two top coats and one coat primer.
 2. Top Coat: Alkyd Dry Fall; MPI #55.
 - a. Basis of Design Product:
 - 1) Sherwin-Williams Super Save-Lite Dryfall, Flat.
 - 2) Substitutions: Not permitted.
 3. Top Coat Sheen:
 - a. Flat: MPI gloss level 1; use this sheen at all locations.
 4. Primer: Sherwin Williams Pro Industrial Pro-Cryl Primer.
- E. Paint CI-OP-3E - Concrete Masonry Units, Epoxy Enamel, 3 Coat:
 1. One coat of catalyzed epoxy primer.
 2. Gloss: Two coats of catalyzed epoxy enamel; MPI #151 X-Green.
 3. Basis of Design Product:
 - a. Sherwin Williams Pro Industrial Pre-Cat Epoxy Eg-Shel.
 - b. Substitutions: Not permitted.
 4. Top Coat Sheen:
 - a. Eggshell: MPI gloss level 3; use this sheen at all locations.
 5. Primer: Sherwin Williams Loxon Concrete & Masonry Primer.

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.
- B. Patching Material: Latex filler.
- C. Fastener Head Cover Material: Latex filler.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that surfaces are ready to receive work as instructed by the product manufacturer.
- B. Examine surfaces scheduled to be finished prior to commencement of work. Report any condition that may potentially effect proper application.

- C. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.
- D. Test shop-applied primer for compatibility with subsequent cover materials.
- E. Measure moisture content of surfaces using an electronic moisture meter. Do not apply finishes unless moisture content of surfaces are 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. Masonry:
 1. Remove efflorescence and chalk. Do not coat surfaces if moisture content or 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.
 3. Clean surfaces with pressurized water. Use pressure range of 600 to 1,500 psi at 6 to 12 inches. Allow to dry.
- H. Gypsum Board: Fill minor defects with filler compound. Spot prime defects after repair.
- I. Insulated Coverings: Remove dirt, grease, and oil from canvas and cotton.
- 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. 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.

3.03 APPLICATION

- A. Apply products in accordance with manufacturer's written instructions and recommendations in "MPI Architectural Painting Specification Manual".
- B. Where adjacent sealant is to be painted, do not apply finish coats until sealant is applied.
- C. Do not apply finishes to surfaces that are not dry. Allow applied coats to dry before next coat is applied.
- D. Apply each coat to uniform appearance in thicknesses specified by manufacturer.
- E. Dark Colors and Deep Clear Colors: Regardless of number of coats specified, apply as many coats as necessary for complete hide.
- F. Sand metal surfaces lightly between coats to achieve required finish.
- G. Vacuum clean surfaces of loose particles. Use tack cloth to remove dust and particles just prior to applying next coat.

- H. Wood to Receive Transparent Finishes: Tint fillers to match wood. Work fillers into the grain before set. Wipe excess from surface.
- I. Reinstall electrical cover plates, hardware, light fixture trim, escutcheons, and fittings removed prior to finishing.

3.04 FIELD QUALITY CONTROL

- A. See Section 01 40 00 - Quality Requirements, for general requirements for field inspection.

3.05 CLEANING

- A. Collect waste material that could constitute a fire hazard, place in closed metal containers, and remove daily from site.

3.06 PROTECTION

- A. Protect finishes until completion of project.
- B. Touch-up damaged finishes after Substantial Completion.

END OF SECTION

SECTION 09 30 00

TILING

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Tile for floor applications.
- B. Tile for wall applications.

1.02 RELATED REQUIREMENTS

- A. Section 03 54 00 - Cast Underlayment.
- B. Section 07 90 05 - Joint Sealers.
- C. Section 09 05 61 - Common Work Results for Flooring Preparation: Concrete slab moisture and alkalinity testing and remediation procedures.
- D. Section 09 21 16 - Gypsum Board Assemblies: Tile backer board.
- E. Division 22: Plumbing Fixtures.

1.03 REFERENCE STANDARDS

- A. ANSI A108/A118/A136 - American National Standard Specifications for the Installation of Ceramic Tile (Compendium); 2019.
- B. ANSI A108.1a - American National Standard Specifications for Installation of Ceramic Tile in the Wet-Set Method, with Portland Cement Mortar; 2017.
- C. ANSI A108.1b - American National Standard Specifications for Installation of Ceramic Tile on a Cured Portland Cement Mortar Setting Bed with Dry-Set or Latex-Portland Cement Mortar; 2017.
- D. ANSI A108.1c - Specifications for Contractors Option: Installation of Ceramic Tile in the Wet-Set Method with Portland Cement Mortar or Installation of Ceramic Tile on a Cured Portland Cement Mortar Bed with Dry-Set or Latex-Portland Cement; 1999 (Reaffirmed 2016).
- E. ANSI A108.2 - American National Standard General Requirements: Materials, Environmental and Workmanship; 2019.
- F. ANSI A108.4 - American National Standard Specifications for Installation of Ceramic Tile with Organic Adhesives or Water Cleanable Tile-Setting Epoxy Adhesive; 2009 (Revised).
- G. ANSI A108.5 - American National Standard Specifications for Installation of Ceramic Tile with Dry-Set Portland Cement Mortar or Latex-Portland Cement Mortar; 1999 (Reaffirmed 2010).
- H. ANSI A108.6 - American National Standard Specifications for Installation of Ceramic Tile with Chemical Resistant, Water Cleanable Tile-Setting and -Grouting Epoxy; 1999 (Reaffirmed 2010).
- I. ANSI A108.8 - American National Standard Specifications for Installation of Ceramic Tile with Chemical Resistant Furan Resin Mortar and Grout; 1999 (Reaffirmed 2010).
- J. ANSI A108.9 - American National Standard Specifications for Installation of Ceramic Tile with Modified Epoxy Emulsion Mortar/Grout; 1999 (Reaffirmed 2010).
- K. ANSI A108.10 - American National Standard Specifications for Installation of Grout in Tilework; 2017.
- L. ANSI A108.11 - American National Standard Specifications for Interior Installation of Cementitious Backer Units; 2010 (Reaffirmed 2016).
- M. ANSI A108.12 - American National Standard for Installation of Ceramic Tile with EGP (Exterior Glue Plywood) Latex-Portland Cement Mortar; 1999 (Reaffirmed 2010).
- N. ANSI A108.13 - American National Standard for Installation of Load Bearing, Bonded, Waterproof Membranes for Thin-Set Ceramic Tile and Dimension Stone; 2005 (Reaffirmed 2016).

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- O. 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; 2017.
- P. ANSI A118.1 - American National Standard Specifications for Dry-Set Cement Mortar; 2012 (Revised).
- Q. ANSI A118.3 - American National Standard Specifications for Chemical Resistant, Water Cleanable Tile-Setting and -Grouting Epoxy and Water Cleanable Tile-Setting Epoxy Adhesive; 2013 (Revised).
- R. ANSI A118.4 - American National Standard Specifications for Modified Dry-Set Cement Mortar; 2012 (Revised).
- S. ANSI A118.6 - American National Standard Specifications for Standard Cement Grouts for Tile Installation; 2010 (Reaffirmed 2016).
- T. ANSI A118.7 - American National Standard Specifications for High Performance Cement Grouts for Tile Installation; 2010 (Reaffirmed 2016).
- U. ANSI A118.9 - American National Standard Specifications for Test Methods and Specifications for Cementitious Backer Units; 1999 (Reaffirmed 2016).
- V. ANSI A118.10 - American National Standard Specifications for Load Bearing, Bonded, Waterproof Membranes For Thin-Set Ceramic Tile And Dimension Stone Installation; 2014.
- W. ANSI A118.12 - American National Standard Specifications for Crack Isolation Membranes for Thin-Set Ceramic Tile and Dimension Stone Installation; 2014.
- X. ANSI A118.13 - American National Standard Specifications for Bonded Sound Reduction Membranes for Thin-Set Ceramic Tile Installation; 2014.
- Y. ANSI A118.15 - American National Standard Specifications for Improved Modified Dry-Set Cement Mortar; 2012.
- Z. ANSI A136.1 - American National Standard for Organic Adhesives for Installation of Ceramic Tile; 2008 (Reaffirmed 2013).
- AA. ANSI A137.1 - American National Standard Specifications for Ceramic Tile; 2019.
- AB. ANSI A137.2 - American National Standard Specifications for Glass Tile; 2013.
- AC. ASTM E492 - Standard Test Method for Laboratory Measurement of Impact Sound Transmission Through Floor-Ceiling Assemblies Using the Tapping Machine; 2009.
- AD. ASTM E2179 - Standard Test Method for Laboratory Measurement of the Effectiveness of Floor Coverings in Reducing Impact Sound Transmission Through Concrete Floors; 2003 (Reapproved 2009).
- AE. ASTM F710 - Standard Practice for Preparing Concrete Floors to Receive Resilient Flooring; 2019, with Editorial Revision (2020).
- AF. ASTM F1869 - Standard Test Method for Measuring Moisture Vapor Emission Rate of Concrete Subfloor Using Anhydrous Calcium Chloride; 2016a.
- AG. ASTM F2170 - Standard Test Method for Determining Relative Humidity in Concrete Floor Slabs Using in situ Probes; 2019a.
- AH. ICC-ES AC308 - Acceptance Criteria for Termite Physical Barrier Systems; 2014, with Editorial Revision (2017).
- AI. TCNA (HB) - Handbook for Ceramic, Glass, and Stone Tile Installation; 2019.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Preinstallation Meeting: Convene a preinstallation meeting one week before starting work of this section; require attendance by affected installers.

1.05 SUBMITTALS

- A. See Section 01 30 00 - 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. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
 - 1. See Section 01 60 00 - Product Requirements, for additional provisions.
 - 2. Extra Tile: 2 percent of each size, color, and surface finish combination, but not less than 10 of each type.

1.06 QUALITY ASSURANCE

- A. Maintain one copy of and ANSI A108/A118/A136 and TCNA (HB) on site.
- B. Manufacturer Qualifications: Company specializing in manufacturing the types of products specified in this section, with minimum five years of documented experience.
- C. Installer Qualifications:
 - 1. Company specializing in performing tile installation, with minimum of five years of documented experience.

1.07 MOCK-UP

- A. See Section 01 40 00 - Quality Requirements, for general requirements for mock-up.
- B. Construct tile mock-up incorporating all components specified for the location:
 - 1. Minimum size of mock-up: 3'-0" wide X full height.
- C. Approved mock-up may remain as part of the Work.

1.08 DELIVERY, STORAGE, AND HANDLING

- A. Protect adhesives from freezing or overheating in accordance with manufacturer's instructions.

1.09 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. Manufacturers: All products by the same manufacturer.
- B. Basis of Design Manufacturer:
 - 1. Crossville: www.crossvilleinc.com.
 - 2. Substitutions: See Section 01 60 00 - Product Requirements.
- C. Glass Mosaic Tile, Type MST: ANSI A137.1, standard grade.
 - 1. Moisture Absorption: 0 to 0.5 percent as tested in accordance with ASTM C373.
 - 2. Size: 1 by 1 inch, nominal.
 - 3. Shape: Square.
 - 4. Edges: Square.
 - 5. Material: Glass.
 - 6. Surface Finish: Unglazed.
 - 7. Color(s): Amethyst.
 - 8. Products:
 - a. Crossville; Glass Blox: www.crossvilleinc.com.
 - b. Substitutions: Not permitted.
- D. Porcelain Floor Tile, Type PTF: ANSI A137.1, standard grade.
 - 1. Moisture Absorption: 0 to 0.5 percent as tested in accordance with ASTM C373.
 - 2. Size: 6 by 6 inch, nominal.
 - 3. Thickness: 3/8 inch.

4. Edges: Square.
 5. Surface Finish: Unglazed.
 6. Color(s): Roasted Marshmallow.
 7. Products:
 - a. Crossville; Color Blox: www.crossvilleinc.com.
 - b. Substitutions: Not permitted.
- E. Porcelain Cove Base Tile, Type PTB: ANSI A137.1, standard grade.
1. Moisture Absorption: 0 to 0.5 percent as tested in accordance with ASTM C373.
 2. Size: 6 by 12 inch, nominal.
 3. Thickness: 3/8 inch.
 4. Edges: Square.
 5. Surface Finish: Unglazed.
 6. Color(s): Roasted Marshmallow.
 7. Products:
 - a. Crossville; Color Blox: www.crossvilleinc.com.
 - b. Substitutions: Not permitted.
- F. Porcelain Wall Field Tile, Type PTW-L: ANSI A137.1, standard grade.
1. Moisture Absorption: 0 to 0.5 percent as tested in accordance with ASTM C373.
 2. Size: 3 by 3 inch, nominal.
 3. Thickness: 3/8 inch.
 4. Edges: Square.
 5. Surface Finish: Unglazed.
 6. Color(s): Sand Box.
 7. Products:
 - a. Crossville; Color Blox: www.crossvilleinc.com.
 - b. Substitutions: Not permitted.
- G. Porcelain Wall Accent Tile, Type PTW-D: ANSI A137.1, standard grade.
1. Moisture Absorption: 0 to 0.5 percent as tested in accordance with ASTM C373.
 2. Size: 3 by 3 inch, nominal.
 3. Thickness: 3/8 inch.
 4. Edges: Square.
 5. Surface Finish: Unglazed.
 6. Color(s): I See The Moon.
 7. Products:
 - a. Crossville; Color Blox: www.crossvilleinc.com.
 - b. Substitutions: Not permitted.

2.02 TRIM AND ACCESSORIES

- A. Top and Corner Edge Protection Trim: Finishing and edge-protection profile for the outside corners of tiled surfaces; trapezoid-perforated anchoring leg, and integrated grout joint spacer.
1. Manufacturer: Schluter Systems; Quade: www.schluter.com.
 - a. Material and Finish: Brushed stainless steel type 304.

2.03 SETTING MATERIALS

- A. Provide setting and grout materials from same manufacturer.
- B. Manufacturers:
1. ARDEX Engineered Cements: www.ardexamericas.com.
 2. Custom Building Products: www.custombuildingproducts.com.
 3. LATICRETE International, Inc: www.laticrete.com.
 4. Merkrete, by Parex USA, Inc: www.merkrete.com.
 5. Substitutions: See Section 01 60 00 - Product Requirements.
- C. Organic Adhesive: ANSI A136.1, thinset mastic type.
1. Applications: Wall and Floor Tile.

2. Use Type I in areas subject to prolonged moisture exposure.
3. Products:
 - a. ARDEX Engineered Cements; ARDEX D14: www.ardexamericas.com/#sle.
 - b. Custom Building Products; ReliaBond Ceramic Tile Adhesive - Type 1: www.custombuildingproducts.com/#sle.
 - c. LATICRETE International, Inc; LATICRETE 15 Premium Mastic: www.laticrete.com/#sle.
 - d. Merkrete, by Parex USA, Inc; Merkrete Merstik: www.merkrete.com/#sle.
 - e. Substitutions: See Section 01 60 00 - Product Requirements.

2.04 GROUTS

- A. Provide setting and grout materials from same manufacturer.
- B. Manufacturers:
 1. ARDEX Engineered Cements: www.ardexamericas.com/#sle.
 2. Custom Building Products: www.custombuildingproducts.com/#sle.
 3. LATICRETE International, Inc: www.laticrete.com/#sle.
 4. Merkrete, by Parex USA, Inc: www.merkrete.com/#sle.
 5. Substitutions: See Section 01 60 00 - Product Requirements.
- C. Epoxy Grout: ANSI A118.3 chemical resistant and water-cleanable epoxy grout.
 1. Applications: All Locker Rooms / Toilet Rooms.
 2. Color(s): As selected by Architect from manufacturer's full line.
 3. Products:
 - a. ARDEX Engineered Cements; ARDEX WA: www.ardexamericas.com.
 - b. Custom Building Products; CEG-IG 100% Solids Industrial Grade Epoxy Grout: www.custombuildingproducts.com.
 - c. LATICRETE International, Inc; LATICRETE SPECTRALOCK PRO Premium Grout: www.laticrete.com.
 - d. Merkrete, by Parex USA, Inc; Merkrete Pro Epoxy: www.merkrete.com.
 - e. Substitutions: See Section 01 60 00 - 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. Peel-and-Stick Sheet Type:
 - a. Material: Rubberized membrane laminated to reinforcing fabric.
 - b. Thickness: 20 mils, maximum.
 - c. Products:
 - 1) Proflex Products, Inc; Maxxim Sim-40: www.proflex.us.
 - 2) Protecto Wrap; AFM Anti-Fracture Membrane: www.protectowrap.com.
 - 3) Substitutions: See Section 01 60 00 - Product Requirements.
- B. 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. Peel-and-Stick Sheet Type:
 - a. Material: Rubberized membrane laminated to reinforcing fabric, 40 mils, thick, minimum.
 - b. Products:
 - 1) Protecto Wrap; AFM-WM Anti-Fracture Waterproofing Membrane: www.protectowrap.com.
 - 2) Proflex Products, Inc; Maxxim Sim-40: www.proflex.us.
 - 3) Substitutions: See Section 01 60 00 - Product Requirements.
- C. Backer Board: Cementitious type complying with ANSI A118.9; high density, glass fiber reinforced, 1/2 inch thick; 2 inch wide coated glass fiber tape for joints and corners.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that subfloor surfaces are smooth and flat within the tolerances specified for that type of work and are ready to receive 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 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 05 61.
 - 2. Obtain instructions if test results are not within limits recommended by tiling material manufacturer and setting material manufacturer.

3.02 PREPARATION

- A. Protect surrounding work from damage.
- B. Vacuum clean surfaces and damp clean.
- C. Seal substrate surface cracks with filler. Level existing substrate surfaces to acceptable flatness tolerances.
- D. Install 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 a feather edge.
- E. Prepare substrate surfaces for adhesive installation in accordance with adhesive manufacturer's instructions.

3.03 INSTALLATION - GENERAL

- A. Install tile and grout in accordance with applicable requirements of ANSI A108.1a through ANSI A108.19, manufacturer's instructions, and TCNA (HB) recommendations.
- B. Lay tile to pattern indicated. 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. Sound tile after setting. Replace hollow sounding units.
- G. Keep control and expansion joints free of mortar, grout, and adhesive.
- H. Prior to grouting, allow installation to completely cure; minimum of 48 hours.
- I. Grout tile joints unless otherwise indicated. Use standard grout unless otherwise indicated.
- J. 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, with standard grout, unless otherwise indicated.
 - 1. Where epoxy bond coat and grout are indicated, install in accordance with TCNA (HB) Method F131.
- B. Install tile-to-tile floor movement joints in accordance with TCNA (HB) Method EJ171F.

3.05 INSTALLATION - SHOWERS WALLS

- A. At tiled shower receptors, install in accordance with TCNA (HB) Method B415, mortar bed floor, and W244, thin-set over cementitious backer unit walls.

- B. At shower walls, install in accordance with TCNA (HB) Method B412, over cementitious backer units with waterproofing membrane.
- C. Grout with epoxy grout.

3.06 INSTALLATION - WALL TILE

- A. Over cementitious backer units on studs, install in accordance with TCNA (HB) Method W244.

3.07 CLEANING

- A. Clean tile and grout surfaces.

3.08 PROTECTION

- A. Do not permit traffic over finished floor surface for 4 days after installation.

END OF SECTION

SECTION 09 96 00
HIGH-PERFORMANCE COATINGS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. High performance coatings.
- B. Surface preparation.

1.02 RELATED REQUIREMENTS

- A. Section 05 12 00 - Structural Steel Framing: Painting of exterior galvanized steel lintels and HVAC rooftop unit support framing.
- B. Section 05 50 00 - Metal Fabrications: Painting of exterior galvanized steel bollards, exterior galvanized steel stairs and railings, and exterior galvanized steel lintels.
- C. Section 08 11 13 - Hollow Metal Doors and Frames: Painting of exterior galvanized hollow metal doors and frames.
- D. Division 23: Painting of exterior black iron gas piping.

1.03 REFERENCE STANDARDS

- A. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2020.
- B. CARB (SCM) - Suggested Control Measure for Architectural Coatings; California Air Resources Board; 2007.
- C. MPI (APL) - Master Painters Institute Approved Products List; Master Painters and Decorators Association; Current Edition.
- D. MPI (APSM) - Master Painters Institute Architectural Painting Specification Manual; Current Edition.
- E. NFPA 101 - Life Safety Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- F. SCAQMD 1113 - Architectural Coatings; 1977 (Amended 2016).
- G. SSPC V1 (PM1) - Good Painting Practice: Painting Manual, Volume 1; 2016.
- H. SSPC V2 (PM2) - Systems and Specifications: Steel Structures Painting Manual, Volume 2; 2015.
- I. SSPC-PA 1 - Shop, Field, and Maintenance Painting of Steel; 2016.
- J. SSPC-SP 1 - Solvent Cleaning; 2015, with Editorial Revision (2016).
- K. SSPC-SP 2 - Hand Tool Cleaning; 2018.
- L. SSPC-SP 3 - Power Tool Cleaning; 2018.

1.04 SUBMITTALS

- A. See Section 01 30 00 - 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/or catalog number, and general product category (e.g. "alkyd enamel").
 - 2. MPI product number (e.g. MPI #47).
 - 3. Cross-reference to specified coating system(s) product is to be used in; include description of each system.
 - 4. Manufacturer's installation instructions.
- C. Samples: Submit two samples 8 by 8 inch in size illustrating colors available for selection.
- D. Manufacturer's Certificate: Certify that high-performance coatings comply with VOC limits specified.

1.05 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing the Products specified in this section with minimum five years documented experience.
- B. Applicator Qualifications: Company specializing in performing the work of this section with minimum five years documented experience.

1.06 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.

1.07 FIELD CONDITIONS

- A. Do not apply exterior coatings during rain or snow, or when relative humidity is outside the humidity ranges required by the coating product manufacturer.
- B. Do not install materials when temperature is below 55 degrees F or above 90 degrees F.
- C. Maintain this temperature range, 24 hours before, during, and 72 hours after installation of coating.
- D. Provide lighting level of 80 ft candles measured mid-height at substrate surface.
- E. Restrict traffic from area where coating is being applied or is curing.

1.08 WARRANTY

- A. See Section 01 78 00 - Closeout Submittals, for additional warranty requirements.
- B. Correct defective Work within a five year period after Date of Substantial Completion.
- C. Warranty: Include coverage for bond to substrate.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. High-Performance Coatings:
 - 1. Basis of Design Manufacturer:
 - a. Tnemec Company, Inc; N69 Hi-Build Epoxoline II base coat Series 73 Endura-Shield top coat: www.tnemec.com.
 - 2. Other Acceptable Manufacturers:
 - a. Dow Chemical Company: www.dow.com.
consumer.dow.com/en-us/industry/ind-building-construction.html.
 - b. PPG Paints: www.ppgpaints.com.
 - c. Precision Coatings: www.precisioncoatingsinc.com.
 - d. Sherwin-Williams Company: www.protective.sherwin-williams.com/industries.
 - e. Substitutions: Section 01 60 00 - Product Requirements.

2.02 HIGH-PERFORMANCE COATINGS

- A. Base Coat: Polyamidoamine Epoxy.
 - 1. Basis of Design: N69 Hi-Build Epoxoline II as manufactured by Tnemec Company, Inc.
 - 2. Finish: Satin.
 - 3. Numer of Coats: 1 Coat.
 - 4. Volume Solids: 67.0 +/- 2.0% (mixed).
 - 5. Recommended DFT: 2.0 to 10.0 mils per coat.
 - 6. Volatile Organic Compounds: 2.40 lbs/gallon (unthinned).
 - 7. Number of Components: Two: Part A (amine) and Part B (epoxy).
 - 8. Net Weight per Gallon: 13.67 lbs.

- B. Top Coat: Aliphatic Acrylic Polyurethane.
 - 1. Basis of Design: Series 73 Endura-Shield as manufactured by Tnemec Company, Inc.
 - 2. Finish: Semi-Gloss.
 - 3. Number of Coats: 1 Coat.
 - 4. Volume Solids: 58.0 +/- 2.0% (mixed).
 - 5. Recommended DFT: 2.0 to 5.0 mils per coat.
 - 6. Volatile Organic Compounds: 2.70 lbs/gallon (unthinned).
 - 7. Number of Components: Two: Part A and Part B.
 - 8. Net Weight per Gallon: 12.13 lbs.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify existing conditions before starting work.
- B. Do not begin application of coatings 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.

3.02 PREPARATION

- A. Clean surfaces of loose foreign matter.
- B. Remove substances that would bleed through finished coatings. If unremovable, seal surface with shellac.
- C. Remove finish hardware, fixture covers, and accessories and store.
- D. 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.
- E. Protect adjacent surfaces and materials not receiving coating from spatter and overspray; mask if necessary to provide adequate protection. Repair damage.

3.03 COATING APPLICATION

- A. Apply coatings in accordance with manufacturer's written instructions, to thicknesses specified and recommendations in "MPI Architectural Painting and Specification Manual".
- 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

- 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.

3.06 SCHEDULE

- A. Exterior galvanized steel lintels.
- B. Exterior galvanized steel HVAC rooftop unit support framing.
- C. Exterior galvanized steel bollards.

- D. Exterior galvanized steel stairs and railings
- E. Exterior galvanized steel hollow metal doors and frames.
- F. Exterior exposed black iron gas piping on roof.

END OF SECTION

SECTION 10 11 00
VISUAL DISPLAY UNITS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Tack boards.

1.02 RELATED REQUIREMENTS

- A. Section 06 10 00 - Rough Carpentry: Blocking and supports.
- B. Section 09 21 16 - Gypsum Board Assemblies.
- C. Section 10 11 16 - Marker Board Surfaces.

1.03 REFERENCE STANDARDS

- A. ANSI A135.4 - American National Standard for Basic Hardboard; 2012.
- B. ANSI A208.1 - American National Standard for Particleboard; 2016.
- C. ASTM C208 - Standard Specification for Cellulosic Fiber Insulating Board; 2012, with Editorial Revision (2017).
- D. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2020.
- E. ASTM F793/F793M - Standard Classification of Wall Coverings by Use Characteristics; 2015.
- F. PS 1 - Structural Plywood; 2009.

1.04 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide manufacturer's data on tack board surface covering and trim.
- C. Shop Drawings: Indicate wall elevations, dimensions, joint locations, special anchor details.
- D. Samples: Submit color charts for selection of color and texture of trim and tack board surface covering.
- E. Test Reports: Show compliance to specified surface burning characteristics requirements.
- F. Manufacturer's printed installation instructions.
- G. 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 WARRANTY

- A. See Section 01 78 00 - Closeout Submittals, for additional warranty requirements.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Visual Display Boards:
 - 1. ADP Lemco, Inc.: www.adplemco.com.
 - 2. Claridge Products and Equipment, Inc: www.claridgeproducts.com.
 - 3. MooreCo, Inc: www.moorecoinc.com.
 - 4. Substitutions: See Section 01 60 00 - Product Requirements.

2.02 VISUAL DISPLAY UNITS

- A. Tackboards: Fabric laminated to fiberboard.
 - 1. Fabric: Burlap.
 - 2. Manufacturer: Guilford of Maine.
 - 3. Color: #1697 Mulberry.

4. Backing: Fiberboard, 3/8 inch thick, laminated to tack surface.
5. Surface Burning Characteristics: Flame spread index of 25, maximum, and smoke developed index of 450, maximum, when tested in accordance with ASTM E84.
6. Height: As indicated on Drawings.
7. Length: As indicated on Drawings.
8. Frame: Extruded aluminum, with concealed fasteners.
9. Frame Finish: Anodized, natural.

2.03 MATERIALS

- A. Burlap: Tightly woven, flame retardant treated.
- B. Hardboard for Cores: ANSI A135.4, Class 1 - Tempered, S2S (smooth two sides).
- C. Fiber Board: ASTM C208, cellulosic fiber board.
- D. Foil Backing: Aluminum foil sheet, 0.005 inch thick.

2.04 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.
- B. Verify that internal wall blocking is ready to receive work and positioning dimensions are as indicated on shop drawings.

3.02 INSTALLATION

- A. Install boards in accordance with manufacturer's instructions.
- B. Install bottom of perimeter frame above finished floor as indicated on the Drawings.
- C. Secure units level and plumb.
- D. Carefully cut holes in boards for thermostats and wall switches.

3.03 CLEANING

- A. Clean board surfaces in accordance with manufacturer's instructions.
- B. Cover with protective cover, taped to frame.
- C. Remove temporary protective cover at Date of Substantial Completion.

END OF SECTION

SECTION 10 11 16
MARKER BOARD SURFACES

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Marker board surfaces.

1.02 RELATED REQUIREMENTS

- A. Section 09 21 16 - Gypsum Board Assemblies.
- B. Section 10 11 00 - Visual Display Units.

1.03 REFERENCE STANDARDS

- A. ASTM International (ASTM): ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials.
- B. California Department of Public Health (CPDH): CPDH Standard Method.
- C. Gypsum Association (GA): GA[UNICODE CHAR NOT COVERED: 8208]214 - Recommended Levels of Finish for Gypsum Board, Glass Mat and Fiber[UNICODE CHAR NOT COVERED: 8208]Reinforced Gypsum Panels
- D. National Fire Protection Association (NFPA): NFPA 101 - Life Safety Code.

1.04 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data:
 - 1. Manufacturer's data sheets on each product to be used.
 - 2. Preparation instructions and recommendations.
 - 3. Storage and handling requirements and recommendations.
 - 4. Typical installation methods.

1.05 QUALITY ASSURANCE

- A. Source Limitations: Provide each type of product from a single manufacturing source to ensure uniformity.
- B. Substrate: GA-214 Finishing Level 5.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Store and handle in strict compliance with manufacturer's written instructions and recommendations.
 - 1. Product edges may be sharp; use caution when handling.
 - 2. Temperature maintained above 54 degrees F with normal humidity.
 - 3. Store horizontally, in original container with end caps and plastic sleeve.
- B. Protect from damage due to weather, excessive temperature, direct sunlight and construction operations.

1.07 PROJECT CONDITIONS

- A. Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's recommended limits.

1.08 WARRANTY

- A. Manufacturer's Standard Limited Warranty: 3 years; free from defects in material and manufacture when used as directed for indoor vertical applications.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. 3M Office Supplies Division; Post-it Flex Write Surface:
[www.https://www.3m.com/3M/en_US/office-us/3m-workspace-solutions/](https://www.3m.com/3M/en_US/office-us/3m-workspace-solutions/)

- B. Substitutions: Not permitted.

2.02 MARKER BOARD SURFACES

- A. Basis of Design: Post-it Flex Write Surface, Permanent-Marker Safe, and Post-it Dry Erase Surface; Dry Erase Only, as manufactured by 3M Office Supplies Division.
 - 1. Application Method: Dry application.
 - 2. Application Location: Interior. Not recommended for exposure to condensation.
 - 3. Application Temperature: 54 to 100 degrees F (12 to 38 degrees C) air and application surface.
 - 4. Acceptable Substrates: Primed and painted drywall, finished wood, glass, painted steel, whiteboards, and chalkboards.
 - 5. Color: White.
 - 6. Surface Finish: Glossy. Stain resistant.
 - 7. Surface Compatibility: Suitable for use with dry erase and permanent markers.
 - 8. Size: Bulk size, 48 inches x 50 ft to fit situations indicated on the Drawings.
- B. Materials:
 - 1. Film: Polyester, 7.5 mils including adhesive.
 - 2. Embossed Release Liner: Polyethylene, 14 mils.
 - 3. Removable Adhesive: Pressure-sensitive, water based, microsphere.
- C. Compliance and Certifications:
 - 1. Low VOC (CPDH): Less than 0.0005 ppm.
 - 2. Fire Resistance (NFPA): Class A, ASTM E84.
- D. Accessories:
 - 1. Cleaning Cloth: Post-it Dry Erase Cleaning Cloth as manufactured by 3M Office Supplies Division.
 - a. Provide (1) one cleaning cloth at each location a marker board surface in indicated on Drawings.
 - 2. Spray Bottle: Spray Bottle as manufactured by 3M Office Supplies Division.
 - a. Provide (1) one spray bottle at each location a marker board surface in indicated on Drawings.
 - 3. Aluminum J-Cap Trim: "Walltalkers" Aluminum J-Cap Trim as manufactured by Koroseal or Architect approved equal.
 - a. Application: Provide around the entire perimeter of any marker board surface indicated on Drawings.
 - b. Color: Clear anodized.
 - c. Length: Longest length available to fit situation.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Do not begin installation until substrates have been properly constructed and prepared.
- B. If substrate preparation is the responsibility of another installer, notify Architect in writing of unsatisfactory preparation before proceeding.

3.02 PREPARATION

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

3.03 INSTALLATION

- A. Install in accordance with manufacturer's instructions, approved submittals and in proper relationship with adjacent construction.
 - 1. Do not scratch, dent or crease film.
 - 2. Make tight seams.

3.04 CLEANING AND PROTECTION

- A. Clean products in accordance with the manufacturers recommendations.
- B. Replace damaged products before Substantial Completion.

END OF SECTION

SECTION 10 21 13.13
METAL TOILET COMPARTMENTS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Metal toilet compartments.
- B. Urinal screens.

1.02 RELATED REQUIREMENTS

- A. Section 06 10 00 - Rough Carpentry: Blocking and supports.
- B. Section 10 28 00 - Toilet, Bath, and Laundry Accessories.

1.03 REFERENCE STANDARDS

- A. ASTM A424/A424M - Standard Specification for Steel, Sheet, for Porcelain Enameling; 2009a (Reapproved 2016).
- B. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2020.
- C. ASTM A666 - Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar; 2015.
- D. Illinois Accessibility Code; 2018.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Coordination: Coordinate the work with placement of support framing and anchors in walls and ceilings.

1.05 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Shop Drawings: Indicate partition plan, elevation views, dimensions, details of wall and floor supports, door swings.
- C. Product Data: Provide data on panel construction, hardware, and accessories.
- D. Samples: Submit two samples of partition panels, 2 X 2 inch in size illustrating panel finish, color, and sheen.
- E. Manufacturer's Installation Instructions: Indicate special procedures.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Do not deliver toilet compartments to site until building is enclosed and HVAC systems are in operation.
 - 1. Deliver toilet compartments in manufacturer's original packaging.
 - 2. Store in an upright condition.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Metal Toilet Compartments:
 - 1. Basis of Design Manufacturer:
 - a. Bradley Corporation; Toilet Compartments: Series 400 - Sentinel / Urinal Screens Model 5: www.bradleycorp.com.
 - 2. Other Acceptable Manufacturers:
 - a. Substitutions: Not permitted.

2.02 MATERIALS

- A. Metallic Coated Steel Sheet: ASTM A 653/A 653M, galvanized commercial steel sheet suitable for exposed applications. Provide with mill phosphatized surface. Provide smooth material, without creases or ripples.

- B. Zinc Aluminum Magnesium and Copper Alloy (Zamac): ASTM B 86.
- C. Stainless Steel Sheet: ASTM A 240 or A 666, 300 series.
- D. Stainless Steel Castings: ASTM A 743/A 743M.
- E. Aluminum: ASTM B 221.

2.03 COMPONENTS

- A. Toilet Compartments: Powder coated steel, floor-mounted headrail-braced.
- B. Doors, Panels, and Pilasters: Sheet steel faces, pressure bonded to sound deadening core, formed and closed edges; corners made with corner clips or mitered, welded, and ground smooth.
 - 1. Panel Faces: 20 gauge, 0.0359 inch.
 - 2. Door Faces: 22 gauge, 0.0299 inch.
 - 3. Pilaster Faces: 20 gauge, 0.0359 inch.
 - 4. Reinforcement: 12 gauge, 0.1046 inch.
 - 5. Internal Reinforcement: Provide in areas of attached hardware and fittings. Mark locations of reinforcement for partition mounted washroom accessories.
- C. Door and Panel Dimensions:
 - 1. Thickness: 1 inch.
 - 2. Door Width: 26 inch.
 - 3. Door Width for Handicapped Use: 36 inch.
 - 4. Height: 58 inch.
- D. Pilasters: 1-1/4 inch thick, of sizes required to suit compartment width and spacing.
- E. Urinal Screens: Wall mounted mounted with continous bracket in addition to wing brackets.

2.04 ACCESSORIES

- A. Pilaster Shoes: Formed ASTM A666, Type 304 stainless steel with No. 4 finish, 4 inch high, concealing floor fastenings.
 - 1. Provide adjustment for floor variations with screw jack through steel saddles integral with pilaster.
 - 2. Provide ceiling attachment using two adjustable hanging studs, attached to above-ceiling framing.
- B. Head Rails: Hollow stainless steel tube, 1 by 1-5/8 inch size, with anti-grip strips and cast socket wall brackets.
- C. Brackets: Satin stainless steel.
- D. Attachments, Screws, and Bolts: Stainless steel, tamper proof type.
 - 1. For attaching panels and pilasters to brackets: Through-bolts and nuts; tamper proof.
- E. Hardware: Satin stainless steel:
 - 1. Pivot hinges, gravity type, adjustable for door close positioning; two per door.
 - 2. Nylon bearings.
 - 3. Thumb turn or sliding door latch with exterior emergency access feature.
 - 4. Door strike and keeper with rubber bumper; mounted on pilaster in alignment with door latch.
 - 5. Coat hook with rubber bumper; one per compartment, mounted on door.
 - 6. Provide door pull for outswinging doors.
- F. Urinal-Screen Post: Standard post design of 1-3/4 inch square, stainless steel tube with No. 4 finish.
- G. Brackets: Full-height continuous type, stainless steel with No. 4 finish.

2.05 HARDWARE

- A. Hardware, Heavy Duty: Heavy-duty stainless steel castings, including stainless steel tamper-resistant fasteners:

1. Hinges: Self-closing continuous spring-loaded type, adjustable to hold doors open at any angle up to 90 degrees, with emergency access by lifting door. Mount with stainless steel through-bolts.
2. Latch and Keeper: Concealed slide latch with wrap-around rubber-faced combination door strike and keeper, with provision for emergency access, meeting requirements for accessibility at accessible compartments.
3. Coat Hook: Combination hook and rubber-tipped stop, sized to prevent door from hitting compartment-mounted accessories. Provide wall bumper where door abuts wall. Provide formed L-shaped hook without stop at outswing doors. Mount with stainless steel through-bolts.
4. Door Pull: Standard unit on outside of inswing doors. Provide pulls on both sides of outswing doors.

2.06 FABRICATION

- A. Overhead-Braced Units: Provide manufacturer's standard corrosion-resistant supports, leveling mechanism, and anchors at pilasters to suit floor conditions. Provide shoes at pilasters to conceal supports and leveling mechanism.
- B. Urinal-Screen Posts: Provide manufacturer's standard corrosion-resistant anchoring assemblies with leveling adjustment at tops and bottoms of posts. Provide caps, shoes, and covers at posts to conceal anchorage.
- C. Door Size and Swings: Unless otherwise indicated, provide 26-inch-wide, in-swinging doors for standard toilet compartments and 36-inch-wide, out-swinging doors with a minimum 32-inch-wide clear opening for compartments designated as accessible.

2.07 FINISHING

- A. Baked Enamel Steel Compartments: Clean, degrease, and neutralize. Follow immediately with a phosphatizing treatment, prime coat and two finish coats baked enamel.
- B. Color: Cyberspace #7076 - Bradley
- C. Stainless Steel Compartments: No. 4 finish.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify existing conditions before starting work.
- B. Verify that field measurements are as indicated on shop drawings.
- C. Verify correct spacing of and between plumbing fixtures.
- D. Verify correct location of built-in framing, anchorage, and bracing.

3.02 INSTALLATION

- A. Install partitions secure, rigid, plumb, and level in accordance with manufacturer's 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. Locate head rail joints at pilaster center lines.
- E. Field touch-up of scratches or damaged enamel finish will not be permitted. Replace damaged or scratched materials with new materials.

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. Hardware Adjustment: Adjust and lubricate hardware according to hardware manufacturer's written instructions for proper operation. Set hinges on in-swinging doors to hold doors open approximately 15 degrees from closed position when unlatched. Set hinges on out-swinging doors [and doors in privacy screens] to return doors to fully closed position.
- C. Adjust adjacent components for consistency of line or plane.

END OF SECTION

SECTION 10 22 13
WIRE MESH PARTITIONS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Wire mesh wall system.
- B. Sliding doors.

1.02 RELATED REQUIREMENTS

- A. Section 08 71 00 - Door Hardware: Cylinders for locksets.
- B. Section 09 91 13 - Exterior Painting.

1.03 REFERENCE STANDARDS

- A. ASTM A36/A36M - Standard Specification for Carbon Structural Steel; 2014.
- B. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products; 2017.
- C. ASTM A500/A500M - Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes; 2020.
- D. ASTM A510/A510M - Standard Specification for General Requirements for Wire Rods and Coarse Round Wire, Carbon Steel, and Alloy Steel; 2018.
- E. ASTM A580/A580M - Standard Specification for Stainless Steel Wire; 2018.
- F. ASTM A1008/A1008M - Standard Specification for Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, Solution Hardened, and Bake Hardenable; 2018.
- G. AWS D1.1/D1.1M - Structural Welding Code - Steel; 2015, with Errata (2016).

1.04 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide data for mesh materials, finishes.
- C. Shop Drawings: Indicate plan and vertical dimensions, elevations, component details; head, jamb, and sill details; location of hardware. Provide component details, anchorage, and type and location of fasteners.
 - 1. Show field measurements on shop drawings.
- D. Samples: Submit two mesh samples, 6 by 6 inch in size, illustrating mesh material. Submit samples of hinge and latchset illustrating style, color, and finish. Incorporate sample into the work.
- E. Manufacturer's Installation Instructions: Indicate special procedures, perimeter conditions requiring special attention.

1.05 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section, with not less than five years of documented experience.
 - 1. Member firm of the Woven Wire Products Association (WWPA).

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Wire Mesh Partitions:
 - 1. Acorn Wire and Iron Works, Inc: www.acornwire.com.
 - 2. The G-S Company: www.g-sco.com.
 - 3. Miller Wire Works, Inc: www.millerwireworks.com.
 - 4. Spaceguard Products: www.spaceguardproducts.com.
 - 5. Substitutions: See Section 01 60 00 - Product Requirements.

2.02 WIRE MESH PARTITIONS

- A. Wire Mesh Partitions: Factory-fabricated modular assemblies of panels, doors, anchors, hardware, and accessories as required to provide a complete system.
 - 1. Design Criteria:
 - a. Design partition system to provide for movement of components without damage, undue stress on fasteners or other detrimental effects, when subject to design loads.
 - b. Design system to accommodate construction tolerances, deflection of building structural members, and clearances of intended openings.
 - c. Comply with applicable code for wire mesh opening size.

2.03 COMPONENTS

- A. Woven Wire Mesh: Heavy duty.
 - 1. Material: ASTM A510/A510M uncoated crimped steel wire.
 - 2. Wire Size: 6 gauge, 0.192 inch.
 - 3. Mesh Opening Size: 1.5 by 1.5 inch square shape.
 - 4. Mesh Weave: Plain weave, inter-crimped.
- B. Framing and Support Members:
 - 1. Material: ASTM A36/A36M steel shapes and ASTM A500/A500M cold-formed steel.
 - 2. Channel Frames: 1-1/2" x 3/4".
 - 3. Vertical Frame Attachment: 3/8" bolt holes at 18" o.c.
 - 4. Center Reinforcing Bar: 1-1/2" X 3/4" channel tenoned into side frames. All wire shall pass through center bar.
 - 5. Flat Bar Posts: 5/16" X 3" with 3/8" bolt holes to match partition.
 - 6. Top Capping Bar: 3" X 4.1 lb. channel with 5/16" "U" bolts 2'-4" o.c. to be anchored to walls.
 - 7. Corner Posts: 1-3/4" X 1-3/4" angles with 3/8" bolt holes to match partition.
 - 8. Floor Sockets: 2-1/2" high with set screw adjustment.
 - 9. Sliding Door Frames: 1-1/2" X 3/4" channel with 1-1/2" X 1/8" flat bar cover all around. Each door to have two (4) wheel roller bearing hangers, box track, and bottom guide channel.
- C. Doors: Same material as partitions, fully framed; manufacturer's standard construction and hardware for sliding operation.
 - 1. Locking: Mortise type cylinder locks as specified in Section 08 71 00.
 - a. Provide double sided mortised type cylinder locks to match the Owner's standard cylinder type.
- D. Sheet Metal Base Panel: ASTM A1008/A1008M, cold rolled steel sheet.

2.04 FASTENERS

- A. Bolts, Nuts and Washers: Hot dip galvanized.
- B. Anchorage Devices: Provide power driven, powder actuated, and drilled expansion bolts.

2.05 ACCESSORIES

- A. Bracing: Formed sheet steel, thickness determined for conditions encountered, manufacturer's standard shapes, same finish as framing members.
- B. Plates, Gussets, Clips: Formed sheet steel, thickness determined for conditions encountered, manufacturer's standard shapes, same finish as framing members.
- C. Post Caps: Manufacturer's standard.
- D. Floor Pilaster Shoe: Manufacturer's standard.
- E. Floor Base: Manufacturer's standard.

2.06 FABRICATION

- A. Fit and assemble in largest practical sections for delivery to site, ready for installation.
- B. Make exposed joints flush or tight.

- C. Provide mortised and tenoned joints for framing members.
- D. Provide components required for anchorage to adjacent construction.
- E. Frame openings made for penetrating mechanical and electrical components.

2.07 FINISHES

- A. Galvanized Finish: In accordance with requirements of ASTM A123/A123M.
- B. Leave components unfinished.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that field measurements are as indicated on shop drawings.
- B. Verify that substrate surfaces and required openings are ready to receive work.

3.02 PREPARATION

- A. Clean substrate surfaces.

3.03 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Install items plumb and level, accurately fitted, free from distortion or defects.
- C. Perform field welding in accordance with AWS D1.1/D1.1M.
- D. After installation, touch-up field welds scratched or damaged surfaces with shop applied finish.

3.04 TOLERANCES

- A. Maximum Variation From Plumb or Level: 1/4 inch.
- B. Maximum Misalignment From True Position: 1/4 inch.

3.05 ADJUSTING

- A. Adjust doors to achieve free movement.

3.06 CLEANING

- A. Remove temporary protection to prefinished surfaces.

END OF SECTION

SECTION 10 26 00
CORNER GUARDS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Corner guards.

1.02 RELATED REQUIREMENTS

- A. Section 05 50 00 - Metal Fabrications: Corner guards fabricated from rolled metal sections or bent plate.
- B. Section 09 21 16 - Gypsum Board Assemblies: Placement of supports in stud wall construction.

1.03 REFERENCE STANDARDS

- A. ADA Standards - Americans with Disabilities Act (ADA) Standards for Accessible Design; 2010.

1.04 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Indicate physical dimensions.
- C. Samples: Submit samples illustrating component design, configurations, joinery, color and finish.
- D. Manufacturer's Instructions: Indicate special procedures, perimeter conditions requiring special attention.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Deliver corner guards in original, undamaged protective packaging. Label items to designate installation locations.
- B. Protect work from moisture damage.
- C. 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.
- D. Store products in either horizontal or vertical position, in compliance with manufacturer's instructions.

1.06 WARRANTY

- A. See Section 01 78 00 - Closeout Submittals, for additional warranty requirements.
- B. Correct defective Work within a one year period after Date of Substantial Completion.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Corner Guards:
 - 1. Arden Architectural Specialties, Inc: www.ardenarch.com.
 - 2. Construction Specialties, Inc: www.c-sgroup.com.
 - 3. Inpro: www.inprocorp.com.
 - 4. Nystrom, Inc: www.nystrom.com.
 - 5. Substitutions: See Section 01 60 00 - Product Requirements.

2.02 PRODUCT TYPES

- A. Corner Guards - Surface Mounted (CG):
 - 1. Material: Type 304 stainless steel, No. 4 finish, 16 gauge, one piece unit installed without any exposed mechanical fasteners.
 - 2. Performance: Resist lateral impact force of 100 lbs at any point without damage or permanent set.
 - 3. Size and Profile: "L" shaped
 - 4. Width of Wings: 2 inches.

5. Corner: Square.
6. Length: 48 inches.
7. Mounting Height: Bottom should be 4" above finished floor (above rubber base).
8. Attachment Method: Adhesive recommended by manufacturer. Exposed fasteners will not be acceptable.

2.03 FABRICATION

- A. Fabricate components with tight joints, corners and seams.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that substrate surfaces for adhered items are clean and smooth.

3.02 INSTALLATION

- A. Install components in accordance with manufacturer's instructions, level and plumb, secured rigidly in position to supporting construction.
- B. Position corner guard 4 inches above finished floor to 48 inches high.

3.03 TOLERANCES

- A. Maximum Variation From Required Height: 1/4 inch.
- B. Maximum Variation From Level or Plane For Visible Length: 1/4 inch.

3.04 CLEANING

- A. See Section 01 74 19 - Construction Waste Management and Disposal, for additional requirements.
- B. Clean corner guard items of excess adhesive, dust, dirt, and other contaminants.

END OF SECTION

SECTION 10 28 00
TOILET, BATH, AND LAUNDRY ACCESSORIES

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Commercial toilet and shower accessories.
- B. Commercial shower and bath accessories.
- C. Institutional ligature-resistant toilet accessories.
- D. Under-lavatory pipe supply covers.
- E. Electric hand/hair dryers.

1.02 RELATED REQUIREMENTS

- A. Section 06 10 00 - Rough Carpentry: Wood blocking.
- B. Section 09 21 16 - Gypsum Board Assemblies.
- C. Section 09 30 00 - Tiling.
- D. Section 10 21 13.13 - Metal Toilet Compartments.

1.03 REFERENCE STANDARDS

- A. ADA Standards - Americans with Disabilities Act (ADA) Standards for Accessible Design; 2010.
- B. ASME A112.18.9 - Protectors/Insulators for Exposed Waste and Supplies on Accessible Fixtures; 2011.
- C. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products; 2017.
- D. ASTM A269/A269M - Standard Specification for Seamless and Welded Austenitic Stainless Steel Tubing for General Service; 2015a.
- E. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2020.
- F. ASTM A666 - Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar; 2015.
- G. ASTM B86 - Standard Specification for Zinc and Zinc-Aluminum (ZA) Alloy Foundry and Die Castings; 2013.
- H. ASTM B456 - Standard Specification for Electrodeposited Coatings of Copper Plus Nickel Plus Chromium and Nickel Plus Chromium; 2017.
- I. ASTM C1036 - Standard Specification for Flat Glass; 2016.
- J. ASTM C1048 - Standard Specification for Heat-Strengthened and Fully Tempered Flat Glass; 2018.
- K. ASTM C1503 - Standard Specification for Silvered Flat Glass Mirror; 2018.
- L. ASTM C1822 - Standard Specification for Insulating Covers on Accessible Lavatory Piping; 2015.
- M. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2020.
- N. ASTM F2285 - Standard Consumer Safety Performance Specification for Diaper Changing Tables for Commercial Use; 2004, with Editorial Revision (2016).
- O. ASTM G21 - Standard Practice for Determining Resistance of Synthetic Polymeric Materials to Fungi; 2015.
- P. ICC A117.1 - Accessible and Usable Buildings and Facilities; 2017.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Coordinate the work with the placement of internal wall reinforcement and reinforcement of toilet partitions to receive anchor attachments.

1.05 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Submit data on accessories describing size, finish, details of function, and attachment methods.
- C. Manufacturer's Installation Instructions: Indicate special procedures and conditions requiring special attention.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Commercial Toilet, Shower, and Bath Accessories:
 - 1. Basis of Design Manufacturer:
 - a. American Specialties, Inc: www.americanspecialties.com.
 - 2. Other Acceptable Manufacturers:
 - a. Bobrick Washroom Equipment, Inc.: www.bobrick.com.
 - b. Bradley Corporation: www.bradleycorp.com.
 - c. Substitutions: Section 01 60 00 - Product Requirements.
- B. Under-Lavatory Pipe Supply Covers:
 - 1. AZ Partsmaster: www.azpartsmaster.com.
 - 2. Plumberex Specialty Products, Inc: www.plumberex.com.
 - 3. Lav Guard 2: www.truebro.com.
 - 4. Substitutions: See Project Manual - Volume 1: Section 01 62 00 - Product Substitutions.
- C. Electric Hand/Hair Dryers:
 - 1. Excel Dryer: www.exceldryer.com.
 - 2. Substitutions: Not permitted.

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 or seamless sheets with flat surfaces.
- B. Stainless Steel Sheet: ASTM A666, Type 304.
- C. Stainless Steel Tubing: ASTM A269/A269M, Grade TP304 or TP316.
- D. Galvanized Sheet Steel: Hot-dipped galvanized steel sheet, ASTM A653/A653M, with G90/Z275 coating.
- E. Zinc Alloy: Die cast, ASTM B86.
- F. Mirror Glass: Annealed float glass, ASTM C1036 Type I, Class 1, Quality Q2, with silvering, protective and physical characteristics complying with ASTM C1503.
- G. Mirror Glass: Tempered safety glass, ASTM C1048; and ASTM C1036 Type I, Class 1, Quality Q2, with silvering as required.
- H. Adhesive: Two component epoxy type, waterproof.
- I. Fasteners, Screws, and Bolts: Hot dip galvanized; tamper-proof; security type.

2.03 FINISHES

- A. Stainless Steel: Satin finish, unless otherwise noted.
- B. Chrome/Nickel Plating: ASTM B456, SC 2, polished finish, unless otherwise noted.
- C. Baked Enamel: Pretreat to clean condition, apply one coat primer and minimum two coats epoxy baked enamel.

- D. Galvanizing for Items Other than Sheet: Comply with ASTM A123/A123M; galvanize ferrous metal and fastening devices.
- E. Shop Primed Ferrous Metals: Pretreat and clean, spray apply one coat primer and bake.
- F. Back paint components where contact is made with building finishes to prevent electrolysis.

2.04 COMMERCIAL TOILET ACCESSORIES

- A. Toilet Paper Dispensor: To be provided by Owner and installed by General Trades/ Coordinating Contractor.
- B. Paper Towel Dispensor: To be provided by Owner and installed by General Trades/ Coordinating Contractor.
- C. Soap Dispensor: To be provided by Owner and installed by General Trades/ Coordinating Contractor.
- D. Mirrors: Stainless steel framed, 1/4 inch thick tempered safety glass; ASTM C1048.
 - 1. Size: As indicated on drawings.
 - 2. Style: Flat mirrors.
 - 3. Frame: 0.05 inch angle shapes, with mitered and welded and ground corners, and tamperproof hanging system; satin finish.
 - 4. Backing: Full-mirror sized, minimum 0.03 inch galvanized steel sheet and nonabsorptive filler material.
 - 5. Basis of Design Products:
 - a. 0600 Series as manufactured by American Specialties, Inc.
 - b. Substitutions: Section 01 60 00 - Product Requirements.
- E. Grab Bars: Stainless steel, textured surface.
 - 1. Standard Duty Grab Bars:
 - a. Push/Pull Point Load: 250 pound-force, minimum.
 - b. Dimensions: 1-1/2 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. Finish: Satin.
 - d. Length and Configuration: As indicated on drawings.
 - e. Basis of Design Product:
 - 1) 3800 Series as manufactured by American Specialties, Inc.
 - 2) Substitutions: See 01 62 00 - Product Substitutions.
- F. Utility Shelf: Fold-down, with manual hinge designed to return shelf to vertical position when not in use; 0.03 inch satin-finished stainless steel, with 1/4 inch rolled or 1/2 inch channel edge at shelf front.
 - 1. Size: 5-13/16" W X 2-1/8" H X 15-5/8" L.
 - 2. Products:
 - a. Model 0698 as manufactured by American Specialties, Inc.
 - b. Substitutions: Section 01 60 00 - Product Requirements.
- G. 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. Model 0473-1A as manufactured by American Specialties, Inc..
 - b. Substitutions: Section 01 60 00 - Product Requirements.

2.05 INSTITUTIONAL LIGATURE-RESISTANT TOILET AND BATH ACCESSORIES

- A. Mirrors: Stainless steel framed, Type 400 polished stainless steel mirror; Exposed front mount.
 - 1. Application: Detention Toilet 1051.
 - 2. Size: 12" X 16"
 - 3. Frame: Solid surface material with mitered beveled edges and welded and ground corners, and tamperproof hanging system; Square corners.
 - 4. Products:

- a. Model 107 as manufactured by American Specialties, Inc..
 - b. Substitutions: Section 01 60 00 - Product Requirements.
- B. Grab Bars: Type 304 stainless steel, smooth surface with closure plate.
 - 1. Standard Duty Grab Bars:
 - a. Application: Detention Toilet 1051.
 - b. Push/Pull Point Load: 250 pound-force, minimum.
 - c. Dimensions: 1-1/2 inch outside diameter, minimum 0.05 inch wall thickness, 1-1/2 inch clearance between wall and inside of grab bar; 14 gauge stainless steel "L" shaped closure plate with wall mounting flange welded to bottom of tube to prevent ligature. Install grab bar and closure plate with tamper-resistant screws through grab bar circular mounting flange and wall flange of flat closure.
 - d. Finish: Satin.
 - e. Length and Configuration: As indicated on drawings.
 - f. Products:
 - 1) Substitutions: Section 01 60 00 - Product Requirements.

2.06 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. Substitutions: Section 01 60 00 - Product Requirements.
- B. Shower Curtain:
 - 1. Material: Opaque vinyl, 0.008 inch thick, matte finish, with antibacterial treatment, flameproof and stain-resistant.
 - 2. Size: 36 by 72 inches, hemmed edges.
 - 3. Grommets: Stainless steel; pierced through top hem on 6 inch centers.
 - 4. Color: White.
 - 5. Shower Curtain Hooks: Chrome-plated or stainless steel spring wire designed for snap closure.
 - 6. Products:
 - a. Model 1200-V / 1200-SHU as manufactured by American Specialties, Inc..
 - b. Substitutions: Section 01 60 00 - 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, rectangular seat.
 - 1. Seat: Phenolic one-piece seat or seat slats, of white color.
 - 2. Size: ADA Standards compliant.
 - 3. Products:
 - a. 8203 as manufactured by American Specialties, Inc..
 - b. Substitutions: Section 01 60 00 - Product Requirements.
- D. Towel Pin: Stainless steel, 3 inch extension from wall; rectangular-shaped bracket and backplate for concealed attachment, satin finish.
 - 1. Application: Provide (2) two at each shower changing area.
 - 2. Products:
 - a. Model 7301-S as manufactured by American Specialties, Inc.
 - b. Substitutions: Section 01 60 00 - Product Requirements.

2.07 UNDER-LAVATORY PIPE AND SUPPLY COVERS

- A. Under-Lavatory Pipe and Supply Covers:
 - 1. Insulate exposed drainage piping, including hot, cold, and tempered water supplies under lavatories or sinks to comply with ADA Standards.
 - 2. Exterior Surfaces: Smooth non-absorbent, non-abrasive surfaces.
 - 3. Construction: 1/8 inch flexible PVC.

- a. 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. Comply with ASTM C1822, type indicated.
- 4. Color: White.
- 5. Fasteners: Reusable, snap-locking fasteners with no sharp or abrasive external surfaces.
- 6. Basis of Design Product:
 - a. Plumberex Specialty Products, Inc; Plumberex Handy-Shield Maxx: www.plumberex.com.
 - b. Substitutions: Not permitted.

2.08 ELECTRIC HAND/HAIR DRYERS

- A. Electric Hand Dryers: Traditional fan-in-case type, with downward fixed nozzle.
 - 1. Operation: Automatic, sensor-operated on and off.
 - 2. Mounting: Surface mounted.
 - 3. Cover: Stainless steel with brushed finish.
 - a. Tamper-resistant screw attachment of cover to mounting plate.
 - 4. Air Velocity: 16,000 linear feet per minute, minimum, at full power.
 - 5. Heater: 970 W, minimum, at full power.
 - 6. Electric Hand Dryer Products:
 - a. Excel Dryer Inc; XLERATOR XL-SB: www.exceldryer.com.
 - 7. Retrofit Receptor: To fit electric hand dryer.
 - a. Products:
 - 1) Excel Dryer Inc; XLERATOR 40502 ADA Compliant Recess Kit: www.exceldryer.com.
 - 2) Substitutions: Section 01 60 00 - Product Requirements.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify existing conditions before starting work.
- B. Verify exact location of accessories for installation.
- C. For electrically-operated accessories, verify that electrical power connections are ready and in the correct locations.
- D. Verify that field measurements are as indicated on drawings.
- E. See Section 06 10 00 - 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 44 00
FIRE PROTECTION SPECIALTIES

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Fire extinguishers.
- B. Fire extinguisher cabinets.
- C. Accessories.

1.02 RELATED REQUIREMENTS

- A. Section 04 20 02 - Single-Wythe Unit Masonry.
- B. Section 06 10 00 - Rough Carpentry: Wood blocking product and execution requirements.
- C. Section 09 21 16 - Gypsum Board Assemblies.

1.03 REFERENCE STANDARDS

- A. FM (AG) - FM Approval Guide; current edition.
- B. NFPA 10 - Standard for Portable Fire Extinguishers; 2017, with Errata (2018).
- C. UL (DIR) - Online Certifications Directory; Current Edition.

1.04 PERFORMANCE REQUIREMENTS

- A. Conform to NFPA 10.
- B. Provide extinguishers classified and labeled by Underwriters Laboratories Inc. for the purpose specified and indicated.

1.05 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide extinguisher operational features, extinguisher ratings and classifications, color and finish, anchorage details, and installation instructions.
- C. Shop Drawings: Indicate locations of cabinets, cabinet physical dimensions, rough-in measurements for recessed cabinets, locations of individual fire extinguishers, mounting measurements for wall bracket, installation procedures, and accessories required for complete installation.
- D. Manufacturer's Installation Instructions: Indicate special criteria and wall opening coordination requirements.
- E. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.
- F. Maintenance Data: Include test, refill or recharge schedules and re-certification requirements.

1.06 FIELD CONDITIONS

- A. Do not install extinguishers when ambient temperature may cause freezing of extinguisher ingredients.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Fire Extinguishers:
 - 1. Amerex: www.amerex-fire.com.
 - 2. Ansul, a Tyco Business: www.ansul.com.
 - 3. Buckeye Fire Equipment Company: www.buckeyefire.com.
 - 4. JL Industries, Inc: www.jlindustries.com.
 - 5. Larsen's Manufacturing Co: www.larsensmfg.com.
 - 6. Potter-Roemer: www.potterroemer.com.
 - 7. Substitutions: See Section 01 60 00 - Product Requirements.

2.02 FIRE EXTINGUISHERS

- A. Fire Extinguishers - General: 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.
- B. Dry Chemical Type Fire Extinguishers (Ammonium Phosphate): Stainless steel tank, with pressure gage.
 - 1. Basis of Design:
 - a. Ansul, a Tyco Business; Sentry, Model A-10H: www.ansul.com.
 - b. Substitutions: See Section 01 60 00 - Product Requirements.
 - 2. Class ABC.
 - 3. Size: 10 pound.
 - 4. Size and classification 10A:60B:C.
 - 5. Finish: Baked enamel, red color.

2.03 FIRE EXTINGUISHER CABINETS

- A. Basis of Design:
 - 1. Larsen's Manufacturing Co; Architectural Series with Full Clear Door: www.larsensmfg.com.
 - 2. Substitutions: See Section 01 60 00 - Product Requirements.
- B. Metal: Formed aluminum.
- C. Cabinet Configuration: Recessed type.
 - 1. Size to accommodate accessories.
 - 2. Provide Fire Rated cabinets where indicated on the drawings.
 - 3. Trim: Returned to wall surface, with 2 1/2 inch projection, 1 1/2 inch wide face.
 - 4. Provide cabinet enclosure with right angle inside corners and seams, and with formed perimeter trim and door stiles.
- D. Tub: Cold rolled steel with powder-coat finish.
- E. Door: 0.036 inch thick, reinforced for flatness and rigidity; with latch. Hinge doors for 180 degree opening with continuous piano hinge. Provide nylon roller catch.
- F. Door Glazing: Float glass, clear, 1/8 inch thick, and set in resilient channel glazing gasket.
- G. Cabinet Mounting Hardware: Appropriate to cabinet, with pre-drilled holes for placement of anchors.
- H. Fabrication: Weld, fill, and grind components smooth.
- I. Finish of Cabinet Exterior Trim and Door: Clear anodized color.
- J. Finish of Cabinet Interior: White colored enamel.

2.04 ACCESSORIES

- A. Extinguisher Brackets: Formed steel, chrome-plated.
- B. Cabinet Signage: "FIRE EXTINGUISHER" 0.30 gauge white silk screen word arranged vertically.
- C. Wall Signage: 4" X 18" three dimensional "tent" shaped plastic wall signs.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify existing conditions before starting work.
- B. Verify rough openings for cabinet are correctly sized and located.

3.02 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Secure rigidly in place.

- C. Place extinguishers in cabinets.
- D. Position wall signage directly above cabinets.

END OF SECTION

SECTION 10 51 13 METAL LOCKERS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Heavy duty welded metal lockers.
- B. Locker benches.
- C. A.D.A. dressing benches.

1.02 RELATED REQUIREMENTS

- A. Section 06 10 00 - Rough Carpentry: Wood blocking and nailers.
- B. Section 08=9 21 16 - Gypsum Board Assemblies.

1.03 REFERENCE STANDARDS

- A. ADA Standards - Americans with Disabilities Act (ADA) Standards for Accessible Design; 2010.
- B. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2020.
- C. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2017.
- D. ICC A117.1 - Accessible and Usable Buildings and Facilities; 2017.
- E. Illinois Accessibility Code; 2018.
- F. NFPA 286 - Standard Methods of Fire Tests for Evaluating Contribution of Wall and Ceiling Interior Finish to Room Fire Growth; 2015.

1.04 SUBMITTALS

- A. See Section 01 30 00 - 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 and combination lock code.
- D. Samples: Submit two samples 3 by 5 inches in size showing color and finish of metal locker material.
- E. Manufacturer's Installation Instructions: Indicate component installation assembly.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Protect locker finish and adjacent surfaces from damage.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Metal Lockers:
 - 1. Basis of Design Manufacturer:
 - a. Lyon Workspace Products: www.lyonworkspace.com.
 - 2. Other Acceptable Manufacturers:
 - a. Art Metal Products: www.artmetalproducts.com.
 - b. List Industries, Inc: www.listindustries.com.
 - c. Lyon Workspace Products: www.lyonworkspace.com.
 - d. Penco Products, Inc: www.pencoproducts.com.
 - e. Republic Storage Systems Co: www.republicstorage.com.
 - f. Substitutions: See Section 01 60 00 - Product Requirements.

2.02 LOCKER APPLICATIONS

- A. Fitness/Athletic : Metal lockers, wall mounted with matching closed base.
 - 1. Location: Women's Locker Room 1076 and Men's Locker Room 1073.
 - 2. Width: 15 inches.

3. Depth: 18 inches.
 4. Height: 72 inches.
 5. Configuration: Two tier.
 6. Fittings: Size and configuration as indicated on drawings.
 - a. Hat shelf.
 - b. Hooks: Two single prong.
 7. Ventilation: Perforated side panels and doors.
 8. Locking: Multi-User Mechanical Built-In Lock.
 9. Provide sloped tops.
- B. Wrestling: Metal lockers, wall mounted with matching closed base.
1. Location: Wrestling Lockers 1074.
 2. Width: 15 inches.
 3. Depth: 18 inches.
 4. Height: 72 inches.
 5. Configuration: Single tier.
 6. Fittings: Size and configuration as indicated on drawings.
 - a. Hat shelf.
 - b. Hooks: Two single prong.
 7. Ventilation: Perforated side panels and doors.
 8. Locking: Multi-User Mechanical Built-In Lock.
 9. Provide sloped tops.
- C. Locker Benches: Stationary type; bench top of laminated birch; painted steel pedestals.
1. Location: Women's Locker Room 1076 and Men's Locker Room 1073.
 2. Size:
 - a. Width: 80 inches.
 - b. Depth: 12 inches.
 - c. Height: 18 inches.
- D. A.D.A. Dressing Benches: Stationary type; bench top and back of laminated birch; painted steel pedestals.
1. Location: Women's Locker Room 1076 and Men's Locker Room 1073.
 2. Size:
 - a. Width: 48 inches.
 - b. Depth: 20 inches.
 - c. Height: 17-19 inches.
 3. Accessibility: Comply with ICC A117.1 and Illinois Accessibility Code; 2018.

2.03 METAL LOCKERS

- A. Accessibility: Comply with ICC A117.1 and ADA Standards.
- B. Lockers: Factory assembled, made of formed sheet steel, ASTM A653/A653M SS Grade 33/230, with G60/Z180 coating, stretcher leveled; metal edges finished smooth without burrs; baked enamel finished inside and out.
1. Where ends or sides are exposed, provide flush panel closures.
 2. Provide filler strips where required, securely attached to lockers.
 3. Color: Putty.
- C. Locker Body: All-welded lockers.
1. Bottoms, Tops, and Shelves:
 - a. 16 gauge steel.
 2. Backs: Solid
 - a. 18 gauge steel.
 - b. Groups to 48 inches wide: One-piece back.
 - c. Groups over 48 inches wide: Two-piece back.
 3. Doors:
 - a. 14 gauge steel.

- b. Ventilation: 3/4 inch wide by 1-1/2 inch high diamond-shaped perforations.
- 4. Sides: Vertical frames and sides.
 - a. Intermediate vertical side frames: Frame channel securely welded to locker side.
 - b. Ventilation: 3/4 inch wide by 1-1/2 inch high diamond-shaped perforations.
 - c. Tops: Notched and formed sheet; one continuous flat top for each group of lockers.
- 5. Bottoms: Notched and formed sheet; one continuous bottom for each group of lockers, suitable for anchoring to wood or concrete bases.
- 6. Shelves: Flanged four sides with additional return flange on front edge to increase strength.
- 7. Door frames: 16 gauge formed in a channel shape with continuous vertical door strikes.
- 8. Locker Doors: One piece sheet steel.
 - a. Multi-Point Latch Doors: Full channel formation of adequate depth to fully conceal lock bar on lock side, channel formation on hinge side, right angle formations across top and bottom, with holes for attaching number plates.
 - b. Provide holes for attaching number plates.
 - c. Ventilation: 3/4 inch wide by 1-1/2 inch high diamond-shaped perforations.
 - d. Hinges:
 - 1) Continuous Hinges: Continuous piano hinge for the full height of the door.
 - 2) Two for doors under 42 inches high; three for doors over 42 inches high; weld securely to locker body and door.

2.04 DOOR HANDLES AND LATCHING

- A. Multi-point latching with recessed handles:
 - 1. Recess finger-lift control handle in door.
 - 2. Pocket: 22 gauge brushed stainless steel securely fastened to door with two tabs and a positive tamper-resistant decorative fastener; of depth sufficient to prevent a combination padlock lock from protruding beyond door face.
 - 3. Provide lock hole cover plate for use with padlocks.
 - 4. Attach 14 gauge formed steel lifting piece to latching channel with one concealed retaining lug and one rivet, assuring a positive two-point connection.
 - 5. Handle Finger Lift: Molded, sound-deadening, attached with rivet; padlock eye for use with 9/32 inch diameter padlock shackle.
 - 6. Latch Clip: Glass-filled nylon engaging the door frame and holding the door shut.
 - a. Doors: Three points.
 - 7. Locking Device: Positive, automatic type, whereby locker may be locked when open, then closed without unlocking.
 - 8. Firmly secure one rubber silencer in frame at each latch hook.

2.05 INTERIOR EQUIPMENT

- A. ADA-Compliant Lockers (Recessed Handles with Multi-Point Latch):
 - 1. Single Tier Lockers: Hat shelf at maximum 48 inches off the floor for unobstructed forward and side reach.
 - 2. Locker Compartment Bottom: Minimum of 15 inches off the floor, or an extra shelf placed 15 inches off the floor for unobstructed forward and side reach.
 - 3. Handicapped symbol attached to door.
 - 4. Hooks as specified for other lockers.
- B. All Welded Lockers:
 - 1. Hat shelf located approximately 9 inches below top of locker.
 - 2. Two single-prong wall hooks and one double-prong ceiling hook.

2.06 ACCESSORIES

- A. Number Plates: Provide each locker with a polished aluminum number plate, 2-1/4 inches wide by 1 inch high, with black numerals not less than 3/8 inch high; attach to face of door with two aluminum rivets.
- B. Coat Hooks: Stainless steel or zinc-plated steel.
- C. Fitness/Athletic and Wrestling Lockers: Multi-User Mechanical Built-In Lock.
 - 1. Basis of Design Manufacturer:
 - a. Master Lock; #3670 Multi-User Mechanical Built-In Lock: www.masterlock.com
 - 2. Other Acceptable Manufacturers:
 - a. Architect approved equal.
 - b. Substitutions: See Section 01 60 00 - Product Requirements.
 - 3. Provide master keys for Owner.
 - a. Provide (4) master keys.
- D. Continuous Sloped Hoods: 18 gauge steel, slope rise equal to 1/3 of the locker depth (18.5 degrees), plus a 1 inch vertical rise at front.
 - 1. Supplied in 72 inch lengths only.
 - 2. Slip joints without visible fasteners at splice locations.
 - 3. Provide necessary end closures.
 - 4. Finish to match lockers.
- E. Finished End Panels: Minimum 16 gauge steel formed to match locker depth and height, 1 inch edge dimension; finish to match lockers and install with concealed fasteners.
- F. Front Fillers: 20 gauge steel formed in an angle shape, with 20 gauge slip joint angles formed in an angle shape with double bend on one leg forming a pocket to provide adjustable mating with angle filler.
 - 1. Attachment by means of concealed fasteners.
 - 2. Finish to match lockers.
- G. Recess Trim: 18 gauge steel, 3 inch face dimension.
 - 1. Vertical and/or horizontal as required.
 - 2. Standard lengths as long as practical.
 - 3. Attach to lockers with concealed clips.
 - 4. Provide necessary finish caps and splices.
 - 5. Finish to match lockers.

2.07 FABRICATION

- A. Fabricate lockers square, rigid, without warp, with metal faces flat and free of distortion.
- B. Welded Lockers: Pre-assemble lockers by welding into one piece structures in groupings most practical for job requirements, welds free of burrs; maximum width of group to be 54 inches; no bolts, nuts, or rivets allowed in assembly of main locker groups.
- C. Finish: Enamel powder coat paint finish electrostatically applied and properly cured to manufacturer's specifications for optimum performance. Finishes containing volatile organic compounds and subject to out-gassing are not acceptable. Locker exterior and interior shall be painted the same color.
 - 1. Powder Coat - Dry Thickness: 1 to 1.2 mils.
 - 2. Color: Putty.
 - 3. Special Finish:
 - a. Anti-Microbial.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Do not begin installation until substrates and bases have been properly prepared.
- B. If substrate and bases are the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

3.02 INSTALLATION

- A. Install metal lockers and accessories at locations shown in accordance with manufacturer's instructions.
- B. Install lockers plumb, level, and square.
- C. Anchor lockers to floor and wall at 48 inches or less, as recommended by the manufacturer.
- D. Bolt adjoining locker units together to provide rigid installation.
- E. Install sloping tops and metal fillers using concealed fasteners. Provide flush hairline joints against adjacent surfaces.
- F. Install front bases between legs without overlap or exposed fasteners. Provide end bases on exposed ends.
- G. Replace components that do not operate smoothly.
- H. Install fittings if not factory installed.

3.03 ADJUSTING AND CLEANING

- A. Adjust doors and latches to operate without binding. Verify that latches are operating satisfactorily.
- B. Adjust built-in locks to prevent binding of dial or key and ensure smooth operation prior to substantial completion.
- C. Touch-up with factory-supplied paint and repair or replace damaged products before substantial completion.
- D. Clean locker interiors and exterior surfaces.

3.04 PROTECTION

- A. Protect installed products until completion of project.

3.05 CLEANING

- A. Clean locker interiors and exterior surfaces.

END OF SECTION

SECTION 12 24 00
WINDOW SHADES

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Interior manual roller shades.

1.02 RELATED REQUIREMENTS

- A. Section 06 10 00 - Rough Carpenry: Wood blocking.
- B. Section 08 56 53 - Security Windows.

1.03 REFERENCE STANDARDS

- A. ASTM G21 - Standard Practice for Determining Resistance of Synthetic Polymeric Materials to Fungi; 2015.
- B. C2C (DIR) - C2C Certified Products Registry; Cradle to Cradle Products Innovation Institute; Current Edition.
- C. NFPA 701 - Standard Methods of Fire Tests for Flame Propagation of Textiles and Films; 2019.
- D. UL 325 - Standard for Door, Drapery, Gate, Louver, and Window Operators and Systems; Current Edition, Including All Revisions.
- E. WCMA A100.1 - Safety of Window Covering Products; 2018.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. 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. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide manufacturer's standard catalog pages and data sheets, including materials, finishes, fabrication details, dimensions, profiles, mounting requirements, and accessories.
- C. Shop Drawings: Include shade schedule indicating size, location and keys to details, head, jamb and sill details, mounting dimension requirements for each product and condition, and operation direction.
- D. Selection Samples: Include fabric samples in full range of available colors and patterns.
- E. Verification Samples: Minimum size 6 inches square, representing actual materials, color and pattern.
- F. Manufacturer's Instructions: Include instructions for storage, handling, protection, examination, preparation, and installation of product.
- G. Operation and Maintenance Data: List of all components with part numbers, sources of supply, and operation and maintenance instructions; include copy of shop drawings.
- H. Warranty: Submit sample of manufacturer's warranty and documentation of final executed warranty 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 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.

1.07 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 78 00 - Closeout Submittals, for additional warranty requirements.
- B. Provide manufacturer's warranty from Date of Substantial Completion, covering the following:
 - 1. Shade Hardware: One year.
 - 2. Fabric: One year.
 - 3. Aluminum and Steel Coatings: One year.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Interior Manually Operated Roller Shades:
 - 1. Basis of Design Manufacturer:
 - a. Draper, Inc; Clutch Operated FlexShade: www.draperinc.com.
 - 2. Other Acceptable Manufacturers:
 - a. Hunter Douglas Architectural; RB500 Manual Roller Shades: www.hunterdouglasarchitectural.com.
 - b. Lutron Electronics Co., Inc; Contract Roller Manual Roller Shades: www.lutron.com.
 - c. MechoShade Systems LLC; Mecho/5 System: www.mechoshade.com.
 - d. Substitutions: See Section 01 60 00 - 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.
- B. Interior Roller Shades - Basis of Design: Draper, Inc; Clutch Operated FlexShade: www.draperinc.com.
 - 1. Description: Single roller, manually operated fabric window shade system complete with mounting brackets, roller tubes, hembars, hardware, and other components necessary for complete installation.
 - a. Drop Position: Regular roll.
 - b. Mounting: Wall mounted.
 - c. Size: As indicated on drawings.
 - d. Fabric: 3% Sheerweave Infinity II.
 - e. Color: Cotton.
 - 2. Mounting Hardware: As recommended by manufacturer for mounting indicated and to accommodate shade fabric roll-up size and weight.
 - a. Hardware Type: Headbox.
 - 3. Roller Tubes: As required for type of shade operation; designed for removal without removing mounting hardware.
 - a. Material: Extruded aluminum or steel, with wall thickness and material selected by manufacturer.
 - b. Size: As recommended by manufacturer; selected for suitability for installation conditions, span, and weight of shades.
 - c. Fabric Attachment: Utilize double-sided adhesive tape.
 - 4. Hembars: Designed to maintain bottom of shade straight and flat, selected from manufacturer's standard options.

- a. Style: Closed pocket; aluminum elliptical slat inside pocket with heat-sealed ends.
- 5. Manual Operation:
 - a. Clutch Operator: Manufacturer's standard material and design, permanently lubricated.
 - b. Drive Chain: Continuous loop stainless steel beaded ball chain, 95 pounds minimum breaking strength. Provide upper and lower limit stops.
 - 1) Polyester Chain Color: White.
 - c. Shade Lift Assistance: Manufacturer's standard spring device contained in the idler end of roller tube to reduce force required to lift shades; as required based on shade weight.
 - d. Chain Retainer:
 - 1) Chain tensioning device complying with WCMA A100.1.
 - 2) Manufacturer's standard clip.
 - e. Idler Assembly: Molded nylon with adjustable length idler pin or spring-loaded idler to facilitate easy installation and removal of shade for service.
- 6. Accessories:
 - a. Exposed Headbox: Extruded aluminum, size as required to conceal shade mounting; clear anodized finish.
 - b. Fasteners: Noncorrosive, and as recommended by shade manufacturer.

2.03 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 - Outside Mounting: Cover window frames, trim, and casings completely.

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 CLEANING

- A. Clean soiled shades and exposed components as recommended by manufacturer.
- B. Replace shades that cannot be cleaned to "like new" condition.

3.05 CLOSEOUT ACTIVITIES

- A. See Section 01 78 00 - Closeout Submittals, for closeout submittals.
- B. See Section 01 79 00 - Demonstration and Training, for additional requirements.

- C. Demonstration: Demonstrate operation and maintenance of window shade system to Owner's personnel.
- D. 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.

3.06 PROTECTION

- A. Protect installed products from subsequent construction operations.
- B. Touch-up, repair, or replace damaged products before Substantial Completion.

END OF SECTION

SECTION 12 34 00
MANUFACTURED PLASTIC LAMINATE CASEWORK

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Modular and special fabricated cabinet units.
- B. Cabinet hardware.
- C. Fixed shelving, adjustable shelving and shelf supports.

1.02 RELATED WORK

- A. Specified elsewhere:
 - 1. Section 06 10 00 - Rough Carpentry: Wood blocking product and execution requirements.
 - 2. Section 07 90 05 - Joint Sealers: Sealing joints between casework and countertops and adjacent walls.
 - 3. Section 12 36 00 - Countertops.
 - 4. Division 22 - Mechanical: Plumbing, utilities, and fixtures. Coordinate with casework.
 - 5. Division 26 - Electrical: Power, signal, and data wiring. Coordinate with casework.

1.03 REFERENCES

- A. AHA A135.4 - Basic Hardboard; American Hardboard Association; 1995.
- B. ANSI A208.1 - American National Standard for Particleboard; 2009.
- C. AWI (QCP) - Quality Certification Program; Current Edition.
- D. AWMAC (GIS) - Guarantee and Inspection Services Program; Current Edition.
- E. AWMAC/WI (NAAWS) - North American Architectural Woodwork Standards, U.S. Version 3.1; 2017, with Errata (2019).
- F. BHMA A156.9 - American National Standard for Cabinet Hardware; 2015.
- G. GSA CID A-A-1936 - Adhesive, Contact, Neoprene Rubber; 1996a (Validated 2013).
- H. HPVA HP-1 - American National Standard for Hardwood and Decorative Plywood; 2016.
- I. NEMA LD 3 - High-Pressure Decorative Laminates; 2005.
- J. NHLA G-101 - Rules for the Measurement & Inspection of Hardwood & Cypress; National Hardwood Lumber Association; 1998.
- K. PS 20 - American Softwood Lumber Standard; National Institute of Standards and Technology (Department of Commerce); 1999.
- L. WIC (MAN) - Manual of Millwork; Woodwork Institute of California 2001.

1.04 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Shop Drawings: Indicate materials, component profiles and elevations, assembly methods, joint details, fastening methods, accessory listings, hardware location and schedule of finishes.
- C. Product Data: Provide data for hardware accessories.
- D. Samples: Submit two 6 X 8 inch samples of plastic laminate samples, illustrating cabinet color choices.
- E. Samples: Submit two 6 inch long samples of PVC edge banding, illustrating color and thickness.
- F. Samples: Submit one sample of drawer pulls, hinges, slides, and other accessories illustrating hardware finish .

1.05 QUALITY ASSURANCE

- A. Perform all work in accordance with AWI Architectural Woodwork Quality Standards Illustrated, Custom quality. excepting that all sight exposed shelving and casework interior surfaces of

open shelving units shall be clad in high pressure laminate of type to match that used for door and drawer fronts.

- B. Provide 5 year Manufacturer warranty against delamination.
- C. Provide Manufacturer certification that products do not contain in excess of one (1) part per million of formaldehyde.
- D. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum ten years of documented experience.

1.06 DELIVERY, STORAGE, AND PROTECTION

- A. Protect units from moisture damage.

1.07 ENVIRONMENTAL REQUIREMENTS

- A. During and after installation of work of this section, maintain the same temperature and humidity conditions in building spaces as will occur after occupancy.

1.08 WARRANTY

- A. All materials and workmanship covered by this section shall carry a 3 year warranty.

PART 2 PRODUCTS

2.01 MANUFACTURERS - GENERAL CASEWORK

- A. Case Systems: www.casesystems.com.
- B. P.R. Bean Compnay: www.prbeanco.com.
- C. Stevens Industries, Inc.: www.stevensind.com.
- D. TMI Systems Corporation: www.tmisystems.com.
- E. Any custom casework fabricator that can meet the requirements of the specifications outlined herein.
- F. Substitutions: See Section 01 60 00 - Product Requirements.

2.02 PANEL MATERIALS

- A. Particleboard: ANSI A208.1; type as specified in AWI Architectural Woodwork Quality Standards Illustrated, composed of wood chips, medium density, made with high waterproof resin adhesive; of grade to suit application; sanded faces, located as described in FABRICATION.
- B. Hardboard: AHA A135.4; Pressed wood fiber with resin binder, Class 1 - Tempered, 1/4 inch thick, smooth one side (S1S), located as described in FABRICATION.

2.03 MANUFACTURERS - PLASTIC LAMINATE

- A. Basis of Design Manufacturer:
 - 1. Wilsonart, LLC; Color: Pinnacle Walnut, Finish: Fine Velvet 38: www.wilsonart.com.
- B. Other Acceptable Manufacturers:
 - 1. Arborite: www.arborite.com.
 - 2. Formica Corporation: www.formica.com.
 - 3. Nevamar: www.panolam.com/nevamar.com.
 - 4. Pionite: www.panolam.com/pionite.com.
 - 5. Substitutions: See Section 01 60 00 - Product Requirements.
- C. Laminate Color Selections
 - 1. Cabinet Body Color:
 - a. Wilsonart: Pinnacle Walnut.
 - 2. Cabinet Body Finish:
 - a. Wilsonart: Fine Velvet 38
 - 3. Basic Cabinet Body Color:

- a. To include closed interior surfaces of all components, including drawer boxes, to be covered with melamine laminate as a minimum requirement; drawer boxes not matching basic color will be rejected.
- b. Melamine laminate shall be available in manufacturer's standard dove grey, frosty white, or light beige color.
- c. Colors for sight exposed cabinet surfaces, including open shelving and interiors of doorless cabinets, grade GP28, shall be selected from the manufacturer's current year laminate series. A maximum of 2 colors to be selected per unit face.

2.04 LAMINATE MATERIALS

- A. Definition: Identification of casework components by surface visibility. Listed are definitions and materials commonly used in defining decorative laminate clad casework. Refer to FABRICATION section for those items selected for use on this project.
 - 1. Open Interiors: Any open storage unit without solid door or drawer fronts and units with full glass doors and/or acrylic doors.
 - 2. Closed Interiors: Any closed storage unit behind solid door or drawer fronts, sliding solid doors.
 - 3. Exposed Ends: Any storage unit exterior side surface that is visible after installation.
 - 4. Other Exposed Surfaces: Faces of doors and drawers when closed, tops of cabinets less than 72" above finished floor.
 - 5. Semi-Exposed Surfaces: Interior surfaces which are visible, bottoms of wall cabinets and tops of cabinets 72" or more above finished floor.
 - 6. Concealed Surfaces: Any surface not visible after installation.
- B. Decorative Laminates / Veneer Where Applicable:
 - 1. High pressure decorative laminate GP28 (.028), NEMA Test LD-3-1995
 - 2. High pressure decorative laminate PG50 (.050), NEMA Test LD-3-1995.
 - 3. High pressure decorative laminate PF42 (.042), NEMA Test LD-3-1995.
 - 4. High pressure cabinet liner CL20 (.020), NEMA Test LD-3-1995.
 - 5. Melamine laminate tested to meet NEMA Test LD
 - 6. High pressure backer BK20 (.020).
- C. Side panels, back, top, drawer fronts, and doors shall be ¾" thick particleboard, laminated on the exterior with high pressure decorative laminate GP28 and on the closed interiors with high pressure cabinet liner CL20 in dove grey, frosty white, or light beige color to match basic cabinet body color selected for project. All exposed edges shall be finished with machine applied OBC banding, 3mm thickness.

2.05 ACCESSORIES

- A. Adhesive: FS MMM-A-130 contact adhesive. Type recommended by AWI and laminate manufacturer to suit application.
- B. PVC Edge Trim: Edging Materials / Colors
 - 1. 3mm PVC banding, machine applied with waterproof hot melt adhesive with external edges and outside corners of doors, drawer fronts and back splashes where applicable, machine profiled to 1/2" radius for safety.
 - 2. PVC banding shall be available in colors matched to manufacturer's laminates of the same name. Width shall match component thickness. Color to be chosen by Architect from manufacturer's full range. Architect may choose color rather than matching laminate.
 - 3. Barbed T-edging or laminate self edge on cabinet components will not be acceptable.
- C. Undercounter support frames, legs and miscellaneous metal parts shall be furniture steel unless noted otherwise, welded, degreased, cleaned, treated and epoxy powder painted in standard colors to match basic cabinet body color, or in a contrasting color
- D. Laminate Backing Sheet: 0.020 inch Backing Sheet grade, undecorated plastic laminate.

2.06 HARDWARE

- A. Hardware: BHMA A156.9. Unless exceeded herein.

- B. Shelf Standards and Brackets: Where rear support of shelving is required standards shall be heavy duty recessed formed channels, cut for heavy duty shelf brackets with CAM lock lever. Electroplated or powder coated finish as selected by Architect.
- C. Adjustable Shelf Supports:
 - 1. Shall be metal, friction fit into cabinet end panels and vertical dividers, readily adjustable on 32mm (approximately 1¼") CENTERS. Each shelf support shall have two (2) integral support pins, 5mm diameter, to interface pre-drilled holes, and to prevent accidental rotation of support. The supports shall be automatically adaptable to ¾" or 1" thick shelving and shall provide non-tip feature for shelving. Supports are designed to readily permit field fixing of shelf if desired. Structural load testing shall show loading to 1,040 pounds (260 lbs. per support) without failure.
- D. Drawer and Door Pulls: Front pull shall be epoxy finished metal wire style, 96mm spacing on fasteners. Available in epoxy finish, or brushed chrome, color to be selected by Architect. Pull design shall be compatible with Americans with Disability Act (ADA), Federal Register Volume 56, No. 144, specifically Paragraph 4.27.4.
- E. Cabinet Locks: Keyed cylinder, two keys per lock, 5 disc tumbler, cam type, master keyed, brushed chrome - US26D finish.
 - 1. Provide Locks on all cabinets doors and drawers.
 - 2. Keying: Keyed separately per room.
- F. Catches: Magnetic; minimum 7 lb. pull, provide 2 per door for units over 48 inches high. Elbow catches shall be used on inactive doors less than 73" tall.
- G. Drawer Slides: Heavy-duty galvanized steel construction, steel ball bearings separating tracks, nylon rollers full extension type.
 - 1. Standard use and knee space drawers shall be Blum Style No. BS230M with epoxy finish. Slides will have a 100 lbs. load rating at full extension and a built-in, positive stop both directions, with self-closing feature. Slides shall have a lifetime warranty as offered by the slide manufacturer.
 - 2. File drawer slides shall be Blum BS430E full extension. Slides shall have a lifetime warranty as offered by the slide manufacturer.
 - 3. Pencil drawers shall be equipped with Blum No. 320 for under counter or support frame mounting.
- H. Hinges:
 - 1. Shall be five knuckle, institutional grade, 2¾" overlay type with hospital tip. Steel shall be minimum .095" thick and have minimum of nine (9) edge and leaf fastenings. Hinges shall pass ANSI-BMHA standard A156.9, Grade 1 requirement for both vertical and horizontal set and sag (pair of hinges will hold minimum of 310 lbs); copy of test result shall be provided upon request. Casework manufacturer shall use specifically engineered screws for attachment of hinges; wood screws shall not be permitted. Doors 48" and over in height shall have three (3) hinges per door. Available in epoxy finish, or brushed chrome. Provide magnetic door catch with minimum seven (7) pound pull, attached with screws and slotted for adjustment.
- I. Bolts:
 - 1. Chain bolts shall be 3" long, shall have an 18" pull and an angle strike to secure inactive door on cabinets over 72" in height.
- J. Coat Rods:
 - 1. Shall be 1¼" diameter, 14 gauge chrome plated steel in captive mounting hardware.
- K. File Suspension Rails:
 - 1. All file drawers shall include a pair of 14 gauge steel file suspension rails. File followers, or other split bottom hardware, shall not be acceptable.
- L. Counter Top Supports:
 - 1. Powder coated steel of size and configuration to support 200 pounds without obstructing knee space.

2. Color: To be selected by Architect from manufacturer's standard range of colors
 3. Locate where indicated on drawings. Spacing not to exceed 36-inches on center.
- M. Grommets: Provide grommets at locations as required to access data and electrical outlets.

2.07 FABRICATION

- A. Shop assemble casework for delivery to site in units easily handled and to permit 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.
- C. Apply plastic laminate finish in full uninterrupted sheets consistent with manufactured sizes. Fit corners and joints hairline; secure with concealed fasteners. Slightly bevel arises. Locate counter butt joints minimum 2 feet from sink cut-outs.
- D. Provide cutouts for plumbing fixtures, inserts, appliances, outlet boxes, fixtures and fittings, and other accessories. Verify locations of cutouts from on-site dimensions. Seal cut edges.
- E. Fabricate casework to dimensions, profiles, and details shown.
- F. Cabinet Body Construction:
 1. Tops and bottoms shall be joined to cabinet ends and internal cabinet components such as fixed horizontals, rails and verticals shall be joined using 10mm diameter industrial grade hardwood dowels, laterally fluted with chamfered ends, securely glued and clamped under pressure during assembly to secure joints and cabinet squareness. Use minimum of six (6) dowels at each joint for 24 in. deep cabinet and minimum of four (4) dowels at each joint for 12" deep cabinets.
 2. Unless specifically indicated, core shall be $\frac{3}{4}$ " thick particleboard. Edging and surface finishes as indicated herein.
 3. Backs shall be $\frac{3}{4}$ " particleboard, color matched to cabinet interior, exterior surface GP28 laminate as selected.
 4. All fixed under counter and tall units shall have individual factory applied base, constructed of $\frac{3}{4}$ " moisture resistant plywood. Base shall be 96mm (nominal 4") high unless otherwise indicated on the drawings.
 5. All under counter units except sink base units, shall be provided with full sub-top. Sink base units shall be provided with open top, front welded steel/epoxy painted sink rail full width at top front edge concealed behind face rail/doors, split back removable access panels and bottom panel to have CL20 high pressure cabinet liner both faces, color to match interior color. No exceptions will be permitted.
 6. All end panels and vertical dividers, except sink base units, shall be prepared to receive adjustable shell hardware at 32mm (approximately $1\frac{1}{4}$ ") centers. Door hinge, drawer slides and pull-out shelves shall mount on line boring to maintain vertical alignment of components and provide for future relocation of doors, drawers, shelves and/or pull-out shelves.
 7. All exposed and semi exposed edges of basic cabinet components shall be factory edged with PVC banding, machine applied with waterproof hot melted adhesive.
 - a. Edging shall be 3mm PVC, available in complimentary or contrasting colors.
 8. Open adjustable shelf units shall be $\frac{3}{4}$ " thick particleboard up to 30" wide, 1" thick particleboard over 30" wide.
 9. Front edge of shelves and unit shall be plastic laminate in color to match units.
 10. Interior finish, units with open interiors:
 - a. Sides, top, bottom, horizontal, and vertical members, and adjustable shelving faced with high pressure decorative laminate GP28 (.028) color from approved laminate manufacturers full range.
 11. Interior finish, units with closed interiors:
 - a. Sides, top, bottom, horizontal, and vertical members, and adjustable shelving faced with melamine laminate with matching prefinished back.
 12. Exposed ends:

- a. Shall be faced with high pressure decorative laminate GP28 (.028) color from laminate manufacturer's full range.
 - 13. Wall unit bottom:
 - a. Shall be faced with melamine laminate.
 - 14. Wall and tall unit tops:
 - a. The top edge of all wall and tall unit end panels shall be factory edged with 3mm PVC to match basic cabinet body color; raw edges at top of wall and tall end panels will be not be permitted.
 - b. Top surface will be laminated with melamine.
 - 15. Balanced construction of all laminated panels is mandatory. Unfinished core stock surfaces, even on concealed surfaces (excluding edges), will not be permitted. No exceptions.
- G. Drawers:
- 1. Sides, back and sub-front shall be particleboard, 1/2" thick, laminated with melamine in dove grey, frosty white or light beige to match basic cabinet body color. The back and sub-front are doweled and glued into the side. Dowels shall be fluted, with chamfered ends and a minimum diameter of 8mm. Top edge is banded with 3mm PVC edging in a matching color.
 - 2. Drawer bottom shall be particleboard, 1/2" thick, laminated with melamine, screwed directly to the bottom edges of the drawer box. Drawer bottom less than 1/2" thick will not be permitted.
 - 3. Paper storage drawers are constructed similar except retaining hood shall be included at the rear of each drawer.
 - 4. Painted finishes on drawer sides and/or bottom will not be permitted.
- H. Door/Drawer Fronts:
- 1. Core for all doors and applied drawer fronts shall be 3/4" thick particleboard, reveal overlay style. All edges shall be finished as indicated herein.
 - 2. Double doors shall be used on all cabinets in excess of 24" wide.
 - 3. Exterior faces shall be laminated with high pressure decorative laminate GP28, color as selected. Interior face shall be high pressure cabinet liner CL20.
 - 4. All edges shall be finished with 3mm PVC. External edges and outside corners shall be machine profiled.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify adequacy of backing and support framing in both existing spaces to receive casework and new spaces to receive casework
- B. Verify location and sizes of utility rough-in associated with work of this section.

3.02 INSTALLATION

- A. Set and secure casework in place; rigid, plumb, and level.
- B. Use fixture attachments in concealed locations for wall mounted components.
- C. Use concealed joint fasteners to align and secure adjoining cabinet units.
- D. Carefully scribe casework abutting other components, with maximum gaps of 1/32 inch. Do not use additional overlay trim for this purpose.
- E. Secure cabinet to floor using appropriate angles and anchorages.
- F. Countersink anchorage devices at exposed locations. Conceal with solid wood plugs of species to match surrounding wood; finish flush with surrounding surfaces.
- G. Provide continuous bead of sealant between casework and countertops and adjacent walls.

3.03 ADJUSTING

- A. Adjust installed work.
- B. Adjust moving or operating parts to function smoothly and correctly.

3.04 CLEANING

- A. Clean casework, counters, shelves, hardware, fittings, and fixtures.

END OF SECTION

**SECTION 12 36 00
COUNTERTOPS**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Solid surface countertops for manufactured casework.
- B. Solid surface lavatory tops with integral bowls.

1.02 RELATED REQUIREMENTS

- A. Section 05 50 00 - Metal Fabrications: Vanity support brackets.
- B. Section 06 10 00 - Rough Carpentry: Wood blocking product and execution requirements.
- C. Section 07 90 05 - Joint Sealers: Sealing joints between casework and countertops and adjacent walls, floors, and ceilings.
- D. Section 12 34 00 - Manufactured Plastic Laminate Casework.
- E. Section 22 40 00 - Plumbing Fixtures: Sinks.

1.03 REFERENCE STANDARDS

- A. ANSI A208.1 - American National Standard for Particleboard; 2016.
- B. ANSI A208.2 - American National Standard for Medium Density Fiberboard for Interior Use; 2016.
- C. ASTM A666 - Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar; 2015.
- D. ASTM D635 - Standard Test Method for Rate of Burning and/or Extent and Time of Burning of Plastics in a Horizontal Position; 2018.
- E. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2020.
- F. AWI/AWMAC/WI (AWS) - Architectural Woodwork Standards; 2014, with Errata (2018).
- G. AWMAC/WI (NAAWS) - North American Architectural Woodwork Standards, U.S. Version 3.1; 2017, with Errata (2019).
- H. ISFA 2-01 - Classification and Standards for Solid Surfacing Material; 2013.

1.04 SUBMITTALS

- A. See Section 01 30 00 - 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. Installation Instructions: Manufacturer's installation instructions and recommendations.
- G. Maintenance Data: Manufacturer's instructions and recommendations for maintenance and repair of countertop surfaces.

1.05 QUALITY ASSURANCE

- A. Installer Qualifications: Company specializing in performing work of the type specified in this section, with not less than five years of documented experience.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Store products in manufacturer's unopened packaging until ready for installation.
- B. Store and dispose of solvent-based materials, and materials used with solvent-based materials, in accordance with requirements of local authorities having jurisdiction.

1.07 FIELD CONDITIONS

- A. Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's absolute limits.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Cast solid surface countertops and lavatory tops:
 - 1. DuPont Company; Product Corian: www.dupont.com.
 - 2. Substitutions: Not permitted.

2.02 COUNTERTOPS

- A. Quality Standard: Custom Grade, in accordance with AWI/AWMAC/WI (AWS) or AWMAC/WI (NAAWS), unless noted otherwise.
- B. Solid Surfacing Countertops and Lavatory Tops: 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 ISSFA-2 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. Surface Burning Characteristics: Flame spread 25, maximum; smoke developed 450, maximum; when tested in accordance with ASTM E84.
 - b. NSF approved for food contact.
 - c. Integral Sinks and Bowls: Integral castings; minimum 3/4 inch wall thickness; comply with ANSI Z124.3.
 - 1) Sink Shape: Dupont "Corian" 810 style.
 - 2) Color: Cameo White.
 - d. Finish on Exposed Surfaces: Matte, gloss rating of 5 to 20
 - e. Color:
 - 1) Sandstone.
 - f. Other Components Thickness: 1/2 inch, minimum.
 - g. Exposed Edge Treatment: Built up to minimum 1-1/2 inch thick; square edge; use marine edge at sinks.
 - h. Back and End Splashes: Same sheet material, square top; minimum 4 inches high.
 - i. Skirts: Same sheet material.

2.03 MATERIALS

- A. Particleboard for Supporting Substrate: ANSI A208.1 Grade 2-M-2, 45 pcf minimum density; minimum 3/4 inch thick; join lengths using metal splines.
- B. Cement board for Supporting Substrate; 1/2" thickness minimum.
- C. Adhesives: Chemical resistant waterproof adhesive as recommended by manufacturer of materials being joined.
- D. Joint Sealant: Mildew-resistant silicone sealant, color as selected by Architect to match adjacent surface..

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.
 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. Cast plastic/solid surface: Fabricate tops up to 144 inches long in one piece; join pieces with adhesive sealant in accordance with manufacturer's recommendations and instructions.
1. Integral sinks: Shop-mount securely to countertop with adhesives, using flush configuration, as per manufacturer's instructions, and as detailed on drawings.
 2. Shop Assembly:
 - a. Fabricate components to greatest extent practical to sizes and shapes indicated, in accordance with approved shop drawings and manufacturer's printed instructions and technical bulletins.
 - b. Form joints between components using manufacturer's standard joint adhesive without conspicuous joints.
 - c. Provide factory cutouts for plumbing fittings and bath accessories as indicated on the drawings.
 - d. Rout and finish component edges with clean, sharp returns.
 - e. Rout cutouts, radii and contours to template.
 - f. Smooth edges.
 - g. Repair or reject defective and inaccurate work.
 3. Thermoforming:
 - a. Comply with manufacturer's data.
 - b. Heat entire component.
 - 1) Material shall be uniform, between 275 and 325 degrees Fahrenheit during forming.
 - c. Form pieces to shape prior to seaming and joining.
 - d. Cut pieces to finished dimensions.
 - e. Sand edges and remove nicks and scratches.
 4. Finish: Provide manufacturer's standard finish.
 - a. Matte: gloss range of 5–20.
 - b. Semigloss: gloss range of 20–50.
 - c. Polished: gloss range of 50–80.

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 - SOLID SURFACE

- A. Install components in accordance with shop drawings and manufacturer's instructions.

- B. Securely attach lavatory tops to vanity support brackets using concealed fasteners. Make flat surfaces level; shim where required.
 - 1. See Section 05 50 00 - Metal Fabrications, for vanity support bracket information.
- C. Securely attach countertops to cabinets using concealed fasteners. Make flat surfaces level; shim where required.
- D. Align work plumb and level.
- E. Rigidly anchor to substrate to prevent misalignment.
- F. Install components plumb, level and rigid, scribed to adjacent finishes.
- G. Provide product in the largest pieces available.
- H. Form field joints using manufacturer's recommended adhesive, with joints inconspicuous in finished work.
 - 1. Exposed joints/seams shall not be allowed.
- I. Reinforce field joints with solid surface strips extending a minimum of 1 inch on either side of the seam with the strip being the same thickness as the top.
- J. Cut and finish component edges with clean, sharp returns.
- K. Route radii and contours to template.
- L. Carefully dress joints smooth, remove surface scratches and clean entire surface.
- M. Provide continuous bead of sealant between casework and countertops or lavatory tops and adjacent walls.

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 REPAIR

- A. Repair or replace damaged work, which cannot be repaired to architect's satisfaction.

3.06 CLEANING

- A. Clean and polish surfaces in accordance with manufacturer's instructions.
- B. Remove from project site packaging and debris caused by installation.

3.07 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 14 42 50
VERTICAL WHEELCHAIR LIFTS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Unenclosed, self-contained vertical platform wheelchair lift.

1.02 RELATED SECTIONS

- A. Section 03 30 00 - Cast-In-Place Concrete: Concrete shaftway and anchor placement.
- B. Section 04 20 02 - Single-Wythe Unit Masonry.
- C. Division 26 - Electrical: Dedicated telephone service and wiring connections.
- D. Division 26 - Electrical: Electrical power service and wiring connections.

1.03 REFERENCES

- A. ASME A17.1 - Safety Code for Elevators and Escalators.
- B. ASME A17.5 - Elevator and Escalator Electrical Equipment.
- C. ASME A18.1 - Safety Standard for Platform Lifts and Stairway Chairlifts.
- D. CSA B44 - Safety Code for Elevators and Escalators.
- E. CSA B355 - Lifts for Persons with Physical Disabilities.
- F. ICC/ANSI A117.1 - Accessible and Usable Buildings and Facilities.
- G. NFPA 70 - National Electric Code.
- H. CSA - National Electric Code.

1.04 SUBMITTALS

- A. Submit under provisions of Section 01 30 00.
- B. Product Data: Manufacturer's data sheets on each product to be used, including:
 - 1. Submit manufacturer's installation instructions, including preparation, storage and handling requirements.
 - 2. Include complete description of performance and operating characteristics.
 - 3. Show maximum and average power demands.
- C. Shop Drawings:
 - 1. Show typical details of assembly, erection and anchorage.
 - 2. Include wiring diagrams for power, control, and signal systems.
 - 3. Show complete layout and location of equipment, including required clearances and coordination with shaftway.
- D. Selection Samples: For each finished product specified, provide two complete sets of color chips representing manufacturer's full range of available colors and patterns.
- E. Verification Samples: For each finish product specified, two samples, representing actual product, color, and patterns.

1.05 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Firm with minimum 10 years experience in manufacturing of vertical platform lifts, with evidence of experience with similar installations of type specified.
- B. Installer Qualifications: Licensed to install equipment of this scope, with evidence of experience with specified equipment. Installer shall maintain an adequate stock of replacement parts, have qualified people available to ensure fulfillment of maintenance and callback service without unreasonable loss of time in reaching project site.

1.06 REGULATORY REQUIREMENTS

- A. Provide platform lifts in compliance with:
 - 1. ASME A18.1 - Safety Standard for Platform Lifts and Stairway Chairlifts.

2. ASME A17.1 - Safety Code for Elevators and Escalators.
 3. ASME A17.5 - Elevator and Escalator Electrical Equipment.
 4. NFPA 70 - National Electric Code.
- B. Provide platform lifts in compliance with:
1. CSA B355 - Lifts for Persons with Physical Disabilities.
 2. CSA B44.1/ASME A17.5 - Elevator and Escalator Electrical Equipment.
 3. CSA - National Electric Code.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Store products in manufacturer's unopened packaging until ready for installation.
- B. Store components off the ground in a dry covered area, protected from adverse weather conditions.

1.08 PROJECT CONDITIONS

- A. Do not use wheelchair lift for hoisting materials or personnel during construction period.

1.09 WARRANTY

- A. Warranty: Manufacturer shall warrant the wheelchair lift materials and factory workmanship for two years following completion of installation.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Basis of Design Manufacturer:
1. Garaventa Lift; Product - Genesis Opal Vertical Platform Wheelchair Lift: www.garaventlift.com.
- B. Other Acceptable Manufacturers:
1. DME Elevators and Lifts: www.dmelift.com
 2. Giant Lift Equipment Mfg. Co.: www.giantlift.com
 3. Harmar: www.harmar.com
 4. Substitutions: Section 01 60 00 - Product Requirements.

2.02 UNENCLOSED VERTICAL WHEELCHAIR LIFT

- A. Capacity: 750 lbs (340 kg) rated capacity.
- B. Mast Height:
1. Model GVL-OP-42; 45 inches maximum lifting height.
- C. Platform Size and Nominal Clear Platform Dimensions:
1. Mid-Size: 36 inches by 54-7/8 inches (1394 mm) clear platform dimensions.
- D. Nominal Clear Platform Dimensions (use for enclosed):
1. Mid-Size: 37 inches by 60 inches.
- E. Platform Configuration:
1. Straight through 180 degree Entry/ Exit.
- F. Landing Openings: Gates shall be self-closing type).
1. Gate Height: 42-1/8 inches.
 2. Gate Width: 41-3/4 inches.
 3. Platform Gate: Travels with platform and opens at lower landing.
 4. Upper Landing Gate: Installed at upper landing.
- G. Power Gate Operators:
1. Location:
 - a. Platform Gate: Travels with platform and opens lower landing.
 - b. Upper Landing Gate.
 2. Automatically opens the gate when platform arrives at a landing. Will also open at landing by pressing call button.
 3. ADA Compliant and obstruction sensitive.

4. Low voltage, 24 VDC with all wiring concealed.
- H. Lift Components:
 1. Machine Tower: Aluminum extrusion.
 2. Base Frame: Structural steel.
 3. Platform Side Wall Panels: 16 gauge galvanized steel sheet.
 4. Platform Access Ramp: 12 gauge galvanized steel plates; slip resistant surfaces.
 - a. Ramp: Stationary type.
 5. Side Guard Panels: 42-1/8 inches high mounted on platform.
- I. Base Mounting at Lower Landing:
 1. Pit Mount: Lift to be mounted in pit with dimensions to meet manufacturer's requirements for the platform size specified. Pit construction shall be in accordance to Section 03 30 00.
- J. Leadscrew Drive:
 1. Drive Type: Self-lubricating acme screw drive.
 2. Battery Powered Emergency Lowering: Battery powered platform lowering device that automatically activates in the event of power failure. Allows passenger to drive platform downward to lower landing. Does not operate lift in up direction.
 3. Safety Devices:
 - a. Integral safety nut assembly with safety switch.
 4. Travel Speed: 10 fpm.
 5. Motor: 2.0 hp (560 W).
 6. Power Supply:
 - a. 120 VAC single phase; 60 Hz on a dedicated 20-amp circuit.
- K. Platform Controls: 24 VDC control circuit with the following features.
 1. Direction Control: Illuminated tactile and constant pressure buttons with dual platform courtesy lights and safety light.
 2. Illuminated and audible emergency stop switch shuts off power to lift and activates audio alarm equipped with battery backup.
 3. Keyless operation.
 4. Emergency Telephone: Platform shall be equipped with ADA compliant integrated telephone with a stainless-steel faceplate. Telephone shall operate in the event of power failure. A telephone line shall be supplied to the lift site as specified under Division 26.
- L. Call Station Controls: 24 VDC control circuit with the following features.
 1. Direction Control: Illuminated and tactile constant pressure elevator-style buttons with illuminated "in-use" indicator.
 2. Safety indicator lamp.
 3. Keyless operation.
 4. Call Station Mounting:
 - a. Lower:
 - 1) Surface Mounted.
 - b. Upper:
 - 1) Surface Mounted.
- M. Safety Devices and Features:
 1. Grounded electrical system with upper, lower, and final limit switches.
 2. Tamper resistant interlock to electrically monitor that the gate is in the closed position and the lock is engaged before lift can move from landing.
 3. Pit stop switch mounted on mast wall.
 4. Electrical disconnect shall shut off power to the lift.
 5. Under platform safety pan with five waterproof safety switches to detect obstruction under platform.
- N. Finishes
 1. Aluminum Extrusions: Electrostatically applied baked powder finish, semi-matte.
 - a. Color: to be selected from manufacturer's optional RAL color chart.

2. Ferrous Components: Electrostatically applied baked powder finish, semi-matte.
 - a. Color: to be selected from manufacturer's optional RAL color chart.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Do not begin installation until substrates have been properly prepared.
- B. Verify shaft and machine space are of correct size and within tolerances.
- C. Verify required landings and openings are of correct size and within tolerances.
- D. Verify electrical rough-in is at correct location.
- E. 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 the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

3.03 INSTALLATION

- A. Comply with manufacturer's written installation instructions applicable to products and applications indicated, except where more stringent
- B. Install platform lifts in accordance with applicable regulatory requirements including ASME A 17.1, ASME A 18.1 and the manufacturer's instructions.
- C. Install lifts in accordance with applicable regulatory requirements including CSA B355, and manufacturer's instructions.
- D. Install system components and connect to building utilities.
- E. Accommodate equipment in space indicated.
- F. Startup equipment in accordance with manufacturer's instructions.
- G. Adjust for smooth operation.

3.04 FIELD QUALITY CONTROL

- A. Perform tests in compliance with ASME A 17.1 or A18.1 and as required by authorities having jurisdiction.
- B. Perform tests in compliance with CSA B355 and required by authorities having jurisdiction.
- C. Schedule tests with agencies and Architect, Owner, and Contractor present.

3.05 PROTECTION

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

END OF SECTION