STUDIO 333

PROJECT MANUAL FOR:

GOLDENWEST CREDIT UNION – PAYSON BRANCH

800 S. 800 W.
PAYSON, UT

PROJECT NUMBER: 2305

DATE: 09.16.24

STUDIO 333 ARCHITECTS
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SET NO. 01

STUDIO 333

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GOLDENWEST CREDIT UNION – PAYSON BRANCH

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PAYSON, UT

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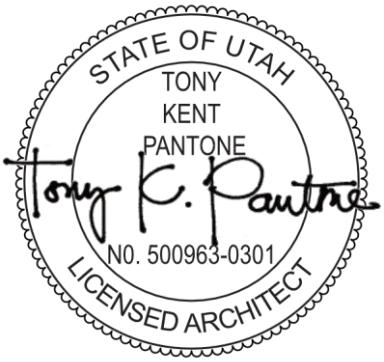
ARCHITECT'S SEAL:



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STUDIO 333

GOLDENWEST CREDIT UNION – PAYSON BRANCH

TABLE OF CONTENTS

BIDDING REQUIREMENTS:

CONDITIONS OF THE CONTRACT:

SAMPLE AIA FORMS

DIVISION 01 – GENERAL REDIVISION 01 – GENERAL REQUIREMENTS

01 7900 Demonstration and Training

DIVISION 03 – CONCRETE
03 3000 Cast-In-Place Concrete
03 4800 Precast Concrete Specialties

DIVISION 4 - MASONRY:
04 2200 Concrete Unit Masonry
04 7300 Manufactured Stone Masonry

DIVISION 5 - METALS:
05 1200 Structural Steel Framing
05 5000 Metal Fabrications

DIVISION 6 - WOOD AND PLASTICS:
06 1000 Rough Carpentry
06 1600 Sheathing
06 1753 Shop-Fabricated Wood Trusses
06 2023 Interior Finish Carpentry
06 4116 Plastic-Laminate-Faced Architectural Cabinets
06 4216 Flush Wood Paneling
06 6001 Miscellaneous Plastic Fabrications

DIVISION 7 - THERMAL AND MOISTURE PROTECTION:
07 1113 Bituminous Dampproofing
07 2100 Thermal Insulation
07 2419 Water Drainage Exterior Insulation and Finish System (EIFS)
07 2726 Fluid-Applied Membrane Air Barriers
07 4113 Standing-Seam Metal Roof Panels
07 4616 Aluminum Cladding
07 4213 Metal Soffit Panels
07 6200 Sheet Metal Flashing and Trim
07 6322 Steel Fascia
07 7123 Manufactured Gutters and Downspouts
07 9200 Joint Sealants

DIVISION 8 - OPENINGS:
08 1113 Hollow Metal Doors and Frames
08 1416 Flush Wood Doors
08 3113 Access Doors and Frames
08 4113 Aluminum-Framed Entrances and Storefronts
08 4229 Swinging Automatic Entrances
08 7100 Door Hardware
08 8000 Glazing

DIVISION 9 - FINISHES:

09 9001	Finish Schedule
09 2216	Non-Structural Metal Framing
09 2900	Gypsum Board
09 3013	Ceramic Tiling
09 5113	Acoustical Panel Ceilings
09 6513	Resilient Base and Accessories
09 6519	Resilient Tile Flooring
09 6813	Tile Carpeting
09 9113	Exterior Painting
09 9123	Interior Painting
09 9300	Staining and Transparent Finishing

DIVISION 10 - SPECIALTIES:

10 1423	Panel Signage
10 2800	Toilet and Bath Accessories
10 4413	Fire Protection Cabinets
10 4416	Fire Extinguishers
10 7516	Ground-Set Flagpoles

DIVISION 11 THROUGH 21: NOT USED

DIVISION 22 - PLUMBING:

22 0501	Common Plumbing Requirements
22 0529	Hangers and Supports for Plumbing Piping and Equipment
22 0553	Plumbing Identification
22 0719	Plumbing Piping Insulation
22 1116	Domestic Water Piping
22 1119	Domestic Water Piping Specialties
22 1123	Domestic Water Pumps
22 1313	Facility Sanitary Sewers
22 1319	Facility Sanitary Sewer Specialties
22 3413	Electric Water Heaters
22 4126	Disposers
22 4213	Commercial Water Closets
22 4216	Commercial Lavatories and Sinks
22 4700	Drinking Fountains

DIVISION 23 – HEATING, VENTILATING, AND AIR-CONDITIONING:

23 0501	General Mechanical Requirements
23 0529	Hangers and Supports for HVAC Piping and Equipment
23 0553	Identification for HVAC Piping and Equipment
23 0713	Duct Insulation
23 0719	HVAC Refrigeration Piping Insulation
23 0933	Electric and Electronic Control System for HVAC
23 0981	Testing and Balancing
23 1123	Facility Natural Gas Piping

23 2300	Refrigerant Piping
23 2600	Condensate Drain Piping
23 3001	General Duct Requirements
23 3114	Low-Pressure Metal Ducts
23 3115	Underground Ducts
23 3300	Air Duct Accessories
23 3346	Flexible Duct
23 3401	Exhaust Fans
23 3713	Diffusers, Registers, and Grilles
23 5135	Air Piping
23 5416	Gas-Fired Furnaces
23 6213	Air-Cooled Refrigerant Condensers

DIVISION 24 AND 25: NOT USED

DIVISION 26 – ELECTRICAL

26 0500	Basic Electrical Materials and Methods
26 0519	Wires and Cables
26 0526	Grounding and Bonding
26 0533	Raceways
26 0923	Lighting Controls
26 0925	Occupancy Sensed Lighting Control
26 2413	Switchboards 600 Volts and Below
26 2416	Panelboards
26 2726	Switches and Receptacles
26 3100	Electric Heat Trace Systems
26 4300	Surge Protective Devices
26 5100	Lighting

DIVISION 27 – TECHNOLOGY

27 0500	Voice and Data Wiring

DIVISION 28 THROUGH 30: NOT USED

DIVISION 31 - EARTHWORK:

31 1000	Site Clearing
31 2000	Earth Moving
31 2319	Dewatering
31 2500	Erosion and Sedimentation Control

DIVISION 32 - EXTERIOR IMPROVEMENTS:

32 1216	Asphalt Paving
32 1313	Concrete Paving
32 1373	Concrete Pavement Joint Sealant
32 1700	Paving Specialties
32 8400	Irrigation System

SECTION 00 2600 - PROCUREMENT SUBSTITUTION PROCEDURES

PART 1 - PROCUREMENT SUBSTITUTION PROCEDURES

1.1 DEFINITIONS

A. Procurement Substitution Requests: Requests for changes in products, materials, equipment, and methods of construction from those indicated in the Procurement and Contracting Documents, submitted prior to receipt of bids.

B. Substitution Requests: Requests for changes in products, materials, equipment, and methods of construction from those indicated in the Contract Documents, submitted following Contract award. See Section 01 2500 "Substitution Procedures" for conditions under which Substitution requests will be considered following Contract award.

1.2 QUALITY ASSURANCE

A. Compatibility of Substitutions: Investigate and document compatibility of proposed substitution with related products and materials.

1.3 PROCUREMENT SUBSTITUTIONS

A. Procurement Substitutions, General: By submitting a bid, the Bidder represents that its bid is based on materials and equipment described in the Procurement and Contracting Documents, including Addenda. Bidders are encouraged to request approval of qualifying substitute materials and equipment when the Specifications Sections list materials and equipment by product or manufacturer name.

B. Procurement Substitution Requests will be received and considered by Owner when the following conditions are satisfied, as determined by Architect; otherwise, requests will be returned without action:

1. Extensive revisions to the Contract Documents are not required.
2. Proposed changes are in keeping with the general intent of the Contract Documents, including the level of quality of the Work represented by the requirements therein.
3. The request is fully documented and properly submitted.

1.4 SUBMITTALS

A. Procurement Substitution Request: Submit to Architect. Procurement Substitution Request must be made in writing in compliance with the following requirements:

1. Requests for substitution of materials and equipment will be considered if received no later than 10 days prior to date of bid opening.
2. Submittal Format: Submit Procurement Substitution Request, using electronic PDF file.

    a. Identify the product or the fabrication or installation method to be replaced in each request. Include related Specifications Sections and drawing numbers.
    b. Provide complete documentation on both the product specified and the proposed substitute, including the following information as appropriate:

        1) Point-by-point comparison of specified and proposed substitute product data, fabrication drawings, and installation procedures.
        2) Copies of current, independent third-party test data of salient product or system characteristics.

3) Samples where applicable or when requested by Architect.
4) Detailed comparison of significant qualities of the proposed substitute with those of the Work specified. Significant qualities may include attributes such as performance, weight, size, durability, visual effect, sustainable design characteristics, warranties, and specific features and requirements indicated. Indicate deviations, if any, from the Work specified.
5) Material test reports from a qualified testing agency indicating and interpreting test results for compliance with requirements indicated.
6) Research reports, where applicable, evidencing compliance with building code in effect for Project, from ICC-ES.
7) Coordination information, including a list of changes or modifications needed to other parts of the Work and to construction performed by Owner and separate contractors, which will become necessary to accommodate the proposed substitute.

c. Provide certification by manufacturer that the substitute proposed is equal to or superior to that required by the Procurement and Contracting Documents, and that its in-place performance will be equal to or superior to the product or equipment specified in the application indicated.
d. Bidder, in submitting the Procurement Substitution Request, waives the right to additional payment or an extension of Contract Time because of the failure of the substitute to perform as represented in the Procurement Substitution Request.

B. Architect's Action:

1. Architect may request additional information or documentation necessary for evaluation of the Procurement Substitution Request. Architect will notify all bidders of acceptance of the proposed substitute by means of an Addendum to the Procurement and Contracting Documents.

C. Architect's approval of a substitute during bidding does not relieve Contractor of the responsibility to submit required shop drawings and to comply with all other requirements of the Contract Documents.

END OF SECTION

SECTION 00 3132 - GEOTECHNICAL DATA

PART 1 - GEOTECHNICAL DATA

1.1 GEOTECHNICAL DATA

A. This Document with its referenced attachments is part of the Procurement and Contracting Requirements for Project. They provide Owner's information for Bidders' convenience and are intended to supplement rather than serve in lieu of Bidders' own investigations. They are made available for Bidders' convenience and information but are not a warranty of existing conditions. This Document and its attachments are not part of the Contract Documents.

B. A geotechnical investigation report for Project, prepared by GSH Geotechnical Inc, dated February 7, 2022, is available for viewing at the office of the Architect and will be furnished with Bid Documents to Bidders.

C. Related Requirements:

1. Document 00 2113 and AIA A701 "Instructions to Bidders" for the Bidder's responsibilities for examination of Project site and existing conditions.

END OF SECTION 00 3132

REPORT
GEOTECHNICAL STUDY
PROPOSED GOLDENWEST CREDIT UNION - PAYSON
NORTHWEST CORNER OF 800 WEST AND 800 SOUTH
PAYSON, UTAH

Submitted To:

Goldenwest Credit Union
c/o Anderson Wahlen & Associates
525 South Adams Avenue
South Ogden, Utah 84403

Submitted By:

GSH Geotechnical, Inc.
473 West 4800 South
Salt Lake City, Utah 84123

February 7, 2022

Job No. 0645-016-22

February 7, 2022
Job No. 0645-016-22

Mr. Butch Campbell and Mr. Eric Malmberg
Goldenwest Credit Union
% Anderson Wahlen & Associates
525 South Adams Avenue
South Ogden, Utah 84403

Messrs. Campbell and Malmberg:

Re: Report
Geotechnical Study
Proposed Goldenwest Credit Union - Payson
Northwest Corner of 800 West and 800 South
Payson, Utah

1. INTRODUCTION

1.1 GENERAL

This report presents the results of our geotechnical study performed at the site of the proposed Goldenwest Credit Union to be located at the northwest corner of 800 West and 800 South in Payson, Utah. The general location of the site with respect to existing roadways, as of 2022, is presented on Figure 1, Vicinity Map. A more detailed layout of the site showing proposed facilities, existing roadways, and the borings drilled in conjunction with this study is presented on Figure 2, Site Plan.

1.2 OBJECTIVES AND SCOPE

The objectives and scope of the study were planned in discussions among Mr. Butch Campbell of Goldenwest Credit Union, Mr. Eric Malmberg of Anderson Wahlen & Associates, and Mr. Alan Spilker of GSH Geotechnical, Inc. (GSH).

In general, the objectives of this study were to:

1. Define and evaluate the subsurface soil and groundwater conditions across the site.

2. Provide appropriate foundation, earthwork, pavement, and geoseismic recommendations to be utilized in the design and construction of the proposed facilities.

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In accomplishing these objectives, our scope has included the following:

1. A field program consisting of the exploration, logging, and sampling of 6 borings.

2. A laboratory testing program.

3. An office program consisting of the correlation of available data, engineering analysis, and the preparation of this summary report.

1.3 AUTHORIZATION

Authorization was provided by returning a signed copy of the Professional Services Agreement No. 21-1244 dated December 20, 2021.

1.4 PROFESSIONAL STATEMENTS

Supporting data upon which our recommendations are based are presented in subsequent sections of this report. Recommendations presented herein are governed by the physical properties of the soils encountered in the exploration borings, projected groundwater conditions, and the layout and design data discussed in Section 2, Proposed Construction. If subsurface conditions other than those described in this report are encountered and/or if design and layout changes are implemented, GSH must be informed so that our recommendations can be reviewed and amended, if necessary.

Our professional services have been performed, our findings developed, and our recommendations prepared in accordance with generally accepted engineering principles and practices in this area at this time.

2. PROPOSED CONSTRUCTION

The project is to consist of the construction of a credit union structure with a footprint of approximately 3,000 square feet and associated pavements. The structure is anticipated to be 1 to 2 levels, placed slab on grade, and supported upon conventional spread and continuous wall footings. A drive-thru canopy is proposed to be located to the northwest of the main structure.

Maximum real column and wall loads are anticipated to be on the order of up to 80 kips and 3 to 5 kips per lineal foot, respectively. Real loads are defined as the total of all dead plus frequently applied (reduced) live loads.

Average uniform floor slabs are anticipated to be light and on the order of 100 to 150 pounds per square foot. A roughly 8-foot by 8-foot vault will likely be supported upon a thickened reinforced concrete slab imposing uniform floor loads up to approximately 500 pounds per square foot.

Associated new pavements will likely consist primarily of asphaltic concrete with some rigid pavements within the drive-thru area. Projected traffic in the parking areas is anticipated to consist

of a light volume of automobiles and light trucks, occasional medium-weight trucks, and no heavy-weight trucks. Projected traffic in the drive lanes is anticipated to consist of a moderate volume of automobiles and light trucks, occasional medium-weight trucks, and no heavyweight trucks.

Site development will require some earthwork in the form of minor cutting and filling. At this time, we anticipate that maximum site grading cuts and fills, excluding utilities, will be on the order of 1 to 3 feet.

3. SITE INVESTIGATIONS

3.1 GENERAL

Subsurface conditions in unexplored locations or at other times may vary from those encountered at specific boring locations. If such variations are noted during construction or if project development plans are changed, GSH must review the changes and amend our recommendations, if necessary.

Boring locations were established by estimating distances and angles from site landmarks. If increased accuracy is desired by the client, we recommend that the boring locations and elevations be surveyed.

3.2 FIELD PROGRAM

To define and evaluate the subsurface soil and groundwater conditions across the site, 6 borings were completed within the accessible areas. These borings were completed to depths ranging from 5 to 22 feet with a truck-mounted drill rig equipped with hollow-stem augers. Auger refusal within very dense granular soils terminated Borings B-1 and B-3. The approximate locations of the borings are presented on Figure 2.

The field portion of our study was under the direct control and continual supervision of an experienced member of our geotechnical staff. During the course of the drilling operations, a continuous log of the subsurface conditions encountered was maintained. In addition, samples of the typical soils encountered were obtained for subsequent laboratory testing and examination. The soils were classified in the field based upon visual and textural examination. These classifications were supplemented by subsequent inspection and testing in our laboratory. Graphical representation of the subsurface conditions encountered is presented on Figures 3A through 3F, Boring Logs. Soils were classified in accordance with the nomenclature described on Figure 4, Key to Boring Log (USCS).

A 3 2.0-inch outside diameter, 1.38-inch inside diameter drive sampler (SPT) was utilized at select locations and depths. The blow counts recorded on the boring logs were those required to drive the sampler 12 inches with a 140-pound hammer dropping 30 inches.

Following completion of exploration operations, 1.25-inch diameter slotted PVC pipe was installed in Boring B-1 to provide a means of monitoring the groundwater fluctuations. The borings were backfilled with auger cuttings.

3.3 LABORATORY TESTING

3.3.1 General

To provide data necessary for our engineering analysis, a laboratory testing program was performed. This program included moisture, partial gradation, and chemical tests. The following paragraphs describe the tests and summarize the test data.

3.3.2 Moisture and Partial Gradation Tests

To aid in classifying the granular soils, partial gradation tests were performed. Results of the tests are tabulated below and presented on the boring logs, Figures 3A through 3F:

Boring No.	Depth (feet)	Percent Passing No. 200 Sieve	Moisture Content Percent	Soil Classification
B-1	2.5	5.7	5.4	GP/GM
B-1	10.0	6.7	3.0	GP/GM
B-1	20.0	5.6	3.6	GP/GM
B-2	5.0	8.4	5.7	GP/GM
B-2	10.0	3.1	6.5	GP
B-3	6.0	7.1	2.5	GP/GM

3.3.3 Chemical Tests

A representative soil sample was collected and sent for laboratory analysis for pH and sulfate content. As of the date of this report, results are still pending and will be transmitted when available and with corresponding cement recommendations, if applicable.

4. SITE CONDITIONS

4.1 SURFACE

The site is located at the northwest corner of 800 West and 800 South in Payson, Utah. The site is currently developed as a recreational baseball field. The topography of the site is relatively flat, grading down to the southeast with a total relief of approximately 2 to 4 feet. Site vegetation consists of various weeds and brush/grass as well as mature trees in the eastern portion of the site.

The site is bounded to the north by similar recreational fields followed by asphalt parking areas with single-family residential structures beyond; to the east by 800 West Street followed by single-family residential structures; to the south by 800 South Street followed by single-family residential structures; and to the west by vacant/undeveloped brush/grass land along with a commercial structure.

4.2 SUBSURFACE SOIL

The following paragraphs provide generalized descriptions of the subsurface profiles and soil conditions encountered within the borings conducted during this study. As previously noted, soil conditions may vary in unexplored locations.

The borings were completed to depths ranging from 5 to 22 feet. The soil conditions encountered in each of the borings, to the depths completed, were generally similar across the boring locations.

- Approximately 6 inches of topsoil was encountered in Borings B-1 and B-2. Topsoil thickness is frequently erratic and thicker zones of topsoil should be anticipated.

- Non-engineered fill soils were encountered in Borings B-2 and B-3, to depths ranging from 0.5 to 3.0 feet beneath the existing ground surface. The non-engineered fill soils primarily consisted of clay with varying silt and sand content as well as sand with varying clay, silt, and gravel content.

- Natural soils were encountered below the non-engineered fill or the ground surface in each boring. The natural soils consisted primarily of sand and gravel with varying silt content.

- Materials causing auger/excavation refusal were encountered within dense natural soils in Borings B-1 and B-3 at depths ranging from 7 feet to 22 feet below the existing ground surface.

The natural sand and gravel soils were medium dense to very dense, dry, and brown in color. The natural sand soils are anticipated to exhibit moderately high strength and moderately low compressibility characteristics under the anticipated load range.

For a more descriptive interpretation of subsurface conditions, please refer to Figures 3A through 3F, Boring Logs. The lines designating the interface between soil types on the boring logs generally represent approximate boundaries. In situ, the transition between soil types may be gradual.

4.3 GROUNDWATER

Groundwater was not encountered to the depths explored in the borings completed at the site.

Groundwater levels vary with changes in season and rainfall, construction activity, irrigation, snow melt, surface water run-off, and other site-specific factors.

5. DISCUSSIONS AND RECOMMENDATIONS

5.1 SUMMARY OF FINDINGS

The proposed structures may be supported upon conventional spread and continuous wall foundations supported upon suitable natural granular soils and/or structural fill extending to suitable natural granular soils.

The most significant geotechnical aspects at the site are:

1. The existing non-engineered fills encountered at the site.

2. The shallow depth to auger refusal in Boring B-3.

Prior to proceeding with construction, removal of any existing debris, surface vegetation, root systems, topsoil, non-engineered fill, and any deleterious materials from beneath an area extending out at least 5 feet from the perimeter of the proposed structure footprints and 3 feet beyond rigid pavements and exterior flatwork areas will be required. All existing utility locations should be reviewed to assess their impact on the proposed construction and abandoned and/or relocated as appropriate.

Due to the developed nature of this site and the surrounding area, additional non-engineered fills may exist in unexplored areas of the site. Based on our experience, non-engineered fills are frequently erratic in composition and consistency. All surficial loose/disturbed soils and non-engineered fills must be removed below all footings, floor slabs, and rigid pavements. The in situ, non-engineered fills may remain below flexible pavements if free of any deleterious materials, of limited thickness, and if properly prepared, as discussed later in this report.

Some of the on-site non-engineered fill soils encountered were granular. On-site granular soils, including existing non-engineered fills, may be re-utilized as structural site grading fill if they meet the criteria for such, as stated later in this report.

The dense natural soils encountered at the refusal depths may require significant effort to excavate and should be considered in the design and bidding process. However, larger excavation equipment may be utilized to reach required design depths.

Detailed discussions pertaining to earthwork, foundations, pavements, and the geoseismic setting of the site are presented in the following sections.

5.2 EARTHWORK

5.2.1 Site Preparation

Initial site preparation will consist of the removal of any existing debris, non-engineered fills, surface vegetation, root systems, topsoil, and any deleterious materials from beneath an area extending out at least 5 feet from the perimeter of the proposed structure footprint and 3 feet beyond rigid pavements and exterior flatwork areas. All existing utility locations should be reviewed to assess their impact on the proposed construction and abandoned and/or relocated as appropriate.

In situ, non-engineered fills may remain below flexible pavements if free of debris and deleterious materials, less than 3 feet in thickness, and if properly prepared. Proper preparation below pavements will consist of the scarification of the upper 12 inches below asphalt concrete (flexible pavement), followed by moisture preparation and re-compaction to the requirements of structural fill. Even with proper preparation, pavements established overlying non-engineered fills may encounter some long-term movements unless the non-engineered fills are completely removed.

It must be noted that from a handling and compaction standpoint, soils containing high amounts of fines (silts and clays) are inherently more difficult to rework and are very sensitive to changes in moisture content, requiring very close moisture control during placement and compaction. This will be very difficult, if not impossible, during wet and cold periods of the year. Additionally, the on-site soils are likely above optimum moisture content for compacting at present and would require some drying prior to re-compacting.

Subsequent to stripping and prior to the placement of floor slabs, foundations, structural site grading fills, exterior flatwork, and pavements, the exposed subgrade must be proof rolled by passing moderate-weight rubber tire-mounted construction equipment over the surface at least twice. If excessively soft or otherwise unsuitable soils are encountered beneath footings, they must be completely removed. If removal depth required is greater than 2 feet below footings, GSH must be notified to provide further recommendations. In pavement, floor slab, and outside flatwork areas, unsuitable natural soils should be removed to a maximum depth of 2 feet and replaced with compacted granular structural fill.

Subgrade preparation as described must be completed prior to placing overlying structural site grading fills.

GSH must be notified prior to the placement of structural site grading fills, floor slabs, footings, and pavements to verify that all loose/disturbed soils and non-engineered fills have been completely removed and/or properly prepared.

5.2.2 Temporary Excavations

Temporary excavations up to 8 feet deep in fine-grained cohesive soils, above or below the water table, may be constructed with sideslopes no steeper than one-half horizontal to one vertical (0.5H:1.0V). Excavations deeper than 8 feet are not anticipated at the site.

For granular (cohesionless) soils, construction excavations above the water table, not exceeding 4 feet, should be no steeper than one-half horizontal to one vertical (0.5H:1.0V). For excavations up to 8 feet, in granular soils and above the water table, the slopes should be no steeper than one horizontal to one vertical (1H:1V). Excavations encountering saturated cohesionless soils will be very difficult and will require very flat sideslopes and/or shoring, bracing, and dewatering.

Due to the relatively shallow refusal depths, difficult excavation should be anticipated within deeper excavations such as those for construction of utilities or the removal of non-engineered fills. However, larger excavation equipment may be utilized to reach required design depths.

All excavations must be inspected periodically by qualified personnel. If any signs of instability or excessive sloughing are noted, immediate remedial action must be initiated.

5.2.3 Structural Fill

Structural fill is defined as all fill which will ultimately be subjected to structural loadings, such as imposed by footings, floor slabs, pavements, etc. Structural fill will be required as backfill over foundations and utilities, as site grading fill, and as replacement fill below footings. All structural fill must be free of surface vegetation, root systems, rubbish, topsoil, frozen soil, and other deleterious materials.

Structural site grading fill is defined as structural fill placed over relatively large open areas to raise the overall grade. For structural site grading fill, the maximum particle size shall not exceed 4 inches; although, occasional larger particles, not exceeding 8 inches in diameter, may be incorporated if placed randomly in a manner such that “honeycombing” does not occur, and the desired degree of compaction can be achieved. The maximum particle size within structural fill placed within confined areas shall be restricted to 2 inches.

On-site soils, including existing non-engineered fills, may be re-utilized as structural site grading fill if they do not contain construction debris or deleterious material and meet the requirements of structural fill. Fine-grained soils will require very close moisture control and may be very difficult, if not impossible, to properly place and compact during wet and cold periods of the year.

Imported structural fill below foundations and floor slabs shall consist of a well graded sand and gravel mixture with less than 30 percent retained on the three-quarter-inch sieve and less than 20 percent passing the No. 200 Sieve (clays and silts).

To stabilize soft subgrade conditions (if encountered) or where structural fill is required to be placed closer than 2.0 feet above the water table at the time of construction, a mixture of coarse angular gravels and cobbles and/or 1.5- to 2.0-inch gravel (stabilizing fill) should be utilized. It may also help to utilize a stabilization fabric, such as Mirafi 600X or equivalent, placed on the natural ground if 1.5- to 2.0-inch gravel is used as stabilizing fill.

5.2.4 Fill Placement and Compaction

All structural fill shall be placed in lifts not exceeding 8 inches in loose thickness. Structural fills shall be compacted in accordance with the percent of the maximum dry density as determined by the AASHTO[1] T180 (ASTM[2] D1557) compaction criteria in accordance with the following table:

Location	Total Fill Thickness (feet)	Minimum Percentage of Maximum Dry Density
Beneath an area extending at least 5 feet beyond the perimeter of the structure	0 to 10	95
Site grading fills outside area defined above	0 to 5	90
Site grading fills outside area defined above	5 to 10	95
Utility trenches within structural areas	--	96
Road base	--	96

Structural fills greater than 10 feet thick are not anticipated at the site.

Subsequent to stripping and prior to the placement of structural site grading fill, the subgrade shall be prepared as discussed in Section 5.2.1, Site Preparation, of this report. In confined areas, subgrade preparation should consist of the removal of all loose or disturbed soils.

Coarse angular gravel and cobble mixtures (stabilizing fill), if utilized, shall be end dumped, spread to a maximum loose lift thickness of 15 inches, and compacted by dropping a backhoe bucket onto the surface continuously at least twice. As an alternative, the stabilizing fill may be compacted by passing moderately heavy construction equipment or large self-propelled compaction equipment over the surface at least twice. Subsequent fill material placed over the coarse gravels and cobbles shall be adequately compacted so that the “fines” are “worked into” the voids in the underlying coarser gravels and cobbles. Where soil fill materials are to be placed directly over more than about 18 inches of clean gravel, a separation geofabric, such as Mirafi 140N or equivalent, is recommended to be placed between the gravel and subsequent soil fills.

[1] American Association of State Highway and Transportation Officials
[2] American Society for Testing and Materials

Non-structural fill may be placed in lifts not exceeding 12 inches in loose thickness and compacted by passing construction, spreading, or hauling equipment over the surface at least twice.

5.2.5 Utility Trenches

All utility trench backfill material below structurally loaded facilities (footings, floor slabs, flatwork, pavements, etc.) shall be placed at the same density requirements established for structural fill. If the surface of the backfill becomes disturbed during the course of construction, the backfill shall be proof rolled and/or properly compacted prior to the construction of any exterior flatwork over a backfilled trench. Proof rolling shall be performed by passing moderately loaded rubber tire-mounted construction equipment uniformly over the surface at least twice. If excessively loose or soft areas are encountered during proof rolling, they shall be removed to a maximum depth of 2 feet below design finish grade and replaced with structural fill.

Many utility companies and City-County governments are now requiring that Type A-1a or A-1b (AASHTO Designation – granular soils with limited fines) soils be used as backfill over utilities. These organizations are also requiring that in public roadways, the backfill over major utilities be compacted over the full depth of fill to at least 96 percent of the maximum dry density as determined by the AASHTO T180 (ASTM D1557) method of compaction. GSH recommends that as the major utilities continue onto the site that these compaction specifications are followed.

Fine-grained soils, such as silts and clays, are not recommended for utility trench backfill in structural areas.

Due to the relatively shallow refusal depths, difficult excavation should be anticipated within deeper excavations such as those for construction of utilities. However, larger excavation equipment may be utilized to reach required design depths.

5.3 GROUNDWATER

Groundwater was not encountered to the depths explored in the borings completed at the site.

The groundwater measurements presented are conditions at the time of the field exploration and may not be representative of other times or locations. Groundwater levels may vary seasonally and with precipitation, as well as other factors including irrigation. Evaluation of these factors is beyond the scope of this study. Groundwater levels may, therefore, be at shallower or deeper depths than those measured during this study, including during construction and over the life of the structure.

The extent and nature of any dewatering required during construction will be dependent on the actual groundwater conditions prevalent at the time of construction and the effectiveness of construction drainage to prevent run-off into open excavations.

5.4 SPREAD AND CONTINUOUS WALL FOUNDATIONS

5.4.1 Design Data

The results of our analysis indicate that the proposed structures may be supported upon conventional spread and continuous wall foundations established upon suitable natural granular soils and/or structural fill extending to suitable natural granular soils. Under no circumstances shall foundations be established over non-engineered fills, loose or disturbed soils, topsoil, surface vegetation, root systems, rubbish, construction debris, other deleterious materials, frozen soils, or within ponded water. For design, the following parameters are provided:

Minimum Recommended Depth of Embedment for Frost Protection	- 30 inches
Minimum Recommended Depth of Embedment for Non-frost Conditions	- 15 inches
Recommended Minimum Width for Continuous Wall Footings	- 18 inches
Minimum Recommended Width for Isolated Spread Footings	- 24 inches
Recommended Net Bearing Capacity for Real Load Conditions for Footings Established Upon Suitable Natural Granular Soils	- 3,000 pounds per square foot
Bearing Capacity Increase for Seismic Loading	- 50 percent

The term “net bearing capacity” refers to the allowable pressure imposed by the portion of the structure located above lowest adjacent final grade. Therefore, the weight of the footing and backfill to lowest adjacent final grade need not be considered. Real loads are defined as the total of all dead plus frequently applied live loads. Total load includes all dead and live loads, including seismic and wind.

5.4.2 Uplift Loads

It is anticipated the drive-thru canopy will be “tied” to the soils with anchors. If the canopy is supported upon conventional spread foundations, uplift loads may be resisted by the weight of the foundation and the backfill within the limits defined by an imaginary line extending outward from the outside top edge of the footing 10 degrees from vertical up to finish grade. A unit weight of compacted backfill over the footings of 120 pounds per square foot may be used.

5.4.3 Installation

Under no circumstances shall the footings be installed upon non-engineered fills, loose or disturbed soils, topsoil, surface vegetation, root systems, rubbish, construction debris, or other deleterious materials. If unsuitable soils are encountered, they must be removed and replaced with compacted granular fill. If granular soils become loose or disturbed, they must be recompacted prior to pouring the concrete.

The width of structural replacement fill below footings should be equal to the width of the footing plus one foot for each foot of fill thickness.

5.4.4 Settlements

Based on column loadings, soil bearing capacities, and the foundation recommendations as discussed above, we expect primary total settlement beneath individual foundations to be less than one inch.

The amount of differential settlement is difficult to predict because the subsurface and foundation loading conditions can vary considerably across the site. However, we anticipate differential settlement between adjacent foundations could vary from 0.5 to 0.75 inch. The final deflected shape of the structure will be dependent on actual foundation locations and loading.

5.5 LATERAL RESISTANCE

Lateral loads imposed upon foundations due to wind or seismic forces may be resisted by the development of passive earth pressures and friction between the base of the footings and the supporting soils. In determining frictional resistance, a coefficient of friction of 0.40 may be utilized for the footing interface with natural granular soils or granular structural fill. Passive resistance provided by properly placed and compacted granular structural fill above the water table may be considered equivalent to a fluid with a density of 300 pounds per cubic foot. Below the water table, this granular soil should be considered equivalent to a fluid with a density of 150 pounds per cubic foot.

A combination of passive earth resistance and friction may be utilized provided that the friction component of the total is divided by 1.5.

5.6 FLOOR SLABS

Floor slabs may be established upon suitable natural subgrade soils or structural fill extending to suitable natural soils. Under no circumstances shall floor slabs be established directly over non-engineered fills, loose or disturbed soils, sod, rubbish, construction debris, other deleterious materials, frozen soils, or within ponded water.

To facilitate curing of the concrete and to provide a capillary moisture break, it is recommended that floor slabs be directly underlain by at least 4 inches of "free-draining" fill, such as "pea" gravel or three-quarters to one inch minus clean gap-graded gravel.

Settlement of lightly loaded floor slabs designed according to previous recommendations (average uniform pressure of 200 pounds per square foot or less) is anticipated to be less than one-quarter of an inch.

5.7 PAVEMENTS

The non-engineered fills will exhibit poor pavement support characteristics when saturated. All pavement areas must be prepared as previously discussed (see Section 5.2.1, Site Preparation). Under no circumstances shall pavements be established over unprepared non-engineered fills, loose or disturbed soils, topsoil, surface vegetation, root systems, rubbish, construction debris, other deleterious materials, frozen soils, or within ponded water. With the subgrade soils and the projected traffic as discussed in Section 2, Proposed Construction, the following pavement sections are recommended:

Parking Areas

(Light Volume of Automobiles and Light Trucks,
Occasional Medium-Weight Trucks,
and No Heavy-Weight Trucks)
[3 equivalent 18-kip axle loads per day]

Flexible Pavements:
(Asphalt Concrete)

3.0 inches	Asphalt concrete
8.0 inches	Aggregate base
Over	Properly prepared fills, natural subgrade soils, and/or structural site grading fill extending to properly prepared fills and/or natural subgrade soils

Rigid Pavements:
(Non-reinforced Concrete)

5.0 inches	Portland cement concrete (non-reinforced)
5.0 inches	Aggregate base
Over	Properly prepared natural subgrade soils, and/or structural site grading fill extending to properly prepared natural subgrade soils

Drive Lanes and Drive-Thru Areas

(Moderate Volume of Automobiles and Light Trucks,
Light Volume of Medium-Weight Trucks,
and Occasional Heavy-Weight Trucks)
[6 equivalent 18-kip axle loads per day]

Flexible Pavements:
(Asphalt Concrete)

3.0 inches	Asphalt concrete
9.0 inches	Aggregate base
Over	Properly prepared fills, natural subgrade soils, and/or structural site grading fill extending to properly prepared fills and/or natural subgrade soils

Rigid Pavements:
(Non-reinforced Concrete)

6.0 inches	Portland cement concrete (non-reinforced)
5.0 inches	Aggregate base
Over	Properly prepared natural subgrade soils, and/or structural site grading fill extending to properly prepared natural subgrade soils

For dumpster pads, we recommend a pavement section consisting of 8.0 inches of Portland cement concrete, 12.0 inches of aggregate base, over properly prepared natural subgrade or site grading structural fills. Dumpster pads should not be constructed overlying non-engineered fills under any circumstances.

These above rigid pavement sections are for non-reinforced Portland cement concrete. Concrete should be designed in accordance with the American Concrete Institute (ACI) and joint details should conform to the Portland Cement Association (PCA) guidelines. The concrete should have a minimum 28-day unconfined compressive strength of 4,000 pounds per square inch and contain 6 percent ±1 percent air-entrainment.

The crushed stone should conform to applicable sections of the current Utah Department of Transportation (UDOT) Standard Specifications. All asphalt material and paving operations should meet applicable specifications of the Asphalt Institute and UDOT. A GSH technician shall observe placement and perform density testing of the base course material and asphalt.

Please note that the recommended pavement section is based on estimated post-construction traffic loading. If the pavement is to be constructed and utilized by construction traffic, the above pavement section may prove insufficient for heavy truck traffic, such as concrete trucks or tractor-trailers used for construction delivery. Unexpected distress, reduced pavement life, and/or premature failure of the pavement section could result if subjected to heavy construction traffic and the owner should be made aware of this risk. If the estimated traffic loading stated herein is not correct, GSH must review actual pavement loading conditions to determine if revisions to these recommendations are warranted.

5.8 CEMENT TYPES

A representative soil sample was collected and sent for laboratory analysis for pH and sulfate content. As of the date of this report, results are still pending and will be transmitted when available and with corresponding cement recommendations, if applicable.

5.9 GEOSEISMIC SETTING

5.9.1 General

Utah municipalities have adopted the International Building Code (IBC) 2018. The IBC 2018 code refers to ASCE 7-16 Minimum Design Loads and Associated Criteria for Buildings and Other Structures (ASCE 7-16) determines the seismic hazard for a site based upon mapping of bedrock accelerations prepared by the United States Geologic Survey (USGS) and the soil site class. The USGS values are presented on maps incorporated into the IBC code and are also available based on latitude and longitude coordinates (grid points).

5.9.2 Faulting

Based on our review of available literature, no active faults pass through or immediately adjacent to the site. The nearest active mapped fault consists of the Nephi Section of the Wasatch Fault, located about 1.2 miles to the east of the site.

5.9.3 Site Class

For dynamic structural analysis, the Site Class D – Default Soil Profile as defined in Chapter 20 of ASCE 7-16 (per Section 1613.3.2, Site Class Definitions, of IBC 2018) can be utilized. If a measured site class is desired based on the project structural engineer's evaluation and recommendations, additional testing and analysis can be completed by GSH to determine the measured site class. Please contact GSH for additional information.

5.9.4 Ground Motions

The IBC 2018 code is based on USGS mapping, which provides values of short and long period accelerations for average bedrock values for the Western United States and must be corrected for local soil conditions. The following table summarizes the peak ground and short and long period accelerations for the MCE event and incorporates the appropriate soil amplification factor for a Site Class D – Default* Soil Profile. Based on the site latitude and longitude (40.0316 degrees north and 111.7460 degrees west, respectively) and Risk Category I, the values for this site are tabulated below:

Spectral Acceleration Value, T	Bedrock Boundary [mapped values] (% g)	Site Coefficient	Site Class D - Default* [adjusted for site class effects] (% g)	Design Values** (% g)
0.2 Seconds (Short Period Acceleration)	S_S = 174.7	F_a = 1.200	S_{MS} = 209.6	S_{DS} = 139.7
1.0 Second (Long Period Acceleration)	S_1 = 64.5	F_v = 1.700	S_{M1} = 109.7	S_{D1} = 73.1

* If a measured site class in accordance with IBC 2018/ ASCE 7-16 is beneficial based on the project structural engineers review, please contact GSH for additional options for obtaining this measured site class.

**IBC 2018/ASCE 7-16 may require a site-specific study based on the project structural engineer's evaluation and recommendations. If needed, GSH can provide additional information and analysis including a complete site-specific study in accordance with chapter 21 of ASCE 7-16.

5.9.5 Liquefaction

Liquefaction is defined as the condition when saturated, loose, granular soils lose their support capabilities because of excessive pore water pressure, which develops during a seismic event. Clayey soils, even if saturated, will generally not liquefy during a major seismic event.

Due to the density of the granular soils and the lack of groundwater, liquefaction is not anticipated to occur within the soils encountered at this site.

5.10 SITE VISITS

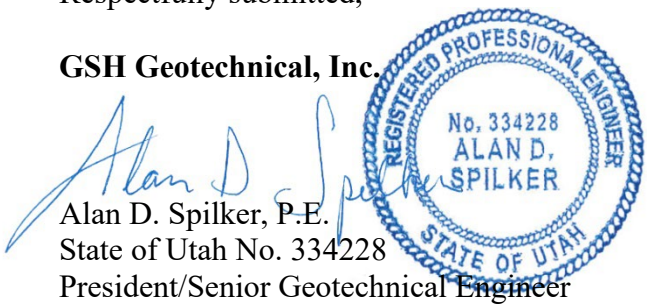
GSH must verify that all topsoil/disturbed soils and any other unsuitable soils have been removed, that non-engineered fills have been removed and/or properly prepared, and that suitable soils have been encountered prior to placing site grading fills, footings, slabs, and pavements. Additionally, GSH must observe fill placement and verify in-place moisture content and density of fill materials placed at the site.

6. CLOSURE

If you have any questions or would like to discuss these items further, please feel free to contact us at (801) 685-9190.

Respectfully submitted,

GSH Geotechnical, Inc.



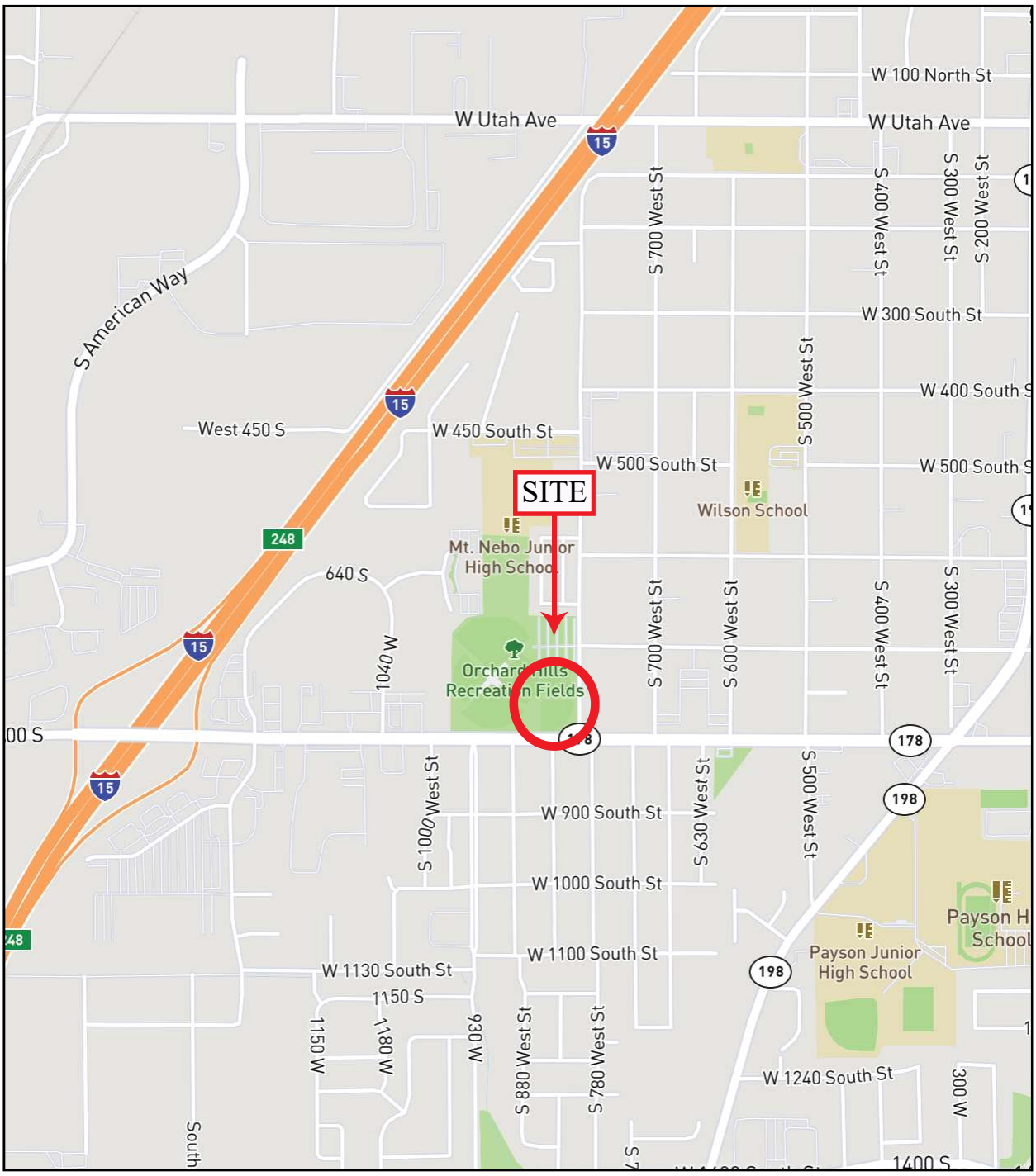
Alan D. Spilker, P.E.
State of Utah No. 334228
President/Senior Geotechnical Engineer

ADS:jlh

Encl. Figure 1, Vicinity Map
Figure 2, Site Plan
Figures 3A through 3F, Boring Logs
Figure 4, Key to Boring Log (USCS)

Addressee (email)

GOLDENWEST CREDIT UNION
JOB NO. 0645-016-22



0.10 0 0 0 0 0.1 0.2 0.3 0.4 MI 0.5

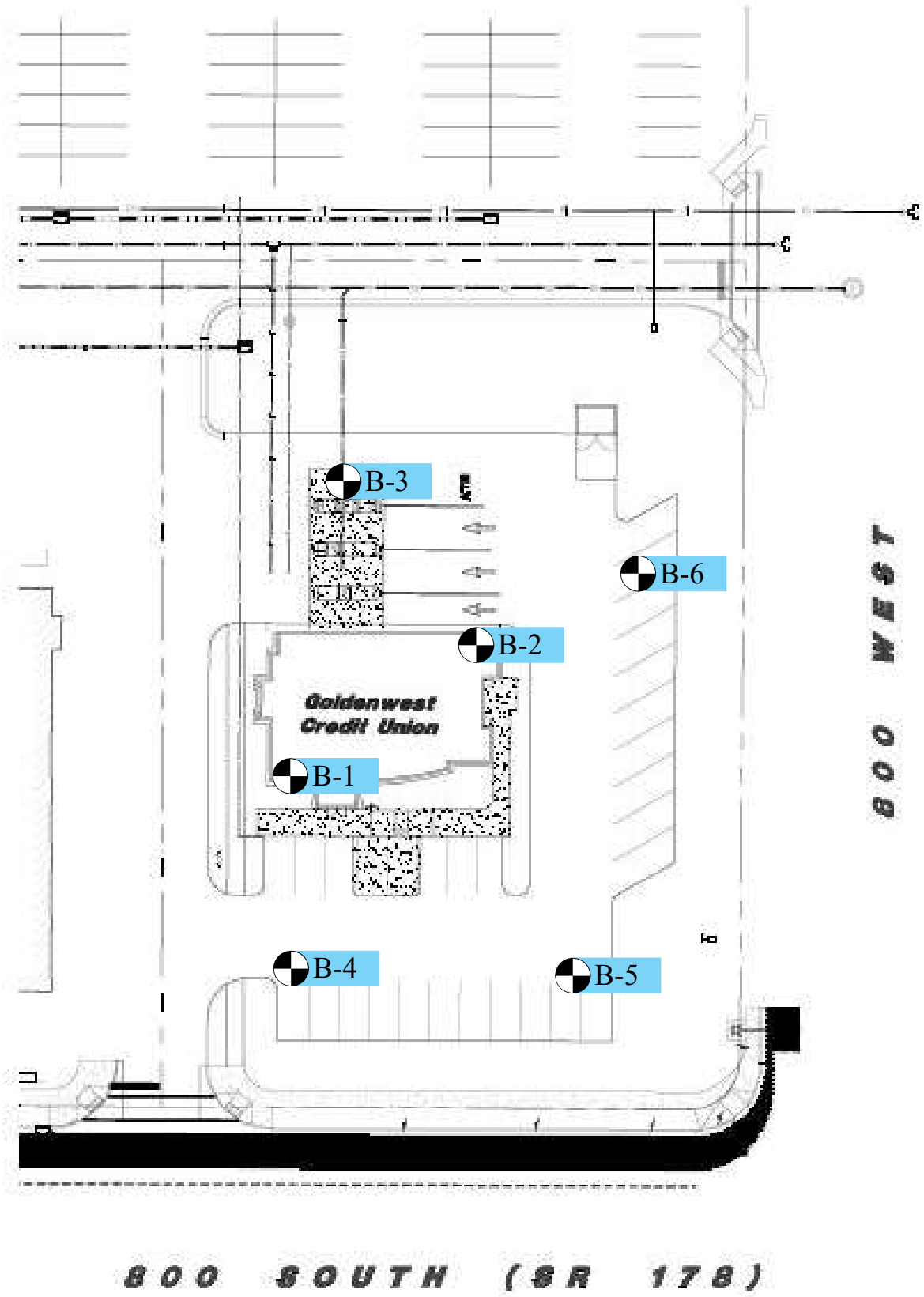
200 0 0 200 400 600 M 800

FIGURE 1
VICINITY MAP

REFERENCE:
ALL TRAILS - NATIONAL GEOGRAPHIC TERRAIN
DATED 2022

GSH

GOLDENWEST CREDIT UNION
JOB NO. 0645-016-22



APPROXIMATE SCALE IN FEET
22 0 22 44

FIGURE 2
SITE PLAN

REFERENCE:
ADAPTED FROM DRAWING ENTITLED
"CONCEPTUAL SITE PLAN GWCU - PAYSON"
BY ANDERSON WAHLEN & ASSOCIATES, DATED 8/11/2021

GSH

BORING LOG

Page: 1 of 1

BORING: B-1

CLIENT: Goldenwest Credit Union | PROJECT NUMBER: 0645-016-22

PROJECT: Proposed Goldenwest Credit Union - Payson | DATE STARTED: 1/19/22 | DATE FINISHED: 1/19/22

LOCATION: Northwest Corner of 800 West and 800 South, Payson, Utah | GSH FIELD REP.: AL

DRILLING METHOD/EQUIPMENT: 3-3/4" ID Hollow-Stem Auger | HAMMER: Automatic | WEIGHT: 140 lbs | DROP: 30"

GROUNDWATER DEPTH: Not Encountered (1/19/22) | ELEVATION: ---

WATER LEVEL	USCS	DESCRIPTION	DEPTH (FT.)	BLOW COUNT	SAMPLE SYMBOL	MOISTURE (%)	DRY DENSITY (PCF)	% PASSING 200	LIQUID LIMIT (%)	PLASTICITY INDEX	REMARKS
		Ground Surface	0								
	GP/ GM	FINE TO COARSE SANDY FINE GRAVEL with some silt; major roots (topsoil) to 6"; brown		65		5.4		5.7			dry very dense
			5	50+							
			10	73		3		6.7			
			15	51							
			20	50+		3.6		5.6			
		Auger refusal at 22.0' on gravel. No groundwater encountered at time of drilling. Installed 1.25" diameter slotted PVC pipe to 22.0'.	25								

See Subsurface Conditions section in the report for additional information.

FIGURE 3A

BORING LOG

Page: 1 of 1

BORING: B-2

CLIENT: Goldenwest Credit Union | PROJECT NUMBER: 0645-016-22

PROJECT: Proposed Goldenwest Credit Union - Payson | DATE STARTED: 1/19/22 | DATE FINISHED: 1/19/22

LOCATION: Northwest Corner of 800 West and 800 South, Payson, Utah | GSH FIELD REP.: AL

DRILLING METHOD/EQUIPMENT: 3-3/4" ID Hollow-Stem Auger | HAMMER: Automatic | WEIGHT: 140 lbs | DROP: 30"

GROUNDWATER DEPTH: Not Encountered (1/19/22) | ELEVATION: ---

WATER LEVEL	USCS	DESCRIPTION	DEPTH (FT.)	BLOW COUNT	SAMPLE SYMBOL	MOISTURE (%)	DRY DENSITY (PCF)	% PASSING 200	LIQUID LIMIT (%)	PLASTICITY INDEX	REMARKS
		Ground Surface	0								
	CL FILL	SILTY CLAY, FILL with fine sand; major roots (topsoil) to 6"; dark brown		31							slightly moist medium stiff dry
	GP/ GM	FINE TO COARSE SANDY FINE GRAVEL with some silt; odorous; brown									dense
			5	28		5.7		8.4			medium dense
	SP	FINE AND COARSE GRAVELLY FINE TO COARSE SAND brown									dry dense
			10	36		6.5		3.1			
		End of Exploration at 11.5'. No groundwater encountered at time of drilling.									
			15								
			20								
			25								

See Subsurface Conditions section in the report for additional information.

FIGURE 3B

BORING LOG

Page: 1 of 1

BORING: B-3

CLIENT: Goldenwest Credit Union | PROJECT NUMBER: 0645-016-22

PROJECT: Proposed Goldenwest Credit Union - Payson | DATE STARTED: 1/19/22 | DATE FINISHED: 1/19/22

LOCATION: Northwest Corner of 800 West and 800 South, Payson, Utah | GSH FIELD REP.: AL

DRILLING METHOD/EQUIPMENT: 3-3/4" ID Hollow-Stem Auger | HAMMER: Automatic | WEIGHT: 140 lbs | DROP: 30"

GROUNDWATER DEPTH: Not Encountered (1/19/22) | ELEVATION: ---

WATER LEVEL	USCS	DESCRIPTION	DEPTH (FT.)	BLOW COUNT	SAMPLE SYMBOL	MOISTURE (%)	DRY DENSITY (PCF)	% PASSING 200	LIQUID LIMIT (%)	PLASTICITY INDEX	REMARKS
		Ground Surface	0								
	SM/SC FILL	SILTY/CLAYEY FINE TO COARSE SAND, FILL with trace fine gravel; reddish-brown		8							moist loose
	GP/GM	FINE TO COARSE SANDY FINE GRAVEL with some silt; brown	5								dry very dense
						2.5		7.1			
		Refusal at 7.0' on gravel. No groundwater encountered at time of drilling.	10								
			15								
			20								
			25								

See Subsurface Conditions section in the report for additional information.

FIGURE 3C

BORING LOG

Page: 1 of 1

BORING: B-4

CLIENT: Goldenwest Credit Union | PROJECT NUMBER: 0645-016-22

PROJECT: Proposed Goldenwest Credit Union - Payson | DATE STARTED: 1/19/22 | DATE FINISHED: 1/19/22

LOCATION: Northwest Corner of 800 West and 800 South, Payson, Utah | GSH FIELD REP.: AL

DRILLING METHOD/EQUIPMENT: 3-3/4" ID Hollow-Stem Auger | HAMMER: Automatic | WEIGHT: 140 lbs | DROP: 30"

GROUNDWATER DEPTH: Not Encountered (1/19/22) | ELEVATION: ---

WATER LEVEL	USCS	DESCRIPTION	DEPTH (FT.)	BLOW COUNT	SAMPLE SYMBOL	MOISTURE (%)	DRY DENSITY (PCF)	% PASSING 200	LIQUID LIMIT (%)	PLASTICITY INDEX	REMARKS
		Ground Surface	0								
	GP/ GM	FINE AND COARSE GRAVEL with fine to coarse sand and some silt; brown									dry very dense
		End of Exploration at 5.0'. No groundwater encountered at time of drilling.	5								
			10								
			15								
			20								
			25								

See Subsurface Conditions section in the report for additional information.

FIGURE 3D

BORING LOG

Page: 1 of 1

BORING: B-5

CLIENT: Goldenwest Credit Union | PROJECT NUMBER: 0645-016-22

PROJECT: Proposed Goldenwest Credit Union - Payson | DATE STARTED: 1/19/22 | DATE FINISHED: 1/19/22

LOCATION: Northwest Corner of 800 West and 800 South, Payson, Utah | GSH FIELD REP.: AL

DRILLING METHOD/EQUIPMENT: 3-3/4" ID Hollow-Stem Auger | HAMMER: Automatic | WEIGHT: 140 lbs | DROP: 30"

GROUNDWATER DEPTH: Not Encountered (1/19/22) | ELEVATION: ---

WATER LEVEL	USCS	DESCRIPTION	DEPTH (FT.)	BLOW COUNT	SAMPLE SYMBOL	MOISTURE (%)	DRY DENSITY (PCF)	% PASSING 200	LIQUID LIMIT (%)	PLASTICITY INDEX	REMARKS
		Ground Surface	0								
	GP	FINE TO COARSE SANDY FINE AND COARSE GRAVEL with trace silt; brown									dry dense
		End of Exploration at 5.0'. No groundwater encountered at time of drilling.	5								
			10								
			15								
			20								
			25								

See Subsurface Conditions section in the report for additional information.

FIGURE 3E

BORING LOG

Page: 1 of 1

BORING: B-6

CLIENT: Goldenwest Credit Union | PROJECT NUMBER: 0645-016-22

PROJECT: Proposed Goldenwest Credit Union - Payson | DATE STARTED: 1/19/22 | DATE FINISHED: 1/19/22

LOCATION: Northwest Corner of 800 West and 800 South, Payson, Utah | GSH FIELD REP.: AL

DRILLING METHOD/EQUIPMENT: 3-3/4" ID Hollow-Stem Auger | HAMMER: Automatic | WEIGHT: 140 lbs | DROP: 30"

GROUNDWATER DEPTH: Not Encountered (1/19/22) | ELEVATION: ---

WATER LEVEL	USCS	DESCRIPTION	DEPTH (FT.)	BLOW COUNT	SAMPLE SYMBOL	MOISTURE (%)	DRY DENSITY (PCF)	% PASSING 200	LIQUID LIMIT (%)	PLASTICITY INDEX	REMARKS
		Ground Surface	0								
	SP/ SM	FINE TO COARSE SAND with fine and coarse gravel and some silt; brown									dry dense
		End of Exploration at 5.0'. No groundwater encountered at time of drilling.	5								
			10								
			15								
			20								
			25								

See Subsurface Conditions section in the report for additional information.

FIGURE 3F

CLIENT: Goldenwest Credit Union
PROJECT: Proposed Goldenwest Credit Union - Payson
PROJECT NUMBER: 0645-016-22

KEY TO BORING LOG

WATER LEVEL	USCS	DESCRIPTION	DEPTH (FT.)	BLOW COUNT	SAMPLE SYMBOL	MOISTURE (%)	DRY DENSITY (PCF)	% PASSING 200	LIQUID LIMIT (%)	PLASTICITY INDEX	REMARKS
①	②	③	④	⑤	⑥	⑦	⑧	⑨	⑩	⑪	⑫

COLUMN DESCRIPTIONS

① **Water Level:** Depth to measured groundwater table. See symbol below.

② **USCS:** (Unified Soil Classification System) Description of soils encountered; typical symbols are explained below.

③ **Description:** Description of material encountered; may include color, moisture, grain size, density/consistency,

④ **Depth (ft.):** Depth in feet below the ground surface.

⑤ **Blow Count:** Number of blows to advance sampler 12" beyond first 6", using a 140-lb hammer with 30" drop.

⑥ **Sample Symbol:** Type of soil sample collected at depth interval shown; sampler symbols are explained below.

⑦ **Moisture (%):** Water content of soil sample measured in laboratory; expressed as percentage of dryweight of

⑧ **Dry Density (pcf):** The density of a soil measured in laboratory; expressed in pounds per cubic foot.

⑨ **% Passing 200:** Fines content of soils sample passing a No. 200 sieve; expressed as a percentage.

⑩ **Liquid Limit (%):** Water content at which a soil changes from plastic to liquid behavior.

⑪ **Plasticity Index (%):** Range of water content at which a soil exhibits plastic properties.

⑫ **Remarks:** Comments and observations regarding drilling or sampling made by driller or field personnel. May include other field and laboratory test results using the following abbreviations:

CEMENTATION:

Weakly: Crumbles or breaks with handling or slight finger pressure.

Moderately: Crumbles or breaks with considerable finger pressure.

Strongly: Will not crumble or break with finger pressure.

MODIFIERS:

Trace <5%

Some 5-12%

With > 12%

MOISTURE CONTENT (FIELD TEST):

Dry: Absence of moisture, dusty, dry to the touch.

Moist: Damp but no visible water.

Saturated: Visible water, usually soil below water table.

Descriptions and stratum lines are interpretive; field descriptions may have been modified to reflect lab test results. Descriptions on the logs apply only at the specific boring locations and at the time the borings were advanced; they are not warranted to be representative of subsurface conditions at other locations or times.

UNIFIED SOIL CLASSIFICATION SYSTEM (USCS)

MAJOR DIVISIONS			USCS SYMBOLS	TYPICAL DESCRIPTIONS
COARSE-GRAINED SOILS More than 50% of material is larger than No. 200 sieve size.	GRAVELS More than 50% of coarse fraction retained on No. 4 sieve.	CLEAN GRAVELS (little or no fines)	GW	Well-Graded Gravels, Gravel-Sand Mixtures, Little or No Fines
			GP	Poorly-Graded Gravels, Gravel-Sand Mixtures, Little or No Fines
		GRAVELS WITH FINES (appreciable amount of fines)	GM	Silty Gravels, Gravel-Sand-Silt Mixtures
			GC	Clayey Gravels, Gravel-Sand-Clay Mixtures
	SANDS More than 50% of coarse fraction passing through No. 4 sieve.	CLEAN SANDS (little or no fines)	SW	Well-Graded Sands, Gravelly Sands, Little or No Fines
			SP	Poorly-Graded Sands, Gravelly Sands, Little or No Fines
		SANDS WITH FINES (appreciable amount of fines)	SM	Silty Sands, Sand-Silt Mixtures
			SC	Clayey Sands, Sand-Clay Mixtures
FINE-GRAINED SOILS More than 50% of material is smaller than No. 200 sieve size.	SILTS AND CLAYS Liquid Limit less than 50%		ML	Inorganic Silts and Very Fine Sands, Rock Flour, Silty or Clayey Fine Sands or Clayey Silts with Slight Plasticity
			CL	Inorganic Clays of Low to Medium Plasticity, Gravelly Clays, Sandy Clays, Silty Clays, Lean Clays
			OL	Organic Silts and Organic Silty Clays o f Low Plasticity
	SILTS AND CLAYS Liquid Limit greater than 50%		MH	Inorganic Silts, Micacious or Diatomacious Fine Sand or Silty Soils
			CH	Inorganic Clays of High Plasticity, Fat Clays
			OH	Organic Silts and Organic Clays of Medium to High Plasticity
HIGHLY ORGANIC SOILS			PT	Peat, Humus, Swamp Soils with High Organic Contents

Note: Dual Symbols are used to indicate borderline soil classifications.

STRATIFICATION:

DESCRIPTION	THICKNESS
Seam	up to 1/8"
Layer	1/8" to 12"

Occasional: One or less per 6" of thickness

Numerous; More than one per 6" of thickness

TYPICAL SAMPLER GRAPHIC SYMBOLS

- Bulk/Bag Sample
- Standard Penetration Split Spoon Sampler
- Rock Core
- No Recovery
- 3.25" OD, 2.42" ID D&M Sampler
- 3.0" OD, 2.42" ID D&M Sampler
- California Sampler
- Thin Wall

WATER SYMBOL

Water Level

FIGURE 4

GSH

SECTION 00 4113 - BID FORM - STIPULATED SUM (SINGLE-PRIME CONTRACT)

PART 1 - BID FORM - STIPULATED SUM (SINGLE-PRIME CONTRACT)

1.1 BID INFORMATION

A. Bidder: _____.

B. Project Name: Goldenwest Credit Union – Payson Branch.

C. Project Location: 800 S. 800 W., Payson, Utah.

D. Owner: Goldenwest Credit Union.

E. Architect: Studio 333 Architects, P.C.

F. Architect Project Number: 2305

1.2 CERTIFICATIONS, BASE BID, AND ALTERNATE BIDS

A. Base Bid, Single-Prime (All Trades) Contract: The undersigned Bidder, having carefully examined the Procurement and Contracting Requirements, Conditions of the Contract, Drawings, Specifications, and all subsequent Addenda, as prepared by Bott Pantone Architects and Architect's consultants, having visited the site, and being familiar with all conditions and requirements of the Work, hereby agrees to furnish all material, labor, equipment and services, including all scheduled allowances, necessary to complete the construction of the above-named project, according to the requirements of the Procurement and Contracting Documents, for the stipulated sum of:

1. DOLLARS $_____
_____

1.3 SUBCONTRACTORS AND SUPPLIERS

A. The following companies shall execute subcontracts for the portions of the Work indicated:

1. Concrete Work: _____.
2. Masonry Work: _____.
3. E.I.F.S. Work: _____.
4. Roofing Work: _____.
5. Plumbing Work: _____.
6. HVAC Work: _____.
7. Electrical Work: _____.
8. Site Grading: _____.
9. Framing: _____.
10. Millwork: _____.
11. Ceramic Tile Work: _____.
12. Painting: _____.
13. Landscaping: _____.

1.4 TIME OF COMPLETION:

A. The undersigned bidder proposes and agrees hereby to complete the work of the Contract Documents on a date specified in a written Notice to Proceed to be issued by the Architect/Owner and shall full complete the work within the number of calendar days listed here: _____ days.

1.5 ACKNOWLEDGEMENT OF ADDENDA:

A. The undersigned Bidder acknowledges receipt of and use of the following Addenda in the preparation of this Bid:

1. Addendum No. 1, dated _____.
2. Addendum No. 2, dated _____.
3. Addendum No. 3, dated _____.
4. Addendum No. 4, dated _____.

1.6 CONTRACTOR'S LICENSE

A. The undersigned further states that it is a duly licensed contractor, for the type of work proposed, in Utah, and that all fees, permits, etc., pursuant to submitting this proposal have been paid in full.

1.7 SUBMISSION OF BID

A. Respectfully submitted this _____ day of _____, 2023.

B. Submitted By:_____(Name of bidding firm or corporation).

C. Authorized Signature:_____(Handwritten signature).

D. Signed By:_____(Type or print name).

E. Title:_____(Owner/Partner/President/Vice President).

F. Street Address:_____.

G. City, State, Zip:_____.

H. Phone:_____.

I. License No.:_____.

J. Federal ID No.:_____.

END OF SECTION

GENERAL AND SUPPLEMENTARY CONDITIONS

CONTRACT FORM AND GENERAL CONDITIONS

Contract will be written on AIA Document A104 - 2007 "Standard Abbreviated Form of Agreement between Owner and Contractor". (Sample of Agreement included herein).

CONTRACTOR'S LIABILITY INSURANCE:

The Contractor shall not commence work under this Contract until he has obtained, as a minimum, the insurance required hereunder and evidence of such insurance has been submitted to the Owner. The submittal of said evidence to the Owner shall not relieve or decrease the liability of the Contractor hereunder. The cost of all such insurance shall be the obligation of the Contractor.

A. Workers Compensation & Employer's Liability Insurance:

   1. As required by Statute

B. Comprehensive General Liability Insurance;

   1. General Liability, including Completed Operations and Broad Form Property Damage Liability Insurance-
      Limits: $1,000,000 / $2,000,000 General Aggregate per occurrence.
   2. Blanket Contractual Liability Insurance:
      Limits: $1,000,000 / $2,000,000 General Aggregate per occurrence.
      The Owner shall be added as additional interest insured.

C. Automobile liability Insurance:

   1. Liability Limits (Bodily Injury and Property Damage)
      covering any automobile-
      $1,000,000 any one accident or loss.

D. A Certificate of Insurance: Shall be furnished by the Contractor as evidence of insurance. The policy or policies shall not be cancelled, nor shall any of the coverages certified be terminated, or the limits declaring such intent until a minimum of ten days after notice has been mailed by registered mail to the Owner.

PAYMENTS TO CONTRACTOR

Contractor may request one progress payment each month during construction and at Substantial Completion. The Owner will pay Ninety-Five percent (95%) of the amount due the Contractor on account of progress payments.

Final Payment will be made after all work is completed and accepted.

Requests for Payment: Submitted in form approved by the Architect and signed by the Owner, Partner, or Corp. Officer.

PROFIT AND OVERHEAD ON CHANGE ORDERS

If Contractor claims that it is entitled to an adjustment in the Contract Sum as a result of an instruction by Owner or Architect, Contractor will furnish a proposal for a Change Order containing a price breakdown itemized as required by Owner. The breakdown will be in sufficient detail to allow Owner to determine any increase or decrease in Direct Costs as a result of compliance with the instruction. Any amount claimed for subcontracts will be supported by a similar price breakdown. Profit and overhead will be subject to the following limitations:

A. Contractor's profit and overhead on work performed by its own crews will not exceed ten (10) percent of its Direct Costs.
B. Contractor's profit and overhead on work performed by its Subcontractors will not exceed eight (8) percent of the Subcontractors' charges for such work.

AIA® Document A104® – 2017

Standard Abbreviated Form of Agreement Between Owner and Contractor

AGREEMENT made as of the day of in the year
(In words, indicate day, month and year.)

BETWEEN the Owner:
(Name, legal status, address and other information)

Goldenwest Credit Union
5025 S. Adams Ave.
Ogden, Utah 84403

and the Contractor:
(Name, legal status, address and other information)

for the following Project:
(Name, location and detailed description)

Goldenwest Credit Union - Payson Branch
800 S. 800 W.
Payson, Utah

The Architect:
(Name, legal status, address and other information)

Studio 333 Architects
333 24th Street
Ogden, Utah 84401

The Owner and Contractor agree as follows.

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

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

TABLE OF ARTICLES

ARTICLE 1 THE WORK OF THIS CONTRACT

The Contractor shall execute the Work described in the Contract Documents, except as specifically indicated in the Contract Documents to be the responsibility of others.

ARTICLE 2 DATE OF COMMENCEMENT AND SUBSTANTIAL COMPLETION

§ 2.1 The date of commencement of the Work shall be:
(Check one of the following boxes.)

[ ] The date of this Agreement.

[ ] A date set forth in a notice to proceed issued by the Owner.

[ ] Established as follows:
(Insert a date or a means to determine the date of commencement of the Work.)

If a date of commencement of the Work is not selected, then the date of commencement shall be the date of this Agreement.

§ 2.2 The Contract Time shall be measured from the date of commencement.

§ 2.3 Substantial Completion

§ 2.3.1 Subject to adjustments of the Contract Time as provided in the Contract Documents, the Contractor shall achieve Substantial Completion of the entire Work:
(Check the appropriate box and complete the necessary information.)

[ ] Not later than ( ) calendar days from the date of commencement of the Work.

[ ] By the following date:

§ 2.3.2 Subject to adjustments of the Contract Time as provided in the Contract Documents, if portions of the Work are to be completed prior to Substantial Completion of the entire Work, the Contractor shall achieve Substantial Completion of such portions by the following dates:

Portion of Work	Substantial Completion Date

§ 2.3.3 If the Contractor fails to achieve Substantial Completion as provided in this Section 2.3, liquidated damages, if any, shall be assessed as set forth in Section 3.5.

ARTICLE 3 CONTRACT SUM

§ 3.1 The Owner shall pay the Contractor the Contract Sum in current funds for the Contractor's performance of the Contract. The Contract Sum shall be one of the following:
(Check the appropriate box.)

[ ] Stipulated Sum, in accordance with Section 3.2 below

[ ] Cost of the Work plus the Contractor's Fee, in accordance with Section 3.3 below

[ ] Cost of the Work plus the Contractor's Fee with a Guaranteed Maximum Price, in accordance with Section 3.4 below

(Based on the selection above, complete Section 3.2, 3.3 or 3.4 below.)

§ 3.2 The Stipulated Sum shall be ($), subject to additions and deductions as provided in the Contract Documents.

§ 3.2.1 The Stipulated Sum is based upon the following alternates, if any, which are described in the Contract Documents and are hereby accepted by the Owner:
(State the numbers or other identification of accepted alternates. If the bidding or proposal documents permit the Owner to accept other alternates subsequent to the execution of this Agreement, attach a schedule of such other alternates showing the amount for each and the date when that amount expires.)

§ 3.2.2 Unit prices, if any:

(Identify the item and state the unit price and the quantity limitations, if any, to which the unit price will be applicable.)

Item	Units and Limitations	Price per Unit ($0.00)

§ 3.2.3 Allowances, if any, included in the stipulated sum:
(Identify each allowance.)

Item	Price

(Paragraphs deleted)
§ 3.4.3.3 Unit Prices, if any:
(Identify the item and state the unit price and the quantity limitations, if any, to which the unit price will be applicable.)

Item	Units and Limitations	Price per Unit ($0.00)

§ 3.4.3.4 Allowances, if any, included in the Guaranteed Maximum Price:
(Identify each allowance.)

Item	Price

§ 3.4.3.5 Assumptions, if any, on which the Guaranteed Maximum Price is based:

§ 3.4.3.6 To the extent that the Contract Documents are anticipated to require further development, the Guaranteed Maximum Price includes the costs attributable to such further development consistent with the Contract Documents and reasonably inferable therefrom. Such further development does not include changes in scope, systems, kinds and quality of materials, finishes or equipment, all of which, if required, shall be incorporated by Change Order.

§ 3.4.3.7 The Owner shall authorize preparation of revisions to the Contract Documents that incorporate the agreed-upon assumptions contained in Section 3.4.3.5. The Owner shall promptly furnish such revised Contract Documents to the Contractor. The Contractor shall notify the Owner and Architect of any inconsistencies between the agreed-upon assumptions contained in Section 3.4.3.5 and the revised Contract Documents.

§ 3.5 Liquidated damages, if any:
(Insert terms and conditions for liquidated damages, if any.)

$500 per calendar day for substantial completion beyond the time specified in this agreement.

ARTICLE 4 PAYMENT
§ 4.1 Progress Payments
§ 4.1.1 Based upon Applications for Payment submitted to the Architect by the Contractor and Certificates for Payment issued by the Architect, the Owner shall make progress payments on account of the Contract Sum to the Contractor as provided below and elsewhere in the Contract Documents.

§ 4.1.2 The period covered by each Application for Payment shall be one calendar month ending on the last day of the month, or as follows:

§ 4.1.3 Provided that an Application for Payment is received by the Architect not later than the day of a month, the Owner shall make payment of the certified amount to the Contractor not later than the day of the month. If an Application for Payment is received by the Architect after the date fixed above, payment shall be made by the Owner not later than ( ) days after the Architect receives the Application for Payment.
(Federal, state or local laws may require payment within a certain period of time.)

§ 4.1.4 For each progress payment made prior to Substantial Completion of the Work, the Owner may withhold retainage from the payment otherwise due as follows:
(Insert a percentage or amount to be withheld as retainage from each Application for Payment and any terms for reduction of retainage during the course of the Work. The amount of retainage may be limited by governing law.)

§ 4.1.5 Payments due and unpaid under the Contract shall bear interest from the date payment is due at the rate stated below, or in the absence thereof, at the legal rate prevailing from time to time at the place where the Project is located.
(Insert rate of interest agreed upon, if any.)

%

§ 4.2 Final Payment

§ 4.2.1 Final payment, constituting the entire unpaid balance of the Contract Sum, shall be made by the Owner to the Contractor when

.1 the Contractor has fully performed the Contract except for the Contractor's responsibility to correct Work as provided in Section 18.2, and to satisfy other requirements, if any, which extend beyond final payment;

.2 the Contractor has submitted a final accounting for the Cost of the Work, where payment is on the basis of the Cost of the Work with or without a Guaranteed Maximum Price; and

.3 a final Certificate for Payment has been issued by the Architect in accordance with Section 15.7.1.

§ 4.2.2 The Owner's final payment to the Contractor shall be made no later than 30 days after the issuance of the Architect's final Certificate for Payment, or as follows:

ARTICLE 5 DISPUTE RESOLUTION

§ 5.1 Binding Dispute Resolution

For any claim subject to, but not resolved by, mediation pursuant to Section 21.5, the method of binding dispute resolution shall be as follows:
(Check the appropriate box.)

[ ] Arbitration pursuant to Section 21.6 of this Agreement

[ ] Litigation in a court of competent jurisdiction

[ ] Other *(Specify)*

If the Owner and Contractor do not select a method of binding dispute resolution, or do not subsequently agree in writing to a binding dispute resolution method other than litigation, claims will be resolved in a court of competent jurisdiction.

ARTICLE 6 ENUMERATION OF CONTRACT DOCUMENTS

§ 6.1 The Contract Documents are defined in Article 7 and, except for Modifications issued after execution of this Agreement, are enumerated in the sections below.

§ 6.1.1 The Agreement is this executed AIA Document A104™–2017, Standard Abbreviated Form of Agreement Between Owner and Contractor.

§ 6.1.2 AIA Document E203™–2013, Building Information Modeling and Digital Data Exhibit, dated as indicated below:
(Insert the date of the E203–2013 incorporated into this Agreement.)

§ 6.1.3 The Supplementary and other Conditions of the Contract:

Document	Title	Date	Pages

§ 6.1.4 The Specifications:
(Either list the Specifications here or refer to an exhibit attached to this Agreement.)

Section	Title	Date	Pages

§ 6.1.5 The Drawings:
(Either list the Drawings here or refer to an exhibit attached to this Agreement.)

Number	Title	Date

§ 6.1.6 The Addenda, if any:

Number	Date	Pages

Portions of Addenda relating to bidding or proposal requirements are not part of the Contract Documents unless the bidding or proposal requirements are enumerated in this Article 6.

§ 6.1.7 Additional documents, if any, forming part of the Contract Documents:

.1 Other Exhibits:
(Check all boxes that apply.)

[ ] Exhibit A, Determination of the Cost of the Work.

[ ] AIA Document E204™–2017, Sustainable Projects Exhibit, dated as indicated below:
(Insert the date of the E204-2017 incorporated into this Agreement.)

[ ] The Sustainability Plan:

Title	Date	Pages

[ ] Supplementary and other Conditions of the Contract:

Document	Title	Date	Pages

.2 Other documents, if any, listed below:
(List here any additional documents that are intended to form part of the Contract Documents.)

ARTICLE 7 GENERAL PROVISIONS

§ 7.1 The Contract Documents

The Contract Documents are enumerated in Article 6 and consist of this Agreement (including, if applicable, Supplementary and other Conditions of the Contract), Drawings, Specifications, Addenda issued prior to the execution of this Agreement, other documents listed in this Agreement, and Modifications issued after execution of this Agreement. A Modification is (1) a written amendment to the Contract signed by both parties, (2) a Change Order, (3) a Construction Change Directive, or (4) a written order for a minor change in the Work issued by the Architect. The intent of the Contract Documents is to include all items necessary for the proper execution and completion of the Work by the Contractor. The Contract Documents are complementary, and what is required by one shall be as binding as if required by all; performance by the Contractor shall be required to the extent consistent with the Contract Documents and reasonably inferable from them as being necessary to produce the indicated results.

§ 7.2 The Contract

The Contract Documents form the Contract for Construction. The Contract represents the entire and integrated agreement between the parties hereto and supersedes prior negotiations, representations, or agreements, either written or oral. The Contract may be amended or modified only by a Modification. The Contract Documents shall not be construed to create a contractual relationship of any kind between any persons or entities other than the Owner and the Contractor.

§ 7.3 The Work

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

§ 7.4 Instruments of Service

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

§ 7.5 Ownership and use of Drawings, Specifications and Other Instruments of Service

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

§ 7.5.2 The Contractor, Subcontractors, Sub-subcontractors and suppliers are authorized to use and reproduce the Instruments of Service provided to them, subject to the protocols established pursuant to Sections 7.6 and 7.7, solely and exclusively for execution of the Work. All copies made under this authorization shall bear the copyright notice, if any, shown on the Instruments of Service. The Contractor, Subcontractors, Sub-subcontractors, and suppliers may not use the Instruments of Service on other projects or for additions to this Project outside the scope of the Work without the specific written consent of the Owner, Architect and the Architect's consultants.

§ 7.6 Digital Data Use and Transmission

The parties shall agree upon protocols governing the transmission and use of Instruments of Service or any other information or documentation in digital form. The parties will use AIA Document E203™–2013, Building

Information Modeling and Digital Data Exhibit, to establish the protocols for the development, use, transmission, and exchange of digital data.

§ 7.7 Building Information Models Use and Reliance

Any use of, or reliance on, all or a portion of a building information model without agreement to protocols governing the use of, and reliance on, the information contained in the model and without having those protocols set forth in AIA Document E203™–2013, Building Information Modeling and Digital Data Exhibit, and the requisite AIA Document G202™–2013, Project Building Information Modeling Protocol Form, shall be at the using or relying party's sole risk and without liability to the other party and its contractors or consultants, the authors of, or contributors to, the building information model, and each of their agents and employees.

§ 7.8 Severability

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

§ 7.9 Notice

§ 7.9.1 Except as otherwise provided in Section 7.9.2, where the Contract Documents require one party to notify or give notice to the other party, such notice shall be provided in writing to the designated representative of the party to whom the notice is addressed and shall be deemed to have been duly served if delivered in person, by mail, by courier, or by electronic transmission in accordance with AIA Document E203™–2013, Building Information Modeling and Digital Data Exhibit, if completed, or as otherwise set forth below:

(If other than in accordance with AIA Document E203–2013, insert requirements for delivering Notice in electronic format such as name, title and email address of the recipient and whether and how the system will be required to generate a read receipt for the transmission.)

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

§ 7.10 Relationship of the Parties

Where the Contract is based on the Cost of the Work plus the Contractor's Fee, with or without a Guaranteed Maximum Price, the Contractor accepts the relationship of trust and confidence established by this Agreement and covenants with the Owner to cooperate with the Architect and exercise the Contractor's skill and judgment in furthering the interests of the Owner; to furnish efficient business administration and supervision; to furnish at all times an adequate supply of workers and materials; and to perform the Work in an expeditious and economical manner consistent with the Owner's interests. The Owner agrees to furnish and approve, in a timely manner, information required by the Contractor and to make payments to the Contractor in accordance with the requirements of the Contract Documents.

ARTICLE 8 OWNER

§ 8.1 Information and Services Required of the Owner

§ 8.1.1 Prior to commencement of the Work, at the written request by the Contractor, the Owner shall furnish to the Contractor reasonable evidence that the Owner has made financial arrangements to fulfill the Owner's obligations under the Contract. The Contractor shall have no obligation to commence the Work until the Owner provides such evidence. If commencement of the Work is delayed under this Section 8.1.1, the Contract Time shall be extended appropriately.

§ 8.1.2 The Owner shall furnish all necessary surveys and a legal description of the site.

§ 8.1.3 The Contractor shall be entitled to rely on the accuracy of information furnished by the Owner but shall exercise proper precautions relating to the safe performance of the Work.

§ 8.1.4 Except for permits and fees that are the responsibility of the Contractor under the Contract Documents, including those required under Section 9.6.1, the Owner shall secure and pay for other necessary approvals, easements, assessments, and charges required for the construction, use, or occupancy of permanent structures or for permanent changes in existing facilities.

§ 8.2 Owner's Right to Stop the Work

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

§ 8.3 Owner's Right to Carry Out the Work

If the Contractor defaults or neglects to carry out the Work in accordance with the Contract Documents, and fails within a ten-day period after receipt of notice from the Owner to commence and continue correction of such default or neglect with diligence and promptness, the Owner may, without prejudice to any other remedies the Owner may have, correct such default or neglect. Such action by the Owner and amounts charged to the Contractor are both subject to prior approval of the Architect and the Architect may, pursuant to Section 15.4.3, withhold or nullify a Certificate for Payment in whole or in part, to the extent reasonably necessary to reimburse the Owner for the reasonable cost of correcting such deficiencies, including the Owner's expenses and compensation for the Architect's additional services made necessary by such default, neglect, or failure. If the Contractor disagrees with the actions of the Owner or the Architect, or the amounts claimed as costs to the Owner, the Contractor may file a Claim pursuant to Article 21.

ARTICLE 9 CONTRACTOR

§ 9.1 Review of Contract Documents and Field Conditions by Contractor

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

§ 9.1.2 Because the Contract Documents are complementary, the Contractor shall, before starting each portion of the Work, carefully study and compare the various Contract Documents relative to that portion of the Work, as well as the information furnished by the Owner pursuant to Section 8.1.2, shall take field measurements of any existing conditions related to that portion of the Work and shall observe any conditions at the site affecting it. These obligations are for the purpose of facilitating coordination and construction by the Contractor and are not for the purpose of discovering errors, omissions, or inconsistencies in the Contract Documents; however, the Contractor shall promptly report to the Architect any errors, inconsistencies, or omissions discovered by or made known to the Contractor as a request for information in such form as the Architect may require. It is recognized that the Contractor's review is made in the Contractor's capacity as a contractor and not as a licensed design professional unless otherwise specifically provided in the Contract Documents.

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

§ 9.2 Supervision and Construction Procedures

§ 9.2.1 The Contractor shall supervise and direct the Work, using the Contractor's best skill and attention. The Contractor shall be solely responsible for and have control over construction means, methods, techniques, sequences, and procedures, and for coordinating all portions of the Work under the Contract, unless the Contract Documents give other specific instructions concerning these matters.

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

§ 9.3 Labor and Materials

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

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

§ 9.3.3 The Contractor may make a substitution only with the consent of the Owner, after evaluation by the Architect and in accordance with a Modification.

§ 9.4 Warranty

The Contractor warrants to the Owner and Architect that materials and equipment furnished under the Contract will be of good quality and new unless the Contract Documents require or permit otherwise. The Contractor further warrants that the Work will conform to the requirements of the Contract Documents and will be free from defects, except for those inherent in the quality of the Work the Contract Documents require or permit. Work, materials, or equipment not conforming to these requirements may be considered defective. The Contractor's warranty excludes remedy for damage or defect caused by abuse, alterations to the Work not executed by the Contractor, improper or insufficient maintenance, improper operation or normal wear and tear under normal usage. All other warranties required by the Contract Documents shall be issued in the name of the Owner, or shall be transferable to the Owner, and shall commence in accordance with Section 15.6.3.

§ 9.5 Taxes

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

§ 9.6 Permits, Fees, Notices, and Compliance with Laws

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

§ 9.6.2 The Contractor shall comply with and give notices required by applicable laws, statutes, ordinances, codes, rules and regulations, and lawful orders of public authorities applicable to performance of the Work. If the Contractor performs Work knowing it to be contrary to applicable laws, statutes, ordinances, codes, rules and regulations, or lawful orders of public authorities, the Contractor shall assume appropriate responsibility for such Work and shall bear the costs attributable to correction.

§ 9.7 Allowances

The Contractor shall include in the Contract Sum all allowances stated in the Contract Documents. The Owner shall select materials and equipment under allowances with reasonable promptness. Allowance amounts shall include the costs to the Contractor of materials and equipment delivered at the site and all required taxes, less applicable trade discounts. Contractor's costs for unloading and handling at the site, labor, installation, overhead, profit, and other expenses contemplated for stated allowance amounts shall be included in the Contract Sum but not in the allowance.

§ 9.8 Contractor's Construction Schedules

§ 9.8.1 The Contractor, promptly after being awarded the Contract, shall submit for the Owner's and Architect's information a Contractor's construction schedule for the Work. The schedule shall not exceed time limits current under the Contract Documents, shall be revised at appropriate intervals as required by the conditions of the Work and Project, shall be related to the entire Project to the extent required by the Contract Documents, and shall provide for expeditious and practicable execution of the Work.

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

§ 9.9 Submittals

§ 9.9.1 The Contractor shall review for compliance with the Contract Documents and submit to the Architect Shop Drawings, Product Data, Samples, and similar submittals required by the Contract Documents in coordination with the Contractor's construction schedule and in such sequence as to allow the Architect reasonable time for review. By submitting Shop Drawings, Product Data, Samples, and similar submittals, the Contractor represents to the Owner and Architect that the Contractor has (1) reviewed and approved them; (2) determined and verified materials, field measurements, and field construction criteria related thereto, or will do so; and (3) checked and coordinated the information contained within such submittals with the requirements of the Work and of the Contract Documents. The Work shall be in accordance with approved submittals.

§ 9.9.2 Shop Drawings, Product Data, Samples and similar submittals are not Contract Documents.

§ 9.9.3 The Contractor shall not be required to provide professional services that constitute the practice of architecture or engineering unless such services are specifically required by the Contract Documents or unless the Contractor needs to provide such services in order to carry out the Contractor's own responsibilities. If professional design services or certifications by a design professional are specifically required, the Owner and the Architect will specify the performance and design criteria that such services must satisfy. The Contractor shall cause such services or certifications to be provided by an appropriately licensed design professional. If no criteria are specified, the design shall comply with applicable codes and ordinances. Each Party shall be entitled to rely upon the information provided by the other Party. The Architect will review and approve or take other appropriate action on submittals for the limited purpose of checking for conformance with information provided and the design concept expressed in the Contract Documents. The Architect's review of Shop Drawings, Product Data, Samples, and similar submittals shall be for the limited purpose of checking for conformance with information given and the design concept expressed in the Contract Documents. In performing such review, the Architect will approve, or take other appropriate action upon, the Contractor's Shop Drawings, Product Data, Samples, and similar submittals.

§ 9.10 Use of Site

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

§ 9.11 Cutting and Patching

The Contractor shall be responsible for cutting, fitting, or patching required to complete the Work or to make its parts fit together properly.

§ 9.12 Cleaning Up

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

§ 9.13 Access to Work

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

§ 9.14 Royalties, Patents and Copyrights

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

§ 9.15 Indemnification

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

provided that such claim, damage, loss, or expense is attributable to bodily injury, sickness, disease or death, or to injury to or destruction of tangible property (other than the Work itself), but only to the extent caused by the negligent acts or omissions of the Contractor, a Subcontractor, anyone directly or indirectly employed by them, or anyone for whose acts they may be liable, regardless of whether or not such claim, damage, loss, or expense is caused in part by a party indemnified hereunder. Such obligation shall not be construed to negate, abridge, or reduce other rights or obligations of indemnity which would otherwise exist as to a party or person described in this Section 9.15.1.

§ 9.15.2 In claims against any person or entity indemnified under this Section 9.15 by an employee of the Contractor, a Subcontractor, anyone directly or indirectly employed by them, or anyone for whose acts they may be liable, the indemnification obligation under Section 9.15.1 shall not be limited by a limitation on amount or type of damages, compensation or benefits payable by or for the Contractor or Subcontractor under workers' compensation acts, disability benefit acts or other employee benefit acts.

ARTICLE 10 ARCHITECT

§ 10.1 The Architect will provide administration of the Contract as described in the Contract Documents and will be an Owner's representative during construction, until the date the Architect issues the final Certificate for Payment. The Architect will have authority to act on behalf of the Owner only to the extent provided in the Contract Documents, unless otherwise modified in writing in accordance with other provisions of the Contract.

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

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

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

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

§ 10.6 The Architect has authority to reject Work that does not conform to the Contract Documents and to require inspection or testing of the Work.

§ 10.7 The Architect will review and approve or take other appropriate action upon, the Contractor's submittals such as Shop Drawings, Product Data, and Samples, but only for the limited purpose of checking for conformance with information given and the design concept expressed in the Contract Documents.

§ 10.8 The Architect will interpret and decide matters concerning performance under, and requirements of, the Contract Documents on written request of either the Owner or Contractor. The Architect will make initial decisions on all claims, disputes, and other matters in question between the Owner and Contractor but will not be liable for results of any interpretations or decisions rendered in good faith.

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

ARTICLE 11 SUBCONTRACTORS

§ 11.1 A Subcontractor is a person or entity who has a direct contract with the Contractor to perform a portion of the Work at the site.

§ 11.2 Unless otherwise stated in the Contract Documents, the Contractor, as soon as practicable after award of the Contract, shall notify the Owner and Architect of the Subcontractors or suppliers proposed for each of the principal portions of the Work. The Contractor shall not contract with any Subcontractor or supplier to whom the Owner or Architect has made reasonable written objection within ten days after receipt of the Contractor's list of Subcontractors and suppliers. If the proposed but rejected Subcontractor was reasonably capable of performing the Work, the Contract Sum and Contract Time shall be increased or decreased by the difference, if any, occasioned by such change, and an appropriate Change Order shall be issued before commencement of the substitute Subcontractor's Work. The Contractor shall not be required to contract with anyone to whom the Contractor has made reasonable objection.

§ 11.3 Contracts between the Contractor and Subcontractors shall (1) require each Subcontractor, to the extent of the Work to be performed by the Subcontractor, to be bound to the Contractor by the terms of the Contract Documents, and to assume toward the Contractor all the obligations and responsibilities, including the responsibility for safety of the Subcontractor's Work, which the Contractor, by the Contract Documents, assumes toward the Owner and Architect, and (2) allow the Subcontractor the benefit of all rights, remedies and redress against the Contractor that the Contractor, by these Contract Documents, has against the Owner.

ARTICLE 12 CONSTRUCTION BY OWNER OR BY SEPARATE CONTRACTORS

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

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

§ 12.3 The Owner shall be reimbursed by the Contractor for costs incurred by the Owner which are payable to a Separate Contractor because of delays, improperly timed activities, or defective construction of the Contractor. The Owner shall be responsible to the Contractor for costs incurred by the Contractor because of delays, improperly timed activities, damage to the Work, or defective construction of a Separate Contractor.

ARTICLE 13 CHANGES IN THE WORK

§ 13.1 By appropriate Modification, changes in the Work may be accomplished after execution of the Contract. The Owner, without invalidating the Contract, may order changes in the Work within the general scope of the Contract consisting of additions, deletions, or other revisions, with the Contract Sum and Contract Time being adjusted accordingly. Such changes in the Work shall be authorized by written Change Order signed by the Owner, Contractor, and Architect, or by written Construction Change Directive signed by the Owner and Architect. Upon issuance of the Change Order or Construction Change Directive, the Contractor shall proceed promptly with such changes in the Work, unless otherwise provided in the Change Order or Construction Change Directive.

§ 13.2 Adjustments in the Contract Sum and Contract Time resulting from a change in the Work shall be determined by mutual agreement of the parties or, in the case of a Construction Change Directive signed only by the Owner and Architect, by the Contractor's cost of labor, material, equipment, and reasonable overhead and profit, unless the parties agree on another method for determining the cost or credit. Pending final determination of the total cost of a Construction Change Directive, the Contractor may request payment for Work completed pursuant to the Construction Change Directive. The Architect will make an interim determination of the amount of payment due for purposes of certifying the Contractor's monthly Application for Payment. When the Owner and Contractor agree on adjustments to the Contract Sum and Contract Time arising from a Construction Change Directive, the Architect will prepare a Change Order.

§ 13.3 The Architect will have authority to order minor changes in the Work not involving adjustment in the Contract Sum or extension of the Contract Time and not inconsistent with the intent of the Contract Documents. Such changes shall be effected by written order and shall be binding on the Owner and Contractor. The Contractor shall carry out such written orders promptly. If the Contractor believes that the proposed minor change in the Work will affect the Contract Sum or Contract Time, the Contractor shall notify the Architect and shall not proceed to implement the change in the Work.

§ 13.4 If concealed or unknown physical conditions are encountered at the site that differ materially from those indicated in the Contract Documents or from those conditions ordinarily found to exist, the Contract Sum and Contract Time shall be equitably adjusted as mutually agreed between the Owner and Contractor; provided that the Contractor provides notice to the Owner and Architect promptly and before conditions are disturbed.

ARTICLE 14 TIME

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

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

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

§ 14.4 The date of Substantial Completion is the date certified by the Architect in accordance with Section 15.6.3.

§ 14.5 If the Contractor is delayed at any time in the commencement or progress of the Work by (1) changes ordered in the Work; (2) by labor disputes, fire, unusual delay in deliveries, abnormal adverse weather conditions not reasonably anticipatable, unavoidable casualties, or any causes beyond the Contractor's control; or (3) by other causes that the Contractor asserts, and the Architect determines, justify delay, then the Contract Time shall be extended for such reasonable time as the Architect may determine, subject to the provisions of Article 21.

ARTICLE 15 PAYMENTS AND COMPLETION

§ 15.1 Schedule of Values

§ 15.1.1 Where the Contract is based on a Stipulated Sum or the Cost of the Work with a Guaranteed Maximum Price pursuant to Section 3.2 or 3.4, the Contractor shall submit a schedule of values to the Architect before the first Application for Payment, allocating the entire Stipulated Sum or Guaranteed Maximum Price to the various portions of the Work. The schedule of values shall be prepared in the form, and supported by the data to substantiate its accuracy required by the Architect. This schedule of values shall be used as a basis for reviewing the Contractor's Applications for Payment.

§ 15.1.2 The allocation of the Stipulated Sum or Guaranteed Maximum Price under this Section 15.1 shall not constitute a separate stipulated sum or guaranteed maximum price for each individual line item in the schedule of values.

§ 15.2 Control Estimate

§ 15.2.1 Where the Contract Sum is the Cost of the Work, plus the Contractor's Fee without a Guaranteed Maximum Price pursuant to Section 3.3, the Contractor shall prepare and submit to the Owner a Control Estimate within 14 days of executing this Agreement. The Control Estimate shall include the estimated Cost of the Work plus the Contractor's Fee.

§ 15.2.2 The Control Estimate shall include:

- **.1** the documents enumerated in Article 6, including all Modifications thereto;
- **.2** a list of the assumptions made by the Contractor in the preparation of the Control Estimate to supplement the information provided by the Owner and contained in the Contract Documents;
- **.3** a statement of the estimated Cost of the Work organized by trade categories or systems and the Contractor's Fee;

.4 a project schedule upon which the Control Estimate is based, indicating proposed Subcontractors, activity sequences and durations, milestone dates for receipt and approval of pertinent information, schedule of shop drawings and samples, procurement and delivery of materials or equipment the Owner's occupancy requirements, and the date of Substantial Completion; and

.5 a list of any contingency amounts included in the Control Estimate for further development of design and construction.

§ 15.2.3 When the Control Estimate is acceptable to the Owner and Architect, the Owner shall acknowledge it in writing. The Owner's acceptance of the Control Estimate does not imply that the Control Estimate constitutes a Guaranteed Maximum Price.

§ 15.2.4 The Contractor shall develop and implement a detailed system of cost control that will provide the Owner and Architect with timely information as to the anticipated total Cost of the Work. The cost control system shall compare the Control Estimate with the actual cost for activities in progress and estimates for uncompleted tasks and proposed changes. This information shall be reported to the Owner, in writing, no later than the Contractor's first Application for Payment and shall be revised and submitted with each Application for Payment.

§ 15.2.5 The Owner shall authorize preparation of revisions to the Contract Documents that incorporate the agreed-upon assumptions contained in the Control Estimate. The Owner shall promptly furnish such revised Contract Documents to the Contractor. The Contractor shall notify the Owner and Architect of any inconsistencies between the Control Estimate and the revised Contract Documents.

§ 15.3 Applications for Payment

§ 15.3.1 At least ten days before the date established for each progress payment, the Contractor shall submit to the Architect an itemized Application for Payment prepared in accordance with the schedule of values, if required under Section 15.1, for completed portions of the Work. The application shall be notarized, if required; be supported by all data substantiating the Contractor's right to payment that the Owner or Architect require; shall reflect retainage if provided for in the Contract Documents; and include any revised cost control information required by Section 15.2.4. Applications for Payment shall not include requests for payment for portions of the Work for which the Contractor does not intend to pay a Subcontractor or supplier, unless such Work has been performed by others whom the Contractor intends to pay.

§ 15.3.2 With each Application for Payment where the Contract Sum is based upon the Cost of the Work, or the Cost of the Work with a Guaranteed Maximum Price, the Contractor shall submit payrolls, petty cash accounts, receipted invoices or invoices with check vouchers attached, and any other evidence required by the Owner to demonstrate that cash disbursements already made by the Contractor on account of the Cost of the Work equal or exceed progress payments already received by the Contractor plus payrolls for the period covered by the present Application for Payment, less that portion of the progress payments attributable to the Contractor's Fee.

§ 15.3.3 Payments shall be made on account of materials and equipment delivered and suitably stored at the site for subsequent incorporation in the Work. If approved in advance by the Owner, payment may similarly be made for materials and equipment stored, and protected from damage, off the site at a location agreed upon in writing.

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

§ 15.4 Certificates for Payment

§ 15.4.1 The Architect will, within seven days after receipt of the Contractor's Application for Payment, either issue to the Owner a Certificate for Payment, with a copy to the Contractor, for such amount as the Architect determines is properly due, or notify the Contractor and Owner of the Architect's reasons for withholding certification in whole or in part as provided in Section 15.4.3.

§ 15.4.2 The issuance of a Certificate for Payment will constitute a representation by the Architect to the Owner, based on the Architect's evaluations of the Work and the data in the Application for Payment, that, to the best of the

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

§ 15.4.3 The Architect may withhold a Certificate for Payment in whole or in part, to the extent reasonably necessary to protect the Owner, if in the Architect's opinion the representations to the Owner required by Section 15.4.2 cannot be made. If the Architect is unable to certify payment in the amount of the Application, the Architect will notify the Contractor and Owner as provided in Section 15.4.1. If the Contractor and the Architect cannot agree on a revised amount, the Architect will promptly issue a Certificate for Payment for the amount for which the Architect is able to make such representations to the Owner. The Architect may also withhold a Certificate for Payment or, because of subsequently discovered evidence, may nullify the whole or a part of a Certificate for Payment previously issued, to such extent as may be necessary in the Architect's opinion to protect the Owner from loss for which the Contractor is responsible, including loss resulting from acts and omissions described in Section 9.2.2, because of

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

§ 15.4.4 When either party disputes the Architect's decision regarding a Certificate for Payment under Section 15.4.3, in whole or in part, that party may submit a Claim in accordance with Article 21.

§ 15.5 Progress Payments

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

§ 15.5.2 Neither the Owner nor Architect shall have an obligation to pay or see to the payment of money to a Subcontractor or supplier except as may otherwise be required by law.

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

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

§ 15.6 Substantial Completion

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

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

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

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

§ 15.7 Final Completion and Final Payment

§ 15.7.1 Upon receipt of the Contractor's notice that the Work is ready for final inspection and acceptance and upon receipt of a final Application for Payment, the Architect will promptly make such inspection and, when the Architect finds the Work acceptable under the Contract Documents and the Contract fully performed, the Architect will promptly issue a final Certificate for Payment stating that to the best of the Architect's knowledge, information and belief, and on the basis of the Architect's on-site visits and inspections, the Work has been completed in accordance with the Contract Documents and that the entire balance found to be due the Contractor and noted in the final Certificate is due and payable. The Architect's final Certificate for Payment will constitute a further representation that conditions stated in Section 15.7.2 as precedent to the Contractor's being entitled to final payment have been fulfilled.

§ 15.7.2 Final payment shall not become due until the Contractor has delivered to the Owner a complete release of all liens arising out of this Contract or receipts in full covering all labor, materials and equipment for which a lien could be filed, or a bond satisfactory to the Owner to indemnify the Owner against such lien. If such lien remains unsatisfied after payments are made, the Contractor shall refund to the Owner all money that the Owner may be compelled to pay in discharging such lien, including costs and reasonable attorneys' fees.

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

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

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

ARTICLE 16 PROTECTION OF PERSONS AND PROPERTY

§ 16.1 Safety Precautions and Programs

The Contractor shall be responsible for initiating, maintaining, and supervising all safety precautions and programs in connection with the performance of the Contract. The Contractor shall take reasonable precautions for safety of, and shall provide reasonable protection to prevent damage, injury, or loss to

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

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

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

The Contractor shall comply with, and give notices required by, applicable laws, statutes, ordinances, codes, rules and regulations, and lawful orders of public authorities bearing on safety of persons and property and their protection from damage, injury, or loss. The Contractor shall promptly remedy damage and loss to property caused in whole or in part by the Contractor, a Subcontractor, a sub-subcontractor, or anyone directly or indirectly employed by any of them, or by anyone for whose acts they may be liable and for which the Contractor is responsible under Sections 16.1.2 and 16.1.3. The Contractor may make a claim for the cost to remedy the damage or loss to the extent such damage or loss is attributable to acts or omissions of the Owner or Architect or by anyone for whose acts either of them may be liable, and not attributable to the fault or negligence of the Contractor. The foregoing obligations of the Contractor are in addition to the Contractor's obligations under Section 9.15.

§ 16.2 Hazardous Materials and Substances

§ 16.2.1 The Contractor is responsible for compliance with the requirements of the Contract Documents regarding hazardous materials or substances. If the Contractor encounters a hazardous material or substance not addressed in the Contract Documents, and if reasonable precautions will be inadequate to prevent foreseeable bodily injury or death to persons resulting from a material or substance, including but not limited to asbestos or polychlorinated biphenyl (PCB), encountered on the site by the Contractor, the Contractor shall, upon recognizing the condition, immediately stop Work in the affected area and notify the Owner and Architect of the condition. When the material or substance has been rendered harmless, Work in the affected area shall resume upon written agreement of the Owner and Contractor. By Change Order, the Contract Time shall be extended appropriately and the Contract Sum shall be increased in the amount of the Contractor's reasonable additional costs of shutdown, delay, and start-up.

§ 16.2.2 To the fullest extent permitted by law, the Owner shall indemnify and hold harmless the Contractor, Subcontractors, Architect, Architect's consultants, and agents and employees of any of them from and against claims, damages, losses, and expenses, including but not limited to attorneys' fees, arising out of or resulting from performance of the Work in the affected area, if in fact, the material or substance presents the risk of bodily injury or death as described in Section 16.2.1 and has not been rendered harmless, provided that such claim, damage, loss, or expense is attributable to bodily injury, sickness, disease or death, or to injury to or destruction of tangible property (other than the Work itself), except to the extent that such damage, loss, or expense is due to the fault or negligence of the party seeking indemnity.

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

ARTICLE 17 INSURANCE AND BONDS

§ 17.1 Contractor's Insurance

§ 17.1.1 The Contractor shall purchase and maintain insurance of the types and limits of liability, containing the endorsements, and subject to the terms and conditions, as described in this Section 17.1 or elsewhere in the Contract Documents. The Contractor shall purchase and maintain the insurance required by this Agreement from an insurance company or insurance companies lawfully authorized to issue insurance in the jurisdiction where the Project is located. The Contractor shall maintain the required insurance until the expiration of the period for correction of Work as set forth in Section 18.4, unless a different duration is stated below:

§ 17.1.2 Commercial General Liability insurance for the Project written on an occurrence form with policy limits of not less than ($) each occurrence, ($) general aggregate, and ($) aggregate for products-completed operations hazard, providing coverage for claims including

.1 damages because of bodily injury, sickness or disease, including occupational sickness or disease, and death of any person;

.2 personal and advertising injury;

.3 damages because of physical damage to or destruction of tangible property, including the loss of use of such property;

.4 bodily injury or property damage arising out of completed operations; and

.5 the Contractor's indemnity obligations under Section 9.15.

§ 17.1.3 Automobile Liability covering vehicles owned by the Contractor and non-owned vehicles used by the Contractor, with policy limits of not less than ($) per accident, for bodily injury, death of any person, and property damage arising out of the ownership, maintenance, and use of those motor vehicles along with any other statutorily required automobile coverage.

§ 17.1.4 The Contractor may achieve the required limits and coverage for Commercial General Liability and Automobile Liability through a combination of primary and excess or umbrella liability insurance, provided such primary and excess or umbrella insurance policies result in the same or greater coverage as those required under Section 17.1.2 and 17.1.3, and in no event shall any excess or umbrella liability insurance provide narrower coverage than the primary policy. The excess policy shall not require the exhaustion of the underlying limits only through the actual payment by the underlying insurers.

§ 17.1.5 Workers' Compensation at statutory limits.

§ 17.1.6 Employers' Liability with policy limits not less than ($) each accident, ($) each employee, and ($) policy limit.

§ 17.1.7 If the Contractor is required to furnish professional services as part of the Work, the Contractor shall procure Professional Liability insurance covering performance of the professional services, with policy limits of not less than ($) per claim and ($) in the aggregate.

§ 17.1.8 If the Work involves the transport, dissemination, use, or release of pollutants, the Contractor shall procure Pollution Liability insurance, with policy limits of not less than ($) per claim and ($) in the aggregate.

§ 17.1.9 Coverage under Sections 17.1.7 and 17.1.8 may be procured through a Combined Professional Liability and Pollution Liability insurance policy, with combined policy limits of not less than ($) per claim and ($) in the aggregate.

§ 17.1.10 The Contractor shall provide certificates of insurance acceptable to the Owner evidencing compliance with the requirements in this Section 17.1 at the following times: (1) prior to commencement of the Work; (2) upon renewal or replacement of each required policy of insurance; and (3) upon the Owner's written request. An additional certificate evidencing continuation of liability coverage, including coverage for completed operations, shall be submitted with the final Application for Payment and thereafter upon renewal or replacement of such coverage until the expiration of the period required by Section 17.1.1. The certificates will show the Owner as an additional insured on the Contractor's Commercial General Liability and excess or umbrella liability policy.

§ 17.1.11 The Contractor shall disclose to the Owner any deductible or self- insured retentions applicable to any insurance required to be provided by the Contractor.

§ 17.1.12 To the fullest extent permitted by law, the Contractor shall cause the commercial liability coverage required by this Section 17.1 to include (1) the Owner, the Architect, and the Architect's Consultants as additional insureds for claims caused in whole or in part by the Contractor's negligent acts or omissions during the Contractor's operations; and (2) the Owner as an additional insured for claims caused in whole or in part by the Contractor's negligent acts or omissions for which loss occurs during completed operations. The additional insured coverage shall be primary and non-contributory to any of the Owner's general liability insurance policies and shall apply to both ongoing and completed operations. To the extent commercially available, the additional insured coverage shall be no less than that provided by Insurance Services Office, Inc. (ISO) forms CG 20 10 07 04, CG 20 37 07 04, and, with respect to the Architect and the Architect's Consultants, CG 20 32 07 04.

§ 17.1.13 Within three (3) business days of the date the Contractor becomes aware of an impending or actual cancellation or expiration of any insurance required by this Section 17.1, the Contractor shall provide notice to the Owner of such impending or actual cancellation or expiration. Upon receipt of notice from the Contractor, the Owner

shall, unless the lapse in coverage arises from an act or omission of the Owner, have the right to stop the Work until the lapse in coverage has been cured by the procurement of replacement coverage by the Contractor. The furnishing of notice by the Contractor shall not relieve the Contractor of any contractual obligation to provide any required coverage.

§ 17.1.14 Other Insurance Provided by the Contractor
(List below any other insurance coverage to be provided by the Contractor and any applicable limits.)

Coverage	Limits

§ 17.2 Owner's Insurance
§ 17.2.1 Owner's Liability Insurance
The Owner shall be responsible for purchasing and maintaining the Owner's usual liability insurance.

§ 17.2.2 Property Insurance
§ 17.2.2.1 The Owner shall purchase and maintain, from an insurance company or insurance companies lawfully authorized to issue insurance in the jurisdiction where the Project is located, property insurance written on a builder's risk "all-risks" completed value or equivalent policy form and sufficient to cover the total value of the entire Project on a replacement cost basis. The Owner's property insurance coverage shall be no less than the amount of the initial Contract Sum, plus the value of subsequent Modifications and labor performed or materials or equipment supplied by others. The property insurance shall be maintained until Substantial Completion and thereafter as provided in Section 17.2.2.2, unless otherwise provided in the Contract Documents or otherwise agreed in writing by the parties to this Agreement. This insurance shall include the interests of the Owner, Contractor, Subcontractors, and Sub-subcontractors in the Project as insureds. This insurance shall include the interests of mortgagees as loss payees.

§ 17.2.2.2 Unless the parties agree otherwise, upon Substantial Completion, the Owner shall continue the insurance required by Section 17.2.2.1 or, if necessary, replace the insurance policy required under Section 17.2.2.1 with property insurance written for the total value of the Project that shall remain in effect until expiration of the period for correction of the Work set forth in Section 18.4.

§ 17.2.2.3 If the insurance required by this Section 17.2.2 is subject to deductibles or self-insured retentions, the Owner shall be responsible for all loss not covered because of such deductibles or retentions.

§ 17.2.2.4 If the Work involves remodeling an existing structure or constructing an addition to an existing structure, the Owner shall purchase and maintain, until the expiration of the period for correction of Work as set forth in Section 18.4, "all-risks" property insurance, on a replacement cost basis, protecting the existing structure against direct physical loss or damage, notwithstanding the undertaking of the Work. The Owner shall be responsible for all co-insurance penalties.

§ 17.2.2.5 Prior to commencement of the Work, the Owner shall secure the insurance, and provide evidence of the coverage, required under this Section 17.2.2 and, upon the Contractor's request, provide a copy of the property insurance policy or policies required by this Section 17.2.2. The copy of the policy or policies provided shall contain all applicable conditions, definitions, exclusions, and endorsements.

§ 17.2.2.6 Within three (3) business days of the date the Owner becomes aware of an impending or actual cancellation or expiration of any insurance required by this Section 17.2.2, the Owner shall provide notice to the Contractor of such impending or actual cancellation or expiration. Unless the lapse in coverage arises from an act or omission of the Contractor: (1) the Contractor, upon receipt of notice from the Owner, shall have the right to stop the Work until the lapse in coverage has been cured by the procurement of replacement coverage by either the Owner or the Contractor; (2) the Contract Time and Contract Sum shall be equitably adjusted; and (3) the Owner waives all rights against the Contractor, Subcontractors, and Sub-subcontractors to the extent any loss to the Owner would have been covered by the insurance had it not expired or been cancelled. If the Contractor purchases replacement coverage, the cost of the insurance shall be charged to the Owner by an appropriate Change Order. The furnishing of notice by the Owner shall not relieve the Owner of any contractual obligation to provide required insurance.

§ 17.2.2.7 Waiver of Subrogation

§ 17.2.2.7.1 The Owner and Contractor waive all rights against (1) each other and any of their subcontractors, sub-subcontractors, agents, and employees, each of the other; (2) the Architect and Architect's consultants; and (3) Separate Contractors, if any, and any of their subcontractors, sub-subcontractors, agents, and employees, for damages caused by fire, or other causes of loss, to the extent those losses are covered by property insurance required by this Agreement or other property insurance applicable to the Project, except such rights as they have to proceeds of such insurance. The Owner or Contractor, as appropriate, shall require similar written waivers in favor of the individuals and entities identified above from the Architect, Architect's consultants, Separate Contractors, subcontractors, and sub-subcontractors. The policies of insurance purchased and maintained by each person or entity agreeing to waive claims pursuant to this Section 17.2.2.7 shall not prohibit this waiver of subrogation. This waiver of subrogation shall be effective as to a person or entity (1) even though that person or entity would otherwise have a duty of indemnification, contractual or otherwise, (2) even though that person or entity did not pay the insurance premium directly or indirectly, or (3) whether or not the person or entity had an insurable interest in the damaged property.

§ 17.2.2.7.2 If during the Project construction period the Owner insures properties, real or personal or both, at or adjacent to the site by property insurance under policies separate from those insuring the Project, or if after final payment property insurance is to be provided on the completed Project through a policy or policies other than those insuring the Project during the construction period, to the extent permissible by such policies, the Owner waives all rights in accordance with the terms of Section 17.2.2.7.1 for damages caused by fire or other causes of loss covered by this separate property insurance.

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

§ 17.2.3 Other Insurance Provided by the Owner

(List below any other insurance coverage to be provided by the Owner and any applicable limits.)

Coverage	Limits

§ 17.3 Performance Bond and Payment Bond

§ 17.3.1 The Owner shall have the right to require the Contractor to furnish bonds covering faithful performance of the Contract and payment of obligations arising thereunder as stipulated in the Contract Documents on the date of execution of the Contract.

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

ARTICLE 18 CORRECTION OF WORK

§ 18.1 The Contractor shall promptly correct Work rejected by the Architect or failing to conform to the requirements of the Contract Documents, whether discovered before or after Substantial Completion and whether or not fabricated, installed, or completed. Costs of correcting such rejected Work, including additional testing and inspections, the cost of uncovering and replacement, and compensation for the Architect's services and expenses made necessary thereby, shall be at the Contractor's expense, unless compensable under Section A.1.7.3 in Exhibit A, Determination of the Cost of the Work.

§ 18.2 In addition to the Contractor's obligations under Section 9.4, if, within one year after the date of Substantial Completion of the Work or designated portion thereof or after the date for commencement of warranties established under Section 15.6.3, or by terms of an applicable special warranty required by the Contract Documents, any of the Work is found to be not in accordance with the requirements of the Contract Documents, the Contractor shall correct it promptly after receipt of notice from the Owner to do so unless the Owner has previously given the Contractor a written acceptance of such condition. The Owner shall give such notice promptly after discovery of the condition. During the one-year period for correction of Work, if the Owner fails to notify the Contractor and give the Contractor

an opportunity to make the correction, the Owner waives the rights to require correction by the Contractor and to make a claim for breach of warranty.

§ 18.3 If the Contractor fails to correct nonconforming Work within a reasonable time, the Owner may correct it in accordance with Section 8.3.

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

§ 18.5 The one-year period for correction of Work shall not be extended by corrective Work performed by the Contractor pursuant to this Article 18.

ARTICLE 19 MISCELLANEOUS PROVISIONS

§ 19.1 Assignment of Contract

Neither party to the Contract shall assign the Contract without written consent of the other, except that the Owner may, without consent of the Contractor, assign the Contract to a lender providing construction financing for the Project if the lender assumes the Owner's rights and obligations under the Contract Documents. The Contractor shall execute all consents reasonably required to facilitate such assignment.

§ 19.2 Governing Law

The Contract shall be governed by the law of the place where the Project is located, excluding that jurisdiction's choice of law rules. If the parties have selected arbitration as the method of binding dispute resolution, the Federal Arbitration Act shall govern Section 21.6.

§ 19.3 Tests and Inspections

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

§ 19.4 The Owner's representative:
(Name, address, email address and other information)

§ 19.5 The Contractor's representative:
(Name, address, email address and other information)

§ 19.6 Neither the Owner's nor the Contractor's representative shall be changed without ten days' prior notice to the other party.

ARTICLE 20 TERMINATION OF THE CONTRACT

§ 20.1 Termination by the Contractor

If the Architect fails to certify payment as provided in Section 15.4.1 for a period of 30 days through no fault of the Contractor, or if the Owner fails to make payment as provided in Section 4.1.3 for a period of 30 days, the Contractor may, upon seven additional days' notice to the Owner and the Architect, terminate the Contract and recover from the Owner payment for Work executed, including reasonable overhead and profit, costs incurred by reason of such termination, and damages.

§ 20.2 Termination by the Owner for Cause

§ 20.2.1 The Owner may terminate the Contract if the Contractor

- **.1** repeatedly refuses or fails to supply enough properly skilled workers or proper materials;
- **.2** fails to make payment to Subcontractors for materials or labor in accordance with the respective agreements between the Contractor and the Subcontractors;
- **.3** repeatedly disregards applicable laws, statutes, ordinances, codes, rules and regulations, or lawful orders of a public authority; or
- **.4** otherwise is guilty of substantial breach of a provision of the Contract Documents.

§ 20.2.2 When any of the reasons described in Section 20.2.1 exists, the Owner, upon certification by the Architect that sufficient cause exists to justify such action, may, without prejudice to any other remedy the Owner may have and after giving the Contractor seven days' notice, terminate the Contract and take possession of the site and of all materials, equipment, tools, and construction equipment and machinery thereon owned by the Contractor and may finish the Work by whatever reasonable method the Owner may deem expedient. Upon request of the Contractor, the Owner shall furnish to the Contractor a detailed accounting of the costs incurred by the Owner in finishing the Work.

§ 20.2.3 When the Owner terminates the Contract for one of the reasons stated in Section 20.2.1, the Contractor shall not be entitled to receive further payment until the Work is finished.

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

§ 20.3 Termination by the Owner for Convenience

The Owner may, at any time, terminate the Contract for the Owner's convenience and without cause. The Owner shall pay the Contractor for Work executed; and costs incurred by reason of such termination, including costs attributable to termination of Subcontracts; and a termination fee, if any, as follows:
(Insert the amount of or method for determining the fee payable to the Contractor by the Owner following a termination for the Owner's convenience, if any.)

ARTICLE 21 CLAIMS AND DISPUTES

§ 21.1 Claims, disputes, and other matters in question arising out of or relating to this Contract, including those alleging an error or omission by the Architect but excluding those arising under Section 16.2, shall be referred initially to the Architect for decision. Such matters, except those waived as provided for in Section 21.11 and Sections 15.7.3 and 15.7.4, shall, after initial decision by the Architect or 30 days after submission of the matter to the Architect, be subject to mediation as a condition precedent to binding dispute resolution.

§ 21.2 Notice of Claims

§ 21.2.1 Claims by either the Owner or Contractor, where the condition giving rise to the Claim is first discovered prior to expiration of the period for correction of the Work set forth in Section 18.2, shall be initiated by notice to the

Architect within 21 days after occurrence of the event giving rise to such Claim or within 21 days after the claimant first recognizes the condition giving rise to the Claim, whichever is later.

§ 21.2.2 Claims by either the Owner or Contractor, where the condition giving rise to the Claim is first discovered after expiration of the period for correction of the Work set forth in Section 18.2, shall be initiated by notice to the other party.

§ 21.3 Time Limits on Claims

The Owner and Contractor shall commence all claims and causes of action against the other and arising out of or related to the Contract in accordance with the requirements of the final dispute resolution method selected in this Agreement whether in contract, tort, breach of warranty, or otherwise, within the period specified by applicable law, but in any case not more than 10 years after the date of Substantial Completion of the Work. The Owner and Contractor waive all claims and causes of action not commenced in accordance with this Section 21.3.

§ 21.4 If a claim, dispute or other matter in question relates to or is the subject of a mechanic's lien, the party asserting such matter may proceed in accordance with applicable law to comply with the lien notice or filing deadlines.

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

§ 21.6 If the parties have selected arbitration as the method for binding dispute resolution in this Agreement, any claim, subject to, but not resolved by, mediation shall be subject to arbitration which, unless the parties mutually agree otherwise, shall be administered by the American Arbitration Association, in accordance with the Construction Industry Arbitration Rules in effect on the date of this Agreement. Demand for arbitration shall be made in writing, delivered to the other party to the Contract, and filed with the person or entity administering the arbitration. The award rendered by the arbitrator or arbitrators shall be final, and judgment may be entered upon it in accordance with applicable law in any court having jurisdiction thereof.

§ 21.7 Subject to the rules of the American Arbitration Association or other applicable arbitration rules, either party, at its sole discretion, may consolidate an arbitration conducted under this Agreement with any other arbitration to which it is a party provided that (1) the arbitration agreement governing the other arbitration permits consolidation; (2) the arbitrations to be consolidated substantially involve common questions of law or fact; and (3) the arbitrations employ materially similar procedural rules and methods for selecting arbitrator(s).

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

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

§ 21.10 Continuing Contract Performance

Pending final resolution of a Claim, except as otherwise agreed in writing, the Contractor shall proceed diligently with performance of the Contract and the Owner shall continue to make payments in accordance with the Contract Documents.

§ 21.11 Waiver of Claims for Consequential Damages

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

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

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

This mutual waiver is applicable, without limitation, to all consequential damages due to either party's termination in accordance with Article 20. Nothing contained in this Section 21.11 shall be deemed to preclude an award of liquidated damages, when applicable, in accordance with the requirements of the Contract Documents.

This Agreement entered into as of the day and year first written above.

OWNER *(Signature)*	**CONTRACTOR** *(Signature)*
(Printed name and title)	*(Printed name and title)*

AIA® Document A201® – 2017

General Conditions of the Contract for Construction

for the following PROJECT:
(Name and location or address)

Goldenwest Credit Union - Payson Branch
800 S. 800 W.
Payson, Utah

THE OWNER:
(Name, legal status and address)

Goldenwest Credit Union
5025 S. Adams Ave.
Ogden, Utah 84403

THE ARCHITECT:
(Name, legal status and address)

Studio 333 Architects
333 24th Street
Ogden, Utah 84401

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

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

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

TABLE OF ARTICLES

14 TERMINATION OR SUSPENSION OF THE CONTRACT

15 CLAIMS AND DISPUTES

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

ARTICLE 1 GENERAL PROVISIONS

§ 1.1 Basic Definitions

§ 1.1.1 The Contract Documents

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

§ 1.1.2 The Contract

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

§ 1.1.3 The Work

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

§ 1.1.4 The Project

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

§ 1.1.5 The Drawings

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

§ 1.1.6 The Specifications

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

§ 1.1.7 Instruments of Service

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

§ 1.1.8 Initial Decision Maker

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

§ 1.2 Correlation and Intent of the Contract Documents

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

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

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

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

§ 1.3 Capitalization

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

§ 1.4 Interpretation

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

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

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

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

§ 1.6 Notice

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

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

§ 1.7 Digital Data Use and Transmission

The parties shall agree upon protocols governing the transmission and use of Instruments of Service or any other information or documentation in digital form. The parties will use AIA Document E203™–2013, Building Information Modeling and Digital Data Exhibit, to establish the protocols for the development, use, transmission, and exchange of digital data.

§ 1.8 Building Information Models Use and Reliance

Any use of, or reliance on, all or a portion of a building information model without agreement to protocols governing the use of, and reliance on, the information contained in the model and without having those protocols set forth in AIA Document E203™–2013, Building Information Modeling and Digital Data Exhibit, and the requisite AIA Document

G202™–2013, Project Building Information Modeling Protocol Form, shall be at the using or relying party's sole risk and without liability to the other party and its contractors or consultants, the authors of, or contributors to, the building information model, and each of their agents and employees.

ARTICLE 2 OWNER

§ 2.1 General

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

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

§ 2.2 Evidence of the Owner's Financial Arrangements

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

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

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

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

§ 2.3 Information and Services Required of the Owner

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

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

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

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

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

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

§ 2.4 Owner's Right to Stop the Work

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

§ 2.5 Owner's Right to Carry Out the Work

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

ARTICLE 3 CONTRACTOR

§ 3.1 General

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

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

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

§ 3.2 Review of Contract Documents and Field Conditions by Contractor

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

§ 3.2.2 Because the Contract Documents are complementary, the Contractor shall, before starting each portion of the Work, carefully study and compare the various Contract Documents relative to that portion of the Work, as well as the information furnished by the Owner pursuant to Section 2.3.4, shall take field measurements of any existing conditions related to that portion of the Work, and shall observe any conditions at the site affecting it. These obligations are for the purpose of facilitating coordination and construction by the Contractor and are not for the purpose of discovering errors, omissions, or inconsistencies in the Contract Documents; however, the Contractor shall promptly report to the Architect any errors, inconsistencies or omissions discovered by or made known to the Contractor as a request for information in such form as the Architect may require. It is recognized that the Contractor's review is made in the Contractor's capacity as a contractor and not as a licensed design professional, unless otherwise specifically provided in the Contract Documents.

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

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

§ 3.3 Supervision and Construction Procedures

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

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

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

§ 3.4 Labor and Materials

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

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

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

§ 3.5 Warranty

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

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

§ 3.6 Taxes

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

§ 3.7 Permits, Fees, Notices and Compliance with Laws

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

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

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

§ 3.7.4 Concealed or Unknown Conditions

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

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

§ 3.8 Allowances

§ 3.8.1 The Contractor shall include in the Contract Sum all allowances stated in the Contract Documents. Items covered by allowances shall be supplied for such amounts and by such persons or entities as the Owner may direct, but the Contractor shall not be required to employ persons or entities to whom the Contractor has reasonable objection.

§ 3.8.2 Unless otherwise provided in the Contract Documents,

- **.1** allowances shall cover the cost to the Contractor of materials and equipment delivered at the site and all required taxes, less applicable trade discounts;
- **.2** Contractor's costs for unloading and handling at the site, labor, installation costs, overhead, profit, and other expenses contemplated for stated allowance amounts shall be included in the Contract Sum but not in the allowances; and
- **.3** whenever costs are more than or less than allowances, the Contract Sum shall be adjusted accordingly by Change Order. The amount of the Change Order shall reflect (1) the difference between actual costs and the allowances under Section 3.8.2.1 and (2) changes in Contractor's costs under Section 3.8.2.2.

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

§ 3.9 Superintendent

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

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

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

§ 3.10 Contractor's Construction and Submittal Schedules

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

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

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

§ 3.11 Documents and Samples at the Site

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

delivered to the Architect for submittal to the Owner upon completion of the Work as a record of the Work as constructed.

§ 3.12 Shop Drawings, Product Data and Samples

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

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

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

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

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

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

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

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

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

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

§ 3.12.10.1 If professional design services or certifications by a design professional related to systems, materials, or equipment are specifically required of the Contractor by the Contract Documents, the Owner and the Architect will

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

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

§ 3.13 Use of Site

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

§ 3.14 Cutting and Patching

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

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

§ 3.15 Cleaning Up

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

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

§ 3.16 Access to Work

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

§ 3.17 Royalties, Patents and Copyrights

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

§ 3.18 Indemnification

§ 3.18.1 To the fullest extent permitted by law, the Contractor shall indemnify and hold harmless the Owner, Architect, Architect's consultants, and agents and employees of any of them from and against claims, damages, losses, and expenses, including but not limited to attorneys' fees, arising out of or resulting from performance of the Work, provided that such claim, damage, loss, or expense is attributable to bodily injury, sickness, disease or death, or to injury to or destruction of tangible property (other than the Work itself), but only to the extent caused by the negligent acts or omissions of the Contractor, a Subcontractor, anyone directly or indirectly employed by them, or anyone for whose acts they may be liable, regardless of whether or not such claim, damage, loss, or expense is caused in part by a party indemnified hereunder. Such obligation shall not be construed to negate, abridge, or reduce other rights or obligations of indemnity that would otherwise exist as to a party or person described in this Section 3.18.

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

ARTICLE 4 ARCHITECT

§ 4.1 General

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

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

§ 4.2 Administration of the Contract

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

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

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

§ 4.2.4 Communications

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

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

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

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

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

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

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

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

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

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

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

ARTICLE 5 SUBCONTRACTORS

§ 5.1 Definitions

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

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

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

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

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

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

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

§ 5.3 Subcontractual Relations

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

§ 5.4 Contingent Assignment of Subcontracts

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

- **.1** assignment is effective only after termination of the Contract by the Owner for cause pursuant to Section 14.2 and only for those subcontract agreements that the Owner accepts by notifying the Subcontractor and Contractor; and
- **.2** assignment is subject to the prior rights of the surety, if any, obligated under bond relating to the Contract.

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

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

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

ARTICLE 6 CONSTRUCTION BY OWNER OR BY SEPARATE CONTRACTORS

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

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

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

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

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

§ 6.2 Mutual Responsibility

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

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

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

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

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

§ 6.3 Owner's Right to Clean Up

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

ARTICLE 7 CHANGES IN THE WORK

§ 7.1 General

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

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

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

§ 7.2 Change Orders

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

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

§ 7.3 Construction Change Directives

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

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

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

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

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

.1 Costs of labor, including applicable payroll taxes, fringe benefits required by agreement or custom, workers' compensation insurance, and other employee costs approved by the Architect;

.2 Costs of materials, supplies, and equipment, including cost of transportation, whether incorporated or consumed;

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

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

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

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

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

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

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

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

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

§ 7.4 Minor Changes in the Work

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

ARTICLE 8 TIME

§ 8.1 Definitions

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

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

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

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

§ 8.2 Progress and Completion

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

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

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

§ 8.3 Delays and Extensions of Time

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

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

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

ARTICLE 9 PAYMENTS AND COMPLETION

§ 9.1 Contract Sum

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

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

§ 9.2 Schedule of Values

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

§ 9.3 Applications for Payment

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

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

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

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

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

§ 9.4 Certificates for Payment

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

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

§ 9.5 Decisions to Withhold Certification

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

- **.1** defective Work not remedied;
- **.2** third party claims filed or reasonable evidence indicating probable filing of such claims, unless security acceptable to the Owner is provided by the Contractor;
- **.3** failure of the Contractor to make payments properly to Subcontractors or suppliers for labor, materials or equipment;

.4 reasonable evidence that the Work cannot be completed for the unpaid balance of the Contract Sum;
.5 damage to the Owner or a Separate Contractor;
.6 reasonable evidence that the Work will not be completed within the Contract Time, and that the unpaid balance would not be adequate to cover actual or liquidated damages for the anticipated delay; or
.7 repeated failure to carry out the Work in accordance with the Contract Documents.

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

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

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

§ 9.6 Progress Payments

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

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

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

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

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

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

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

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

§ 9.7 Failure of Payment

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

§ 9.8 Substantial Completion

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

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

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

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

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

§ 9.9 Partial Occupancy or Use

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

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

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

§ 9.10 Final Completion and Final Payment

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

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

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

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

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

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

ARTICLE 10 PROTECTION OF PERSONS AND PROPERTY

§ 10.1 Safety Precautions and Programs

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

§ 10.2 Safety of Persons and Property

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

.1 employees on the Work and other persons who may be affected thereby;
.2 the Work and materials and equipment to be incorporated therein, whether in storage on or off the site, under care, custody, or control of the Contractor, a Subcontractor, or a Sub-subcontractor; and
.3 other property at the site or adjacent thereto, such as trees, shrubs, lawns, walks, pavements, roadways, structures, and utilities not designated for removal, relocation, or replacement in the course of construction.

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

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

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

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

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

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

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

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

§ 10.3.2 Upon receipt of the Contractor's notice, the Owner shall obtain the services of a licensed laboratory to verify the presence or absence of the material or substance reported by the Contractor and, in the event such material or substance is found to be present, to cause it to be rendered harmless. Unless otherwise required by the Contract Documents, the Owner shall furnish in writing to the Contractor and Architect the names and qualifications of persons or entities who are to perform tests verifying the presence or absence of the material or substance or who are to perform the task of removal or safe containment of the material or substance. The Contractor and the Architect will

promptly reply to the Owner in writing stating whether or not either has reasonable objection to the persons or entities proposed by the Owner. If either the Contractor or Architect has an objection to a person or entity proposed by the Owner, the Owner shall propose another to whom the Contractor and the Architect have no reasonable objection. When the material or substance has been rendered harmless, Work in the affected area shall resume upon written agreement of the Owner and Contractor. By Change Order, the Contract Time shall be extended appropriately and the Contract Sum shall be increased by the amount of the Contractor's reasonable additional costs of shutdown, delay, and start-up.

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

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

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

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

§ 10.4 Emergencies

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

ARTICLE 11 INSURANCE AND BONDS

§ 11.1 Contractor's Insurance and Bonds

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

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

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

§ 11.1.4 Notice of Cancellation or Expiration of Contractor's Required Insurance. Within three (3) business days of the date the Contractor becomes aware of an impending or actual cancellation or expiration of any insurance required by the Contract Documents, the Contractor shall provide notice to the Owner of such impending or actual cancellation or expiration. Upon receipt of notice from the Contractor, the Owner shall, unless the lapse in coverage arises from an act

or omission of the Owner, have the right to stop the Work until the lapse in coverage has been cured by the procurement of replacement coverage by the Contractor. The furnishing of notice by the Contractor shall not relieve the Contractor of any contractual obligation to provide any required coverage.

§ 11.2 Owner's Insurance

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

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

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

§ 11.3 Waivers of Subrogation

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

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

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

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

§11.5 Adjustment and Settlement of Insured Loss

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

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

ARTICLE 12 UNCOVERING AND CORRECTION OF WORK

§ 12.1 Uncovering of Work

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

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

§ 12.2 Correction of Work

§ 12.2.1 Before Substantial Completion

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

§ 12.2.2 After Substantial Completion

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

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

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

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

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

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

§ 12.3 Acceptance of Nonconforming Work

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

ARTICLE 13 MISCELLANEOUS PROVISIONS

§ 13.1 Governing Law

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

§ 13.2 Successors and Assigns

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

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

§ 13.3 Rights and Remedies

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

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

§ 13.4 Tests and Inspections

§ 13.4.1 Tests, inspections, and approvals of portions of the Work shall be made as required by the Contract Documents and by applicable laws, statutes, ordinances, codes, rules, and regulations or lawful orders of public authorities. Unless otherwise provided, the Contractor shall make arrangements for such tests, inspections, and

approvals with an independent testing laboratory or entity acceptable to the Owner, or with the appropriate public authority, and shall bear all related costs of tests, inspections, and approvals. The Contractor shall give the Architect timely notice of when and where tests and inspections are to be made so that the Architect may be present for such procedures. The Owner shall bear costs of tests, inspections, or approvals that do not become requirements until after bids are received or negotiations concluded. The Owner shall directly arrange and pay for tests, inspections, or approvals where building codes or applicable laws or regulations so require.

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

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

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

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

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

§ 13.5 Interest

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

ARTICLE 14 TERMINATION OR SUSPENSION OF THE CONTRACT

§ 14.1 Termination by the Contractor

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

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

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

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

§ 14.1.4 If the Work is stopped for a period of 60 consecutive days through no act or fault of the Contractor, a Subcontractor, a Sub-subcontractor, or their agents or employees or any other persons or entities performing portions of the Work because the Owner has repeatedly failed to fulfill the Owner's obligations under the Contract Documents with respect to matters important to the progress of the Work, the Contractor may, upon seven additional days' notice to the Owner and the Architect, terminate the Contract and recover from the Owner as provided in Section 14.1.3.

§ 14.2 Termination by the Owner for Cause

§ 14.2.1 The Owner may terminate the Contract if the Contractor

- **.1** repeatedly refuses or fails to supply enough properly skilled workers or proper materials;
- **.2** fails to make payment to Subcontractors or suppliers in accordance with the respective agreements between the Contractor and the Subcontractors or suppliers;
- **.3** repeatedly disregards applicable laws, statutes, ordinances, codes, rules and regulations, or lawful orders of a public authority; or
- **.4** otherwise is guilty of substantial breach of a provision of the Contract Documents.

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

- **.1** Exclude the Contractor from the site and take possession of all materials, equipment, tools, and construction equipment and machinery thereon owned by the Contractor;
- **.2** Accept assignment of subcontracts pursuant to Section 5.4; and
- **.3** Finish the Work by whatever reasonable method the Owner may deem expedient. Upon written request of the Contractor, the Owner shall furnish to the Contractor a detailed accounting of the costs incurred by the Owner in finishing the Work.

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

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

§ 14.3 Suspension by the Owner for Convenience

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

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

- **.1** that performance is, was, or would have been, so suspended, delayed, or interrupted, by another cause for which the Contractor is responsible; or
- **.2** that an equitable adjustment is made or denied under another provision of the Contract.

§ 14.4 Termination by the Owner for Convenience

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

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

- **.1** cease operations as directed by the Owner in the notice;
- **.2** take actions necessary, or that the Owner may direct, for the protection and preservation of the Work; and
- **.3** except for Work directed to be performed prior to the effective date of termination stated in the notice, terminate all existing subcontracts and purchase orders and enter into no further subcontracts and purchase orders.

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

ARTICLE 15 CLAIMS AND DISPUTES

§ 15.1 Claims

§ 15.1.1 Definition

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

§ 15.1.2 Time Limits on Claims

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

§ 15.1.3 Notice of Claims

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

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

§ 15.1.4 Continuing Contract Performance

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

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

§ 15.1.5 Claims for Additional Cost

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

§ 15.1.6 Claims for Additional Time

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

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

§ 15.1.7 Waiver of Claims for Consequential Damages

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

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

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

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

§ 15.2 Initial Decision

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

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

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

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

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

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

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

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

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

§ 15.3 Mediation

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

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

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

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

§ 15.4 Arbitration

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

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

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

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

§ 15.4.4 Consolidation or Joinder

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

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

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

Additions and Deletions Report for

AIA® Document A201® – 2017

This Additions and Deletions Report, as defined on page 1 of the associated document, reproduces below all text the author has added to the standard form AIA document in order to complete it, as well as any text the author may have added to or deleted from the original AIA text. Added text is shown underlined. Deleted text is indicated with a horizontal line through the original AIA text.

Note: This Additions and Deletions Report is provided for information purposes only and is not incorporated into or constitute any part of the associated AIA document. This Additions and Deletions Report and its associated document were generated simultaneously by AIA software at 16:01:33 ET on 05/17/2024.

PAGE 1

Goldenwest Credit Union - Payson Branch
800 S. 800 W.
Payson, Utah

...

Goldenwest Credit Union
5025 S. Adams Ave.
Ogden, Utah 84403

...

Studio 333 Architects
333 24th Street
Ogden, Utah 84401

Certification of Document's Authenticity

AIA® Document D401™ – 2003

I, , hereby certify, to the best of my knowledge, information and belief, that I created the attached final document simultaneously with its associated Additions and Deletions Report and this certification at 16:01:33 ET on 05/17/2024 under Order No. 2114426376 from AIA Contract Documents software and that in preparing the attached final document I made no changes to the original text of AIA® Document A201™ – 2017, General Conditions of the Contract for Construction, other than those additions and deletions shown in the associated Additions and Deletions Report.

_____

(Signed)

_____

(Title)

_____

(Dated)

AIA® Document G702® – 1992

Application and Certificate for Payment

TO OWNER: Goldenwest Credit Union
5025 S. Adams Ave.
Ogden, Utah 84403

PROJECT: Goldenwest Credit Union - Payson Branch
800 S. 800 W.
Payson, Utah

APPLICATION NO: 001
PERIOD TO:

CONTRACT FOR: General Construction
CONTRACT DATE:
PROJECT NOS: 2305 / /

Distribution to:
OWNER: ☒
ARCHITECT: ☒
CONTRACTOR: ☒
FIELD: ☐
OTHER : ☐

FROM CONTRACTOR:

VIA ARCHITECT: Studio 333 Architects
333 24th Street
Ogden, Utah 84401

CONTRACTOR'S APPLICATION FOR PAYMENT

Application is made for payment, as shown below, in connection with the Contract.
AIA Document G703®, Continuation Sheet, is attached.

1. ORIGINAL CONTRACT SUM		$0.00
2. NET CHANGE BY CHANGE ORDERS		$0.00
3. CONTRACT SUM TO DATE (Line 1 ± 2)		$0.00
4. TOTAL COMPLETED & STORED TO DATE (Column G on G703)		$0.00
5. RETAINAGE:		
a. 0 % of Completed Work (Column D + E on G703)	$0.00	
b. 0 % of Stored Material (Column F on G703)	$0.00	
Total Retainage (Lines 5a + 5b or Total in Column I of G703)		$0.00
6. TOTAL EARNED LESS RETAINAGE (Line 4 Less Line 5 Total)		$0.00
7. LESS PREVIOUS CERTIFICATES FOR PAYMENT (Line 6 from prior Certificate)		$0.00
8. CURRENT PAYMENT DUE		$0.00
9. BALANCE TO FINISH, INCLUDING RETAINAGE (Line 3 less Line 6)	$0.00	

CHANGE ORDER SUMMARY	ADDITIONS	DEDUCTIONS
Total changes approved in previous months by Owner	$0.00	$0.00
Total approved this Month	$0.00	$0.00
TOTALS	$0.00	$0.00
NET CHANGES by Change Order		$0.00

The undersigned Contractor certifies that to the best of the Contractor's knowledge, information and belief the Work covered by this Application for Payment has been completed in accordance with the Contract Documents, that all amounts have been paid by the Contractor for Work for which previous Certificates for Payment were issued and payments received from the Owner, and that current payment shown herein is now due.

CONTRACTOR:

By: _____ Date: _____

State of:

County of:

Subscribed and sworn to before me this day of

Notary Public:

My Commission expires:

ARCHITECT'S CERTIFICATE FOR PAYMENT

In accordance with the Contract Documents, based on on-site observations and the data comprising this application, the Architect certifies to the Owner that to the best of the Architect's knowledge, information and belief the Work has progressed as indicated, the quality of the Work is in accordance with the Contract Documents, and the Contractor is entitled to payment of the AMOUNT CERTIFIED.

AMOUNT CERTIFIED $0.00

(Attach explanation if amount certified differs from the amount applied. Initial all figures on this Application and on the Continuation Sheet that are changed to conform with the amount certified.)

ARCHITECT:

By: _____ Date: _____

This Certificate is not negotiable. The AMOUNT CERTIFIED is payable only to the Contractor named herein. Issuance, payment and acceptance of payment are without prejudice to any rights of the Owner or Contractor under this Contract.

AIA Document G703® – 1992

Continuation Sheet

AIA Document G702®, Application and Certification for Payment, or G732™, Application and Certificate for Payment, Construction Manager as Adviser Edition, containing Contractor's signed certification is attached. Use Column I on Contracts where variable retainage for line items may apply.	**APPLICATION NO:** 001 **APPLICATION DATE:** **PERIOD TO:** **ARCHITECT'S PROJECT NO:** 2305

A	B	C	D	E	F	G		H	I
			WORK COMPLETED						
ITEM NO.	DESCRIPTION OF WORK	SCHEDULED VALUE	FROM PREVIOUS APPLICATION (D + E)	THIS PERIOD	MATERIALS PRESENTLY STORED (NOT IN D OR E)	TOTAL COMPLETED AND STORED TO DATE (D + E + F)	% (G÷C)	BALANCE TO FINISH (C - G)	RETAINAGE (IF VARIABLE RATE)
		0.00	0.00	0.00	0.00	0.00	0.00%	0.00	0.00
		0.00	0.00	0.00	0.00	0.00	0.00%	0.00	0.00
		0.00	0.00	0.00	0.00	0.00	0.00%	0.00	0.00
		0.00	0.00	0.00	0.00	0.00	0.00%	0.00	0.00
		0.00	0.00	0.00	0.00	0.00	0.00%	0.00	0.00
		0.00	0.00	0.00	0.00	0.00	0.00%	0.00	0.00
		0.00	0.00	0.00	0.00	0.00	0.00%	0.00	0.00
		0.00	0.00	0.00	0.00	0.00	0.00%	0.00	0.00
		0.00	0.00	0.00	0.00	0.00	0.00%	0.00	0.00
		0.00	0.00	0.00	0.00	0.00	0.00%	0.00	0.00
		0.00	0.00	0.00	0.00	0.00	0.00%	0.00	0.00
		0.00	0.00	0.00	0.00	0.00	0.00%	0.00	0.00
		0.00	0.00	0.00	0.00	0.00	0.00%	0.00	0.00
		0.00	0.00	0.00	0.00	0.00	0.00%	0.00	0.00
		0.00	0.00	0.00	0.00	0.00	0.00%	0.00	0.00
		0.00	0.00	0.00	0.00	0.00	0.00%	0.00	0.00
		0.00	0.00	0.00	0.00	0.00	0.00%	0.00	0.00
		0.00	0.00	0.00	0.00	0.00	0.00%	0.00	0.00
		0.00	0.00	0.00	0.00	0.00	0.00%	0.00	0.00
		0.00	0.00	0.00	0.00	0.00	0.00%	0.00	0.00
	GRAND TOTAL	**$0.00**	**$0.00**	**$0.00**	**$0.00**	**$0.00**	**0.00%**	**$0.00**	**$0.00**

AIA® Document G704® – 2017

Certificate of Substantial Completion

PROJECT: *(name and address)* Goldenwest Credit Union - Payson Branch 800 S. 800 W. Payson, Utah	**CONTRACT INFORMATION:** Contract For: General Construction Date:	**CERTIFICATE INFORMATION:** Certificate Number: 001 Date:
OWNER: *(name and address)* Goldenwest Credit Union 5025 S. Adams Ave. Ogden, Utah 84403	**ARCHITECT:** *(name and address)* Studio 333 Architects 333 24th Street Ogden, Utah 84401	**CONTRACTOR:** *(name and address)*

The Work identified below has been reviewed and found, to the Architect's best knowledge, information, and belief, to be substantially complete. Substantial Completion is the stage in the progress of the Work when the Work or designated portion is sufficiently complete in accordance with the Contract Documents so that the Owner can occupy or utilize the Work for its intended use. The date of Substantial Completion of the Project or portion designated below is the date established by this Certificate.
(Identify the Work, or portion thereof, that is substantially complete.)

Studio 333 Architects		Tony K Pantone, LEED/AP	
ARCHITECT *(Firm Name)*	**SIGNATURE**	**PRINTED NAME AND TITLE**	**DATE OF SUBSTANTIAL COMPLETION**

WARRANTIES
The date of Substantial Completion of the Project or portion designated above is also the date of commencement of applicable warranties required by the Contract Documents, except as stated below:
(Identify warranties that do not commence on the date of Substantial Completion, if any, and indicate their date of commencement.)

WORK TO BE COMPLETED OR CORRECTED
A list of items to be completed or corrected is attached hereto, or transmitted as agreed upon by the parties, and identified as follows:
(Identify the list of Work to be completed or corrected.)

The failure to include any items on such list does not alter the responsibility of the Contractor to complete all Work in accordance with the Contract Documents. Unless otherwise agreed to in writing, the date of commencement of warranties for items on the attached list will be the date of issuance of the final Certificate of Payment or the date of final payment, whichever occurs first. The Contractor will complete or correct the Work on the list of items attached hereto within ( ) days from the above date of Substantial Completion.

Cost estimate of Work to be completed or corrected: $

The responsibilities of the Owner and Contractor for security, maintenance, heat, utilities, damage to the Work, insurance, and other items identified below shall be as follows:
(Note: Owner's and Contractor's legal and insurance counsel should review insurance requirements and coverage.)

The Owner and Contractor hereby accept the responsibilities assigned to them in this Certificate of Substantial Completion:

CONTRACTOR *(Firm Name)*	**SIGNATURE**	**PRINTED NAME AND TITLE**	**DATE**
OWNER *(Firm Name)*	**SIGNATURE**	**PRINTED NAME AND TITLE**	**DATE**

AIA® Document G706® – 1994

Contractor's Affidavit of Payment of Debts and Claims

PROJECT: *(Name and address)* Goldenwest Credit Union - Payson Branch 800 S. 800 W. Payson, Utah	**ARCHITECT'S PROJECT NUMBER:** 2305 **CONTRACT FOR:** General Construction **CONTRACT DATED:**	OWNER: ☒ ARCHITECT: ☒ CONTRACTOR: ☒ SURETY: ☐ OTHER: ☐
TO OWNER: *(Name and address)* Goldenwest Credit Union 5025 S. Adams Ave. Ogden, Utah 84403		

STATE OF: **Utah**
COUNTY OF:

The undersigned hereby certifies that, except as listed below, payment has been made in full and all obligations have otherwise been satisfied for all materials and equipment furnished, for all work, labor, and services performed, and for all known indebtedness and claims against the Contractor for damages arising in any manner in connection with the performance of the Contract referenced above for which the Owner or Owner's property might in any way be held responsible or encumbered.

EXCEPTIONS:

SUPPORTING DOCUMENTS ATTACHED HERETO:

1. Consent of Surety to Final Payment. Whenever Surety is involved, Consent of Surety is required. AIA Document G707, Consent of Surety, may be used for this purpose

Indicate Attachment ☐ Yes ☒ No

The following supporting documents should be attached hereto if required by the Owner:

1. Contractor's Release or Waiver of Liens, conditional upon receipt of final payment.

2. Separate Releases or Waivers of Liens from Subcontractors and material and equipment suppliers, to the extent required by the Owner, accompanied by a list thereof.

3. Contractor's Affidavit of Release of Liens (AIA Document G706A).

CONTRACTOR: *(Name and address)*

BY: _____
(Signature of authorized representative)

_____
(Printed name and title)

Subscribed and sworn to before me on this date:

Notary Public:
My Commission Expires:

AIA® Document G706®A – 1994

Contractor's Affidavit of Release of Liens

PROJECT: *(Name and address)*
Goldenwest Credit Union - Payson Branch
800 S. 800 W.
Payson, Utah
TO OWNER: *(Name and address)*
Goldenwest Credit Union
5025 S. Adams Ave
Ogden, Utah 84403

ARCHITECT'S PROJECT NUMBER:
2305

CONTRACT FOR: General Construction
CONTRACT DATED:

OWNER: ☒
ARCHITECT: ☒
CONTRACTOR: ☒
SURETY: ☐
OTHER: ☐

STATE OF: Utah
COUNTY OF:

The undersigned hereby certifies that to the best of the undersigned's knowledge, information and belief, except as listed below, the Releases or Waivers of Lien attached hereto include the Contractor, all Subcontractors, all suppliers of materials and equipment, and all performers of Work, labor or services who have or may have liens or encumbrances or the right to assert liens or encumbrances against any property of the Owner arising in any manner out of the performance of the Contract referenced above.

EXCEPTIONS:

SUPPORTING DOCUMENTS ATTACHED HERETO:

1. Contractor's Release or Waiver of Liens, conditional upon receipt of final payment.

2. Separate Releases or Waivers of Liens from Subcontractors and material and equipment suppliers, to the extent required by the Owner, accompanied by a list thereof.

CONTRACTOR: *(Name and address)*

BY: _____
(Signature of authorized representative)

_____
(Printed name and title)

Subscribed and sworn to before me on this date:

Notary Public:
My Commission Expires:

AIA® Document G707™ – 1994

Consent Of Surety to Final Payment

PROJECT: *(Name and address)*
Goldenwest Credit Union - Payson Branch
800 S. 800 W.
Payson, Utah

ARCHITECT'S PROJECT NUMBER: 2305

CONTRACT FOR: General Construction

CONTRACT DATED:

OWNER: ☒
ARCHITECT: ☒
CONTRACTOR: ☒
SURETY: ☐
OTHER: ☐

TO OWNER: *(Name and address)*
Goldenwest Credit Union
5025 S. Adams Ave
Ogden, Utah 84403

In accordance with the provisions of the Contract between the Owner and the Contractor as indicated above, the
(*Insert name and address of Surety*)

, SURETY,

on bond of
(Insert name and address of Contractor)

, CONTRACTOR,

hereby approves of the final payment to the Contractor, and agrees that final payment to the Contractor shall not relieve the Surety of any of its obligations to
(Insert name and address of Owner)

, OWNER,

as set forth in said Surety's bond.

IN WITNESS WHEREOF, the Surety has hereunto set its hand on this date:
(Insert in writing the month followed by the numeric date and year.)

(Surety)

(Signature of authorized representative)

Attest:
(Seal):

(Printed name and title)

DIVISION 01 – GENERAL REQUIREMENTS

01 1000	Summary
01 1200	Multiple Contract Summary
01 2500	Substitution Procedures
01 2600	Contract Modification Procedures
01 2900	Payment Procedures
01 3100	Project Management and Coordination
01 3200	Construction Progress Documentation
01 3233	Photographic Documentation
01 3300	Submittal Procedures
01 4000	Quality Requirements
01 4200	References
01 5000	Temporary Facilities and Controls
01 6000	Product Requirements
01 6311	Substitution Request
01 7300	Execution
01 7419	Construction Waste Management and Disposal
01 7700	Closeout Procedures
01 7823	Operation and Maintenance Data
01 7839	Project Record Documents
01 7900	Demonstration and Training

SECTION 01 1000 - SUMMARY

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Project information.
2. Work covered by Contract Documents.
3. Owner-furnished products.
4. Access to site.
5. Work restrictions.
6. Specification and drawing conventions.

B. Related Requirements:

1. Section 01 5000 "Temporary Facilities and Controls" for limitations and procedures governing temporary use of Owner's facilities.

1.3 PROJECT INFORMATION

A. Project Identification: Goldenwest Credit Union – Payson Branch.

1. Project Location: 800 S. 800 W., Payson, Utah.

B. Architect: Studio 333 Architects – 2305

1.4 WORK COVERED BY CONTRACT DOCUMENTS

A. The Work of Project is defined by the Contract Documents and consists of the following:

1. Construction of a new Credit Union Branch Office approximately 3,026 s.f. in size.

B. Type of Contract:

1. Project will be constructed under a single prime contract.

1.5 WORK UNDER SEPARATE CONTRACTS

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

B. Concurrent Work: Owner will award separate contract(s) for the following construction operations at Project site. Those operations will be conducted simultaneously with work under this Contract.

C. Subsequent Work: Owner will award separate contract(s) for the following additional work to be performed at site following Substantial Completion. Completion of that work will depend on successful completion of preparatory work under this Contract.

1. Furnishings and Miscellaneous Equipment.

2. Banking and Security equipment.

1.6 ACCESS TO SITE

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

1.7 WORK RESTRICTIONS

A. Work Restrictions, General: Comply with restrictions on construction operations.

1. Comply with limitations on use of public streets and with other requirements of authorities having jurisdiction.

B. Controlled Substances: Use of tobacco products and other controlled substances within the enclosed building is not permitted.

1.8 SPECIFICATION AND DRAWING CONVENTIONS

A. Specification Content: The Specifications use certain conventions for the style of language and the intended meaning of certain terms, words, and phrases when used in particular situations. These conventions are as follows:

1. Imperative mood and streamlined language are generally used in the Specifications. The words "shall," "shall be," or "shall comply with," depending on the context, are implied where a colon (:) is used within a sentence or phrase.
2. Specification requirements are to be performed by Contractor unless specifically stated otherwise.

B. Division 01 General Requirements: Requirements of Sections in Division 01 apply to the Work of all Sections in the Specifications.

C. Drawing Coordination: Requirements for materials and products identified on Drawings are described in detail in the Specifications. One or more of the following are used on Drawings to identify materials and products:

1. Terminology: Materials and products are identified by the typical generic terms used in the individual Specifications Sections.
2. Abbreviations: Materials and products are identified by abbreviations and scheduled on Drawings.
3. Keynoting: Materials and products are identified by reference keynotes referencing Specification Section numbers found in this Project Manual.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION

SECTION 01 1200 - MULTIPLE CONTRACT SUMMARY

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section includes a summary of each contract, including responsibilities for coordination and temporary facilities and controls.

B. Related Requirements:

1. Section 01 1000 "Summary" for the Work covered by the Contract Documents, restrictions on use of Project site and work restrictions.
2. Section 01 3100 "Project Management and Coordination" for general coordination requirements.

1.3 COORDINATION ACTIVITIES

A. Coordination activities include, but are not limited to, the following:

1. Provide overall coordination of the Work.
2. Coordinate shared access to workspaces.
3. Provide overall coordination of temporary facilities and controls.
4. Coordinate, schedule, and approve interruptions of permanent and temporary utilities, including those necessary to make connections for temporary services.
5. Coordinate construction and operations of the Work with work performed by each Contract and Owner's construction forces.
6. Provide photographic documentation.
7. Provide quality-assurance and quality-control services specified in Section 01 4000 "Quality Requirements."
8. Provide progress cleaning of common areas and coordinate progress cleaning of areas or pieces of equipment where more than one contractor has worked.
9. Coordinate cutting and patching.
10. Coordinate protection of the Work.
11. Coordinate completion of interrelated punch list items.
12. Coordinate preparation of Project record documents if information from more than one contractor is to be integrated with information from other contractors to form one combined record.
13. Coordinate preparation of operation and maintenance manuals if information from more than one contractor is to be integrated with information from other contractors to form one combined record.

PART 2 - PRODUCTS (Not Used)
PART 3 - EXECUTION (Not Used)
END OF SECTION 01 1200

SECTION 01 2500 - SUBSTITUTION PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section includes administrative and procedural requirements for substitutions.

B. Related Requirements:

1. Section 01 6000 "Product Requirements" for requirements for submitting comparable product submittals for products by listed manufacturers.

1.3 DEFINITIONS

A. Substitutions: Changes in products, materials, equipment, and methods of construction from those required by the Contract Documents and proposed by Contractor.

1. Substitutions for Cause: Changes proposed by Contractor that are required due to changed Project conditions, such as unavailability of product, regulatory changes, or unavailability of required warranty terms.
2. Substitutions for Convenience: Changes proposed by Contractor or Owner that are not required in order to meet other Project requirements but may offer advantage to Contractor or Owner.

1.4 ACTION SUBMITTALS

A. Substitution Requests: Submit three copies of each request for consideration. Identify product or fabrication or installation method to be replaced. Include Specification Section number and title and Drawing numbers and titles.

1. Substitution Request Form: Use CSI Form 13.1A.
2. Documentation: Show compliance with requirements for substitutions and the following, as applicable:

a. Statement indicating why specified product or fabrication, or installation cannot be provided, if applicable.
b. Coordination information, including a list of changes or revisions needed to other parts of the Work and to construction performed by Owner and separate contractors, that will be necessary to accommodate proposed substitution.
c. Detailed comparison of significant qualities of proposed substitution with those of the Work specified. Include annotated copy of applicable Specification Section. Significant qualities may include attributes such as performance, weight, size, durability, visual effect, sustainable design characteristics, warranties, and specific features and requirements indicated. Indicate deviations, if any, from the Work specified.
d. Product Data, including drawings and descriptions of products and fabrication and installation procedures.
e. Samples, where applicable or requested.
f. Certificates and qualification data, where applicable or requested.
g. List of similar installations for completed projects with project names and addresses and names and addresses of architects and owners.
h. Material test reports from a qualified testing agency indicating and interpreting test results for compliance with requirements indicated.
i. Research reports evidencing compliance with building code in effect for Project, from ICC-ES.
j. Detailed comparison of Contractor's construction schedule using proposed substitution with products specified for the Work, including effect on the overall Contract Time. If specified product or method of construction cannot be provided within the Contract Time, include letter from manufacturer, on

manufacturer's letterhead, stating date of receipt of purchase order, lack of availability, or delays in delivery.

k. Cost information, including a proposal of change, if any, in the Contract Sum.

l. Contractor's certification that proposed substitution complies with requirements in the Contract Documents except as indicated in substitution request, is compatible with related materials, and is appropriate for applications indicated.

m. Contractor's waiver of rights to additional payment or time that may subsequently become necessary because of failure of proposed substitution to produce indicated results.

3. Architect's Action: If necessary, Architect will request additional information or documentation for evaluation within seven days of receipt of a request for substitution. Architect will notify Contractor of acceptance or rejection of proposed substitution within 15 days of receipt of request, or seven days of receipt of additional information or documentation, whichever is later.

a. Forms of Acceptance: Change Order, Construction Change Directive, or Architect's Supplemental Instructions for minor changes in the Work.

b. Use product specified if Architect does not issue a decision on use of a proposed substitution within time allocated.

1.5 QUALITY ASSURANCE

A. Compatibility of Substitutions: Investigate and document compatibility of proposed substitution with related products and materials. Engage a qualified testing agency to perform compatibility tests recommended by manufacturers.

1.6 PROCEDURES

A. Coordination: Revise or adjust affected work as necessary to integrate work of the approved substitutions.

PART 2 - PRODUCTS

2.1 SUBSTITUTIONS

A. Substitutions for Cause: Submit requests for substitution immediately on discovery of need for change, but not later than 15 days prior to time required for preparation and review of related submittals.

1. Conditions: Architect will consider Contractor's request for substitution when the following conditions are satisfied. If the following conditions are not satisfied, Architect will return requests without action, except to record noncompliance with these requirements:

a. Requested substitution is consistent with the Contract Documents and will produce indicated results.

b. Substitution request is fully documented and properly submitted.

c. Requested substitution will not adversely affect Contractor's construction schedule.

d. Requested substitution has received necessary approvals of authorities having jurisdiction.

e. Requested substitution is compatible with other portions of the Work.

f. Requested substitution has been coordinated with other portions of the Work.

g. Requested substitution provides specified warranty.

h. If requested substitution involves more than one contractor, requested substitution has been coordinated with other portions of the Work, is uniform and consistent, is compatible with other products, and is acceptable to all contractors involved.

B. Substitutions for Convenience: Architect will consider requests for substitution if received within 30 days after commencement of the Work. Requests received after that time may be considered or rejected at discretion of Architect.

1. Conditions: Architect will consider Contractor's request for substitution when the following conditions are satisfied. If the following conditions are not satisfied, Architect will return requests without action, except to record noncompliance with these requirements:

    a. Requested substitution offers Owner a substantial advantage in cost, time, energy conservation, or other considerations, after deducting additional responsibilities Owner must assume. Owner's additional responsibilities may include compensation to Architect for redesign and evaluation services, increased cost of other construction by Owner, and similar considerations.
    b. Requested substitution does not require extensive revisions to the Contract Documents.
    c. Requested substitution is consistent with the Contract Documents and will produce indicated results.
    d. Substitution request is fully documented and properly submitted.
    e. Requested substitution will not adversely affect Contractor's construction schedule.
    f. Requested substitution has received necessary approvals of authorities having jurisdiction.
    g. Requested substitution is compatible with other portions of the Work.
    h. Requested substitution has been coordinated with other portions of the Work.
    i. Requested substitution provides specified warranty.
    j. If requested substitution involves more than one contractor, requested substitution has been coordinated with other portions of the Work, is uniform and consistent, is compatible with other products, and is acceptable to all contractors involved.

PART 3 - EXECUTION (Not Used)

END OF SECTION 01 2500

SECTION 01 2600 - CONTRACT MODIFICATION PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section includes administrative and procedural requirements for handling and processing Contract modifications.

B. Related Requirements:

1. Section 01 2500 "Substitution Procedures" for administrative procedures for handling requests for substitutions made after the Contract award.

1.3 MINOR CHANGES IN THE WORK

A. Architect will issue supplemental instructions authorizing minor changes in the Work, not involving adjustment to the Contract Sum or the Contract Time, on Architect's Standard Form.

1.4 PROPOSAL REQUESTS

A. Owner-Initiated Proposal Requests: Architect will issue a detailed description of proposed changes in the Work that may require adjustment to the Contract Sum or the Contract Time. If necessary, the description will include supplemental or revised Drawings and Specifications.

1. Work Change Proposal Requests issued by Architect are not instructions either to stop work in progress or to execute the proposed change.
2. Within time specified in Proposal Request for 10 days after receipt of Proposal Request, submit a quotation estimating cost adjustments to the Contract Sum and the Contract Time necessary to execute the change.

    a. Include a list of quantities of products required or eliminated and unit costs, with total amount of purchases and credits to be made. If requested, furnish survey data to substantiate quantities.
    b. Indicate applicable taxes, delivery charges, equipment rental, and amounts of trade discounts.
    c. Include costs of labor and supervision directly attributable to the change.
    d. Include an updated Contractor's construction schedule that indicates the effect of the change, including, but not limited to, changes in activity duration, start and finish times, and activity relationship. Use available total float before requesting an extension of the Contract Time.
    e. Quotation Form: Use forms acceptable to Architect.

B. Contractor-Initiated Proposals: If latent or changed conditions require modifications to the Contract, Contractor may initiate a claim by submitting a request for a change to Architect.

1. Include a statement outlining reasons for the change and the effect of the change on the Work. Provide a complete description of the proposed change. Indicate the effect of the proposed change on the Contract Sum and the Contract Time.
2. Include a list of quantities of products required or eliminated and unit costs, with total amount of purchases and credits to be made. If requested, furnish survey data to substantiate quantities.
3. Indicate applicable taxes, delivery charges, equipment rental, and amounts of trade discounts.
4. Include costs of labor and supervision directly attributable to the change.

5. Include an updated Contractor's construction schedule that indicates the effect of the change, including, but not limited to, changes in activity duration, start and finish times, and activity relationship. Use available total float before requesting an extension of the Contract Time.
6. Comply with requirements in Section 01 2500 "Substitution Procedures" if the proposed change requires substitution of one product or system for product or system specified.
7. Proposal Request Form: Use form acceptable to Architect.

1.5 CHANGE ORDER PROCEDURES

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

1.6 CONSTRUCTION CHANGE DIRECTIVE

A. Construction Change Directive: Architect may issue a Construction Change Directive on AIA Document G714. Construction Change Directive instructs Contractor to proceed with a change in the Work, for subsequent inclusion in a Change Order.

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

B. Documentation: Maintain detailed records on a time and material basis of work required by the Construction Change Directive.

1. After completion of change, submit an itemized account and supporting data necessary to substantiate cost and time adjustments to the Contract.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 01 2600

SECTION 01 2900 - PAYMENT PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section includes administrative and procedural requirements necessary to prepare and process Applications for Payment.

B. Related Requirements:

1. Section 01 2600 "Contract Modification Procedures" for administrative procedures for handling changes to the Contract.
2. Section 01 3200 "Construction Progress Documentation" for administrative requirements governing the preparation and submittal of the Contractor's construction schedule.

1.3 DEFINITIONS

A. Schedule of Values: A statement furnished by Contractor allocating portions of the Contract Sum to various portions of the Work and used as the basis for reviewing Contractor's Applications for Payment.

1.4 SCHEDULE OF VALUES

A. Coordination: Coordinate preparation of the schedule of values with preparation of Contractor's construction schedule.

1. Coordinate line items in the schedule of values with other required administrative forms and schedules, including the following:

    a. Application for Payment forms with continuation sheets.
    b. Submittal schedule.
    c. Items required to be indicated as separate activities in Contractor's construction schedule.

2. Submit the schedule of values to Architect at earliest possible date, but no later than seven days before the date scheduled for submittal of initial Applications for Payment.

B. Format and Content: Use Project Manual table of contents as a guide to establish line items for the schedule of values. Provide at least one line item for each Specification Section.

1. Identification: Include the following Project identification on the schedule of values:

    a. Project name and location.
    b. Name of Architect.
    c. Architect's project number.
    d. Contractor's name and address.
    e. Date of submittal.

2. Arrange schedule of values consistent with format of AIA Document G703.
3. Arrange the schedule of values in tabular form with separate columns to indicate the following for each item listed:

    a. Related Specification Section or Division.
    b. Description of the Work.

c. Name of subcontractor.
d. Name of manufacturer or fabricator.
e. Name of supplier.
f. Change Orders (numbers) that affect value.
g. Dollar value of the following, as a percentage of the Contract Sum to nearest one-hundredth percent, adjusted to total 100 percent.

1) Labor.
2) Materials.
3) Equipment.

4. Provide a breakdown of the Contract Sum in enough detail to facilitate continued evaluation of Applications for Payment and progress reports. Coordinate with Project Manual table of contents.
5. Round amounts to nearest whole dollar; total shall equal the Contract Sum.
6. Provide a separate line item in the schedule of values for each part of the Work where Applications for Payment may include materials or equipment purchased or fabricated and stored, but not yet installed.

a. Differentiate between items stored on-site and items stored off-site. If required, include evidence of insurance.

7. Provide separate line items in the schedule of values for initial cost of materials, for each subsequent stage of completion, and for total installed value of that part of the Work.
8. Each item in the schedule of values and Applications for Payment shall be complete. Include total cost and proportionate share of general overhead and profit for each item.

a. Temporary facilities and other major cost items that are not direct cost of actual work-in-place may be shown either as separate line items in the schedule of values or distributed as general overhead expense, at Contractor's option.

9. Schedule Updating: Update and resubmit the schedule of values before the next Applications for Payment when Change Orders or Construction Change Directives result in a change in the Contract Sum.

1.5 APPLICATIONS FOR PAYMENT

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

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

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

C. Application for Payment Forms: Use AIA Document G702 and AIA Document G703 as form for Applications for Payment.

D. Application Preparation: Complete every entry on form. Notarize and execute by a person authorized to sign legal documents on behalf of Contractor. Architect will return incomplete applications without action.

1. Entries shall match data on the schedule of values and Contractor's construction schedule. Use updated schedules if revisions were made.
2. Include amounts for work completed following previous Application for Payment, whether or not payment has been received. Include only amounts for work completed at time of Application for Payment.
3. Include amounts of Change Orders and Construction Change Directives issued before last day of construction period covered by application.
4. Indicate separate amounts for work being carried out under Owner-requested project acceleration.

E. Stored Materials: Include in Application for Payment amounts applied for materials or equipment purchased or fabricated and stored, but not yet installed. Differentiate between items stored on-site and items stored off-site.

1. Provide certificate of insurance, evidence of transfer of title to Owner, and consent of surety to payment, for stored materials.
2. Provide supporting documentation that verifies amount requested, such as paid invoices. Match amount requested with amounts indicated on documentation; do not include overhead and profit on stored materials.
3. Provide summary documentation for stored materials indicating the following:

    a. Value of materials previously stored and remaining stored as of date of previous Applications for Payment.
    b. Value of previously stored materials put in place after date of previous Application for Payment and on or before date of current Application for Payment.
    c. Value of materials stored since date of previous Application for Payment and remaining stored as of date of current Application for Payment.

F. Transmittal: Submit three signed and notarized original copies of each Application for Payment to Architect by a method ensuring receipt within 24 hours. One copy shall include waivers of lien and similar attachments if required.

1. Transmit each copy with a transmittal form listing attachments and recording appropriate information about application.

G. Initial Application for Payment: Administrative actions and submittals that must precede or coincide with submittal of first Application for Payment include the following:

1. List of subcontractors.
2. Schedule of values.
3. Contractor's construction schedule (preliminary if not final).
4. Submittal schedule (preliminary if not final).
5. Copies of building permits.
6. Certificates of insurance and insurance policies.

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

1. Include documentation supporting claim that the Work is substantially complete and a statement showing an accounting of changes to the Contract Sum.

I. Final Payment Application: After completing Project closeout requirements, submit final Application for Payment with releases and supporting documentation not previously submitted and accepted, including, but not limited, to the following:

1. Evidence of completion of Project closeout requirements.
2. Insurance certificates for products and completed operations where required and proof that taxes, fees, and similar obligations were paid.
3. Updated final statement, accounting for final changes to the Contract Sum.
4. AIA Document G706, "Contractor's Affidavit of Payment of Debts and Claims."
5. AIA Document G706A, "Contractor's Affidavit of Release of Liens."
6. AIA Document G707, "Consent of Surety to Final Payment."
7. Evidence that claims have been settled.
8. Final meter readings for utilities, a measured record of stored fuel, and similar data as of date of Substantial Completion or when Owner took possession of and assumed responsibility for corresponding elements of the Work.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 01 2900

SECTION 01 3100 - PROJECT MANAGEMENT AND COORDINATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section includes administrative provisions for coordinating construction operations on Project including, but not limited to, the following:

1. General coordination procedures.
2. Coordination drawings.
3. Requests for Information (RFIs).
4. Project meetings.

B. Each contractor shall participate in coordination requirements. Certain areas of responsibility are assigned to a specific contractor.

C. Related Requirements:

1. Section 01 1200 "Multiple Contract Summary" for a description of the division of work among separate contracts and responsibility for coordination activities not in this Section.
2. Section 01 3200 "Construction Progress Documentation" for preparing and submitting Contractor's construction schedule.
3. Section 01 7300 "Execution" for procedures for coordinating general installation and field-engineering services, including establishment of benchmarks and control points.
4. Section 01 7700 "Closeout Procedures" for coordinating closeout of the Contract.

1.3 DEFINITIONS

A. RFI: Request from Owner, Architect, or Contractor seeking information required by or clarifications of the Contract Documents.

1.4 INFORMATIONAL SUBMITTALS

A. Subcontract List: Prepare a written summary identifying individuals or firms proposed for each portion of the Work, including those who are to furnish products or equipment fabricated to a special design. Include the following information in tabular form:

1. Name, address, and telephone number of entity performing subcontract or supplying products.
2. Number and title of related Specification Section(s) covered by subcontract.
3. Drawing number and detail references, as appropriate, covered by subcontract.

1.5 GENERAL COORDINATION PROCEDURES

A. Coordination: Coordinate construction operations included in different Sections of the Specifications to ensure efficient and orderly installation of each part of the Work. Coordinate construction operations, included in different Sections that depend on each other for proper installation, connection, and operation.

1. Schedule construction operations in sequence required to obtain the best results where installation of one part of the Work depends on installation of other components, before or after its own installation.

2. Coordinate installation of different components to ensure maximum performance and accessibility for required maintenance, service, and repair.
3. Make adequate provisions to accommodate items scheduled for later installation.

B. Prepare memoranda for distribution to each party involved, outlining special procedures required for coordination. Include such items as required notices, reports, and list of attendees at meetings.

1. Prepare similar memoranda for Owner and separate contractors if coordination of their Work is required.

C. Administrative Procedures: Coordinate scheduling and timing of required administrative procedures with other construction activities and activities of other contractors to avoid conflicts and to ensure orderly progress of the Work. Such administrative activities include, but are not limited to, the following:

1. Preparation of Contractor's construction schedule.
2. Preparation of the schedule of values.
3. Installation and removal of temporary facilities and controls.
4. Delivery and processing of submittals.
5. Progress meetings.
6. Preinstallation conferences.
7. Project closeout activities.
8. Startup and adjustment of systems.

D. Conservation: Coordinate construction activities to ensure that operations are carried out with consideration given to conservation of energy, water, and materials. Coordinate use of temporary utilities to minimize waste.

1. Salvage materials and equipment involved in performance of, but not actually incorporated into, the Work. See other Sections for disposition of salvaged materials that are designated as Owner's property.

1.6 COORDINATION DRAWINGS

A. Coordination Drawings, General: Prepare coordination drawings according to requirements in individual Sections, and additionally where installation is not completely shown on Shop Drawings, where limited space availability necessitates coordination, or if coordination is required to facilitate integration of products and materials fabricated or installed by more than one entity.

1. Content: Project-specific information, drawn accurately to a scale large enough to indicate and resolve conflicts. Do not base coordination drawings on standard printed data. Include the following information, as applicable:

a. Use applicable Drawings as a basis for preparation of coordination drawings. Prepare sections, elevations, and details as needed to describe relationship of various systems and components.
b. Coordinate the addition of trade-specific information to the coordination drawings by multiple contractors in a sequence that best provides for coordination of the information and resolution of conflicts between installed components before submitting for review.
c. Indicate functional and spatial relationships of components of architectural, structural, civil, mechanical, and electrical systems.
d. Indicate space requirements for routine maintenance and for anticipated replacement of components during the life of the installation.
e. Show location and size of access doors required for access to concealed dampers, valves, and other controls.
f. Indicate required installation sequences.
g. Indicate dimensions shown on the Drawings. Specifically note dimensions that appear to be in conflict with submitted equipment and minimum clearance requirements. Provide alternate sketches to Architect indicating proposed resolution of such conflicts. Minor dimension changes and difficult installations will not be considered changes to the Contract.

B. Coordination Drawing Organization: Organize coordination drawings as follows:

1. Floor Plans and Reflected Ceiling Plans: Show architectural and structural elements, and mechanical, plumbing, fire-protection, fire-alarm, and electrical Work. Show locations of visible ceiling-mounted devices relative to acoustical ceiling grid. Supplement plan drawings with section drawings where required to adequately represent the Work.
2. Mechanical Rooms: Provide coordination drawings for mechanical rooms showing plans and elevations of mechanical, plumbing, fire-protection, fire-alarm, and electrical equipment.
3. Structural Penetrations: Indicate penetrations and openings required for all disciplines.
4. Review: Architect will review coordination drawings to confirm that the Work is being coordinated, but not for the details of the coordination, which are Contractor's responsibility. If Architect determines that coordination drawings are not being prepared in sufficient scope or detail, or are otherwise deficient, Architect will so inform Contractor, who shall make changes as directed and resubmit.
5. Coordination Drawing Prints: Prepare coordination drawing prints according to requirements in Section 01 3300 "Submittal Procedures."

1.7 REQUESTS FOR INFORMATION (RFIs)

A. General: Immediately on discovery of the need for additional information or interpretation of the Contract Documents, Contractor shall prepare and submit an RFI in the form specified.

1. Architect will return RFIs submitted to Architect by other entities controlled by Contractor with no response.
2. Coordinate and submit RFIs in a prompt manner so as to avoid delays in Contractor's work or work of subcontractors.

B. Content of the RFI: Include a detailed, legible description of item needing information or interpretation and the following:

1. Project name.
2. Project number.
3. Date.
4. Name of Contractor.
5. Name of Architect.
6. RFI number, numbered sequentially.
7. RFI subject.
8. Specification Section number and title and related paragraphs, as appropriate.
9. Drawing number and detail references, as appropriate.
10. Field dimensions and conditions, as appropriate.
11. Contractor's suggested resolution. If Contractor's suggested resolution impacts the Contract Time or the Contract Sum, Contractor shall state impact in the RFI.
12. Contractor's signature.
13. Attachments: Include sketches, descriptions, measurements, photos, Product Data, Shop Drawings, coordination drawings, and other information necessary to fully describe items needing interpretation.

    a. Include dimensions, thicknesses, structural grid references, and details of affected materials, assemblies, and attachments on attached sketches.

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

1. Attachments shall be electronic files in Adobe Acrobat PDF format.

D. Architect's Action: Architect will review each RFI, determine action required, and respond. Allow seven working days for Architect's response for each RFI. RFIs received by Architect after 1:00 p.m. will be considered as received the following working day.

1. The following Contractor-generated RFIs will be returned without action:

    a. Requests for approval of submittals.
    b. Requests for approval of substitutions.
    c. Requests for approval of Contractor's means and methods.

d. Requests for coordination information already indicated in the Contract Documents.
e. Requests for adjustments in the Contract Time or the Contract Sum.
f. Requests for interpretation of Architect's actions on submittals.
g. Incomplete RFIs or inaccurately prepared RFIs.

2. Architect's action may include a request for additional information, in which case Architect's time for response will date from time of receipt of additional information.
3. Architect's action on RFIs that may result in a change to the Contract Time or the Contract Sum may be eligible for Contractor to submit Change Proposal according to Section 01 2600 "Contract Modification Procedures."

a. If Contractor believes the RFI response warrants change in the Contract Time or the Contract Sum, notify Architect in writing within 10 days of receipt of the RFI response.

E. RFI Log: Prepare, maintain, and submit a tabular log of RFIs organized by the RFI number. Submit log monthly. Include the following:

1. Project name.
2. Name and address of Contractor.
3. Name and address of Architect.
4. RFI number including RFIs that were returned without action or withdrawn.
5. RFI description.
6. Date the RFI was submitted.
7. Date Architect's response was received.

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

1. Identification of related Minor Change in the Work, Construction Change Directive, and Proposal Request, as appropriate.

1.8 PROJECT MEETINGS

A. General: Schedule and conduct meetings and conferences at Project site unless otherwise indicated.

1. Attendees: Inform participants and others involved, and individuals whose presence is required, of date and time of each meeting. Notify Owner and Architect of scheduled meeting dates and times.
2. Agenda: Prepare the meeting agenda. Distribute the agenda to all invited attendees.
3. Minutes: Entity responsible for conducting meeting will record significant discussions and agreements achieved. Distribute the meeting minutes to everyone concerned, including Owner and Architect, within three days of the meeting.

B. Preconstruction Conference: Schedule and conduct a preconstruction conference before starting construction, at a time convenient to Owner and Architect, but no later than 15 days after execution of the Agreement.

1. Conduct the conference to review responsibilities and personnel assignments.
2. Attendees: Authorized representatives of Owner, Architect, and their consultants; Contractor and its superintendent; major subcontractors; suppliers; and other concerned parties shall attend the conference. Participants at the conference shall be familiar with Project and authorized to conclude matters relating to the Work.
3. Agenda: Discuss items of significance that could affect progress, including the following:

a. Tentative construction schedule.
b. Critical work sequencing and long-lead items.
c. Lines of communications.
d. Procedures for processing field decisions and Change Orders.
e. Procedures for RFIs.
f. Procedures for testing and inspecting.

g. Procedures for processing Applications for Payment.
h. Submittal procedures.
i. Preparation of record documents.
j. Work restrictions.
k. Working hours.
l. Responsibility for temporary facilities and controls.
m. First aid.
n. Security.
o. Progress cleaning.

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

C. Preinstallation Conferences: Conduct a preinstallation conference at Project site before each construction activity that requires coordination with other construction.

1. Attendees: Installer and representatives of manufacturers and fabricators involved in or affected by the installation and its coordination or integration with other materials and installations that have preceded or will follow, shall attend the meeting. Advise Architect, and Owner's Commissioning Authority of scheduled meeting dates.
2. Agenda: Review progress of other construction activities and preparations for the particular activity under consideration, including requirements for the following:

a. Contract Documents.
b. Options.
c. Related RFIs.
d. Related Change Orders.
e. Submittals.
f. Review of mockups.
g. Possible conflicts.
h. Compatibility requirements.
i. Time schedules.
j. Weather limitations.
k. Manufacturer's written instructions.
l. Acceptability of substrates.
m. Temporary facilities and controls.
n. Space and access limitations.
o. Testing and inspecting requirements.
p. Installation procedures.
q. Coordination with other work.
r. Required performance results.
s. Protection of adjacent work.
t. Protection of construction and personnel.

3. Record significant conference discussions, agreements, and disagreements, including required corrective measures and actions.
4. Reporting: Distribute minutes of the meeting to each party present and to other parties requiring information.
5. Do not proceed with installation if the conference cannot be successfully concluded. Initiate whatever actions are necessary to resolve impediments to performance of the Work and reconvene the conference at earliest feasible date.

D. Progress Meetings: Conduct progress meetings at weekly intervals.

1. Coordinate dates of meetings with preparation of payment requests.
2. Attendees: In addition to representatives of Owner, Architect, each contractor, subcontractor, supplier, and other entity concerned with current progress or involved in planning, coordination, or performance of future activities shall be represented at these meetings. All participants at the meeting shall be familiar with Project and authorized to conclude matters relating to the Work.

3. Agenda: Review and correct or approve minutes of previous progress meeting. Review other items of significance that could affect progress. Include topics for discussion as appropriate to status of Project.

    a. Contractor's Construction Schedule: Review progress since the last meeting. Determine whether each activity is on time, ahead of schedule, or behind schedule, in relation to Contractor's construction schedule. Determine how construction behind schedule will be expedited; secure commitments from parties involved to do so. Discuss whether schedule revisions are required to ensure that current and subsequent activities will be completed within the Contract Time.

        1) Review schedule for next period.

    b. Review present and future needs of each entity present, including the following:

        1) Interface requirements.
        2) Sequence of operations.
        3) Status of submittals.
        4) Temporary facilities and controls.
        5) Progress cleaning.
        6) Quality and work standards.
        7) Status of correction of deficient items.
        8) Field observations.
        9) Status of RFIs.
        10) Status of proposal requests.
        11) Pending changes.
        12) Status of Change Orders.
        13) Pending claims and disputes.
        14) Documentation of information for payment requests.

4. Minutes: Entity responsible for conducting the meeting will record and distribute the meeting minutes to each party present and to parties requiring information.

    a. Schedule Updating: Revise Contractor's construction schedule after each progress meeting where revisions to the schedule have been made or recognized. Issue revised schedule concurrently with the report of each meeting.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 01 3100

SECTION 01 3200 - CONSTRUCTION PROGRESS DOCUMENTATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section includes administrative and procedural requirements for documenting the progress of construction during performance of the Work, including the following:

1. Contractor's construction schedule.
2. Construction schedule updating reports.
3. Daily construction reports.
4. Site condition reports.

B. Related Requirements:

1. Section 01 1200 "Multiple Contract Summary" for preparing a combined Contractor's construction schedule.
2. Section 01 3300 "Submittal Procedures" for submitting schedules and reports.
3. Section 01 4000 "Quality Requirements" for submitting a schedule of tests and inspections.

1.3 DEFINITIONS

A. Activity: A discrete part of a project that can be identified for planning, scheduling, monitoring, and controlling the construction project. Activities included in a construction schedule consume time and resources.

1. Critical Activity: An activity on the critical path that must start and finish on the planned early start and finish times.
2. Predecessor Activity: An activity that precedes another activity in the network.
3. Successor Activity: An activity that follows another activity in the network.

B. Cost Loading: The allocation of the schedule of values for the completion of an activity as scheduled. The sum of costs for all activities must equal the total Contract Sum unless otherwise approved by Architect.

C. CPM: Critical path method, which is a method of planning and scheduling a construction project where activities are arranged based on activity relationships. Network calculations determine when activities can be performed and the critical path of Project.

D. Event: The starting or ending point of an activity.

1.4 INFORMATIONAL SUBMITTALS

A. Format for Submittals: Submit required submittals in the following format:

1. Working electronic copy of schedule file, where indicated.
2. PDF electronic file.

B. Startup Network Diagram: Of size required to display entire network for entire construction period. Show logic ties for activities.

C. Contractor's Construction Schedule: Initial schedule, of size required to display entire schedule for entire construction period.

1. Submit a working electronic copy of schedule, using software indicated, and labeled to comply with requirements for submittals. Include type of schedule (initial or updated) and date on label.

D. Construction Schedule Updating Reports: Submit with Applications for Payment.

E. Daily Construction Reports: Submit at weekly intervals.

F. Site Condition Reports: Submit at time of discovery of differing conditions.

1.5 COORDINATION

A. Coordinate preparation and processing of schedules and reports with performance of construction activities and with scheduling and reporting of separate contractors.

B. Coordinate Contractor's construction schedule with the schedule of values, submittal schedule, progress reports, payment requests, and other required schedules and reports.

1. Secure time commitments for performing critical elements of the Work from entities involved.
2. Coordinate each construction activity in the network with other activities and schedule them in proper sequence.

PART 2 - PRODUCTS

2.1 CONTRACTOR'S CONSTRUCTION SCHEDULE, GENERAL

A. Time Frame: Extend schedule from date established for commencement of the Work to date of final completion.

1. Contract completion date shall not be changed by submission of a schedule that shows an early completion date, unless specifically authorized by Change Order.

B. Milestones: Include milestones indicated in the Contract Documents in schedule, including, but not limited to, the Notice to Proceed, Substantial Completion, and final completion.

C. Upcoming Work Summary: Prepare summary report indicating activities scheduled to occur or commence prior to submittal of next schedule update. Summarize the following issues:

1. Unresolved issues.
2. Unanswered Requests for Information.
3. Rejected or unreturned submittals.
4. Notations on returned submittals.
5. Pending modifications affecting the Work and Contract Time.

D. Recovery Schedule: When periodic update indicates the Work is 14 or more calendar days behind the current approved schedule, submit a separate recovery schedule indicating means by which Contractor intends to regain compliance with the schedule. Indicate changes to working hours, working days, crew sizes, and equipment required to achieve compliance, and date by which recovery will be accomplished.

2.2 CONTRACTOR'S CONSTRUCTION SCHEDULE (GANTT CHART)

A. Gantt-Chart Schedule: Submit a comprehensive, fully developed, horizontal, Gantt-chart-type, Contractor's construction schedule within 30 days of date established for commencement of the Work. Base schedule on the startup construction schedule and additional information received since the start of Project.

B. Preparation: Indicate each significant construction activity separately. Identify first workday of each week with a continuous vertical line.

1. For construction activities that require three months or longer to complete, indicate an estimated completion percentage in 10 percent increments within time bar.

2.3 REPORTS

A. Daily Construction Reports: Prepare a daily construction report recording the following information concerning events at Project site:

1. List of subcontractors at Project site.
2. List of separate contractors at Project site.
3. Approximate count of personnel at Project site.
4. Equipment at Project site.
5. Material deliveries.
6. High and low temperatures and general weather conditions, including presence of rain or snow.
7. Accidents.
8. Meetings and significant decisions.
9. Unusual events (see special reports).
10. Stoppages, delays, shortages, and losses.
11. Meter readings and similar recordings.
12. Emergency procedures.
13. Orders and requests of authorities having jurisdiction.
14. Change Orders received and implemented.
15. Construction Change Directives received and implemented.
16. Services connected and disconnected.
17. Equipment or system tests and startups.
18. Partial completions and occupancies.
19. Substantial Completions authorized.

B. Site Condition Reports: Immediately on discovery of a difference between site conditions and the Contract Documents, prepare and submit a detailed report. Submit with a Request for Information. Include a detailed description of the differing conditions, together with recommendations for changing the Contract Documents.

PART 3 - EXECUTION

3.1 CONTRACTOR'S CONSTRUCTION SCHEDULE

A. Contractor's Construction Schedule Updating: At weekly intervals, update schedule to reflect actual construction progress and activities. Issue schedule one day before each regularly scheduled progress meeting.

1. Revise schedule immediately after each meeting or other activity where revisions have been recognized or made. Issue updated schedule concurrently with the report of each such meeting.
2. Include a report with updated schedule that indicates every change, including, but not limited to, changes in logic, durations, actual starts and finishes, and activity durations.
3. As the Work progresses, indicate final completion percentage for each activity.

B. Distribution: Distribute copies of approved schedule to Architect Owner, separate contractors, testing and inspecting agencies, and other parties identified by Contractor with a need-to-know schedule responsibility.

1. Post copies in Project meeting rooms and temporary field offices.
2. When revisions are made, distribute updated schedules to the same parties and post in the same locations. Delete parties from distribution when they have completed their assigned portion of the Work and are no longer involved in performance of construction activities.

END OF SECTION 01 3200

SECTION 01 3233 - PHOTOGRAPHIC DOCUMENTATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section includes administrative and procedural requirements for the following:

1. Preconstruction photographs.
2. Periodic construction photographs.
3. Final completion construction photographs.

B. Related Requirements:

1. Section 01 3300 "Submittal Procedures" for submitting photographic documentation.
2. Section 01 7700 "Closeout Procedures" for submitting photographic documentation as project record documents at Project closeout.

1.3 INFORMATIONAL SUBMITTALS

A. Digital Photographs: Submit image files within three days of taking photographs.

1. Digital Camera: Minimum sensor resolution of 8 megapixels.
2. Format: Minimum 3200 by 2400 pixels, in unaltered original files, with same aspect ratio as the sensor, uncropped, date and time stamped, in folder named by date of photograph, accompanied by key plan file.
3. Identification: Provide the following information with each image description in file metadata tag:

    a. Name of Project.
    b. Name of Architect.
    c. Name of Contractor.
    d. Date photograph was taken.
    e. Description of vantage point, indicating location, direction (by compass point), and elevation or story of construction.
    f. Unique sequential identifier keyed to accompanying key plan.

PART 2 - PRODUCTS

2.1 PHOTOGRAPHIC MEDIA

A. Digital Images: Provide images in JPG format, produced by a digital camera with minimum sensor size of 8 megapixels, and at an image resolution of not less than 3200 by 2400 pixels.

PART 3 - EXECUTION

3.1 CONSTRUCTION PHOTOGRAPHS

A. General: Take photographs using the maximum range of depth of field, and that are in focus, to clearly show the Work. Photographs with blurry or out-of-focus areas will not be accepted.

B. Digital Images: Submit digital images exactly as originally recorded in the digital camera, without alteration, manipulation, editing, or modifications using image-editing software.

1. Date and Time: Include date and time in file name for each image.
2. Field Office Images: Maintain one set of images accessible in the field office at Project site, available at all times for reference. Identify images in the same manner as those submitted to Architect.

C. Preconstruction Photographs: Before commencement of excavation, take photographs of Project site and surrounding properties, including existing items to remain during construction, from different vantage points, as directed by Architect.

1. Take 20 photographs to show existing conditions on and adjacent to property before starting the Work.

D. Periodic Construction Photographs: Take 20 photographs weekly, with timing each month adjusted to coincide with the cutoff date associated with each Application for Payment. Select vantage points to show status of construction and progress since last photographs were taken.

E. Final Completion Construction Photographs: Take 20 color photographs after date of Substantial Completion for submission as project record documents.

END OF SECTION 01 3233

SECTION 01 3300 - SUBMITTAL PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section includes requirements for the submittal schedule and administrative and procedural requirements for submitting Shop Drawings, Product Data, Samples, and other submittals.

B. Related Requirements:

1. Section 01 2900 "Payment Procedures" for submitting Applications for Payment and the schedule of values.
2. Section 01 3200 "Construction Progress Documentation" for submitting schedules and reports, including Contractor's construction schedule.
3. Section 01 7823 "Operation and Maintenance Data" for submitting operation and maintenance manuals.
4. Section 01 7839 "Project Record Documents" for submitting record Drawings, record Specifications, and record Product Data.

1.3 DEFINITIONS

A. Action Submittals: Written and graphic information and physical samples that require Architect's responsive action. Action submittals are those submittals indicated in individual Specification Sections as "action submittals."

B. Informational Submittals: Written and graphic information and physical samples that do not require Architect's responsive action. Submittals may be rejected for not complying with requirements. Informational submittals are those submittals indicated in individual Specification Sections as "informational submittals."

C. File Transfer Protocol (FTP): Communications protocol that enables transfer of files to and from another computer over a network and that serves as the basis for standard Internet protocols. An FTP site is a portion of a network located outside of network firewalls within which internal and external users are able to access files.

D. Portable Document Format (PDF): An open standard file format licensed by Adobe Systems used for representing documents in a device-independent and display resolution-independent fixed-layout document format.

1.4 ACTION SUBMITTALS

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

1.5 SUBMITTAL ADMINISTRATIVE REQUIREMENTS

A. Architect's Digital Data Files: Electronic digital data files of the Contract Drawings may be provided by Architect for Contractor's use in preparing submittals.

B. Coordination: Coordinate preparation and processing of submittals with performance of construction activities.

1. Coordinate each submittal with fabrication, purchasing, testing, delivery, other submittals, and related activities that require sequential activity.

2. Submit all submittal items required for each Specification Section concurrently unless partial submittals for portions of the Work are indicated on approved submittal schedule.
3. Submit action submittals and informational submittals required by the same Specification Section as separate packages under separate transmittals.
4. Coordinate transmittal of different types of submittals for related parts of the Work so processing will not be delayed because of need to review submittals concurrently for coordination.

    a. Architect reserves the right to withhold action on a submittal requiring coordination with other submittals until related submittals are received.

C. Processing Time: Allow time for submittal review, including time for resubmittals, as follows. Time for review shall commence on Architect's receipt of submittal. No extension of the Contract Time will be authorized because of failure to transmit submittals enough in advance of the Work to permit processing, including resubmittals.

1. Initial Review: Allow 15 days for initial review of each submittal. Allow additional time if coordination with subsequent submittals is required. Architect will advise Contractor when a submittal being processed must be delayed for coordination.
2. Intermediate Review: If intermediate submittal is necessary, process it in same manner as initial submittal.
3. Resubmittal Review: Allow 15 days for review of each resubmittal.

D. Electronic Submittals: Identify and incorporate information in each electronic submittal file as follows:

1. Assemble complete submittal package into a single indexed file incorporating submittal requirements of a single Specification Section and transmittal form with links enabling navigation to each item.
2. Name file with submittal number or other unique identifier, including revision identifier.
3. Provide means for insertion to permanently record Contractor's review and approval markings and action taken by Architect.
4. Transmittal Form for Electronic Submittals: Use Electronic form acceptable to Owner, containing the following information:

    a. Project name.
    b. Date.
    c. Name and address of Architect.
    d. Name of Contractor.
    e. Name of firm or entity that prepared submittal.
    f. Names of subcontractor, manufacturer, and supplier.
    g. Category and type of submittal.
    h. Submittal purpose and description.
    i. Specification Section number and title.
    j. Specification paragraph number or drawing designation and generic name for each of multiple items.
    k. Drawing number and detail references, as appropriate.
    l. Location(s) where product is to be installed, as appropriate.
    m. Related physical samples submitted directly.
    n. Indication of full or partial submittal.
    o. Transmittal number.
    p. Submittal and transmittal distribution record.
    q. Other necessary identification.
    r. Remarks.

E. Options: Identify options requiring selection by Architect.

F. Deviations and Additional Information: On an attached separate sheet, prepared on Contractor's letterhead, record relevant information, requests for data, revisions other than those requested by Architect on previous submittals, and deviations from requirements in the Contract Documents, including minor variations and limitations. Include same identification information as related submittal.

G. Resubmittals: Make resubmittals in same form and number of copies as initial submittal.

1. Note date and content of previous submittal.
2. Note date and content of revision in label or title block and clearly indicate extent of revision.
3. Resubmit submittals until they are marked with approval notation from Architect's action stamp.

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

I. Use for Construction: Retain complete copies of submittals on Project site. Use only final action submittals that are marked with approval notation from Architect's action stamp.

PART 2 - PRODUCTS

2.1 SUBMITTAL PROCEDURES

A. General Submittal Procedure Requirements: Prepare and submit submittals required by individual Specification Sections. Types of submittals are indicated in individual Specification Sections.

1. Submit electronic submittals via email as PDF electronic files.

a. Architect will return annotated file. Annotate and retain one copy of file as an electronic Project record document file.

B. Product Data: Collect information into a single submittal for each element of construction and type of product or equipment.

1. If information must be specially prepared for submittal because standard published data are not suitable for use, submit as Shop Drawings, not as Product Data.
2. Mark each copy of each submittal to show which products and options are applicable.
3. Include the following information, as applicable:

a. Manufacturer's catalog cuts.
b. Manufacturer's product specifications.
c. Standard color charts.
d. Statement of compliance with specified referenced standards.
e. Testing by recognized testing agency.
f. Notation of coordination requirements.

4. For equipment, include the following in addition to the above, as applicable:

a. Wiring diagrams showing factory-installed wiring.
b. Clearances required to other construction, if not indicated on accompanying Shop Drawings.

5. Submit Product Data before or concurrent with Samples.
6. Submit Product Data in the following format:

a. PDF electronic file.

C. Shop Drawings: Prepare Project-specific information, drawn accurately to scale. Do not base Shop Drawings on reproductions of the Contract Documents or standard printed data.

1. Preparation: Fully illustrate requirements in the Contract Documents. Include the following information, as applicable:

a. Identification of products.
b. Schedules.
c. Compliance with specified standards.
d. Notation of coordination requirements.
e. Notation of dimensions established by field measurement.
f. Relationship and attachment to adjoining construction clearly indicated.
g. Seal and signature of professional engineer if specified.

2. Sheet Size: Except for templates, patterns, and similar full-size drawings, submit Shop Drawings on sheets at least 8-1/2 by 11 inches but no larger than 30 by 42 inches.
3. Submit Shop Drawings in the following format:

a. PDF electronic file.

D. Samples: Submit Samples for review of kind, color, pattern, and texture for a check of these characteristics with other elements and for a comparison of these characteristics between submittal and actual component as delivered and installed.

1. Transmit Samples that contain multiple, related components such as accessories together in one submittal package.
2. Identification: Attach label on unexposed side of Samples that includes the following:

a. Generic description of Sample.
b. Product name and name of manufacturer.
c. Sample source.
d. Number and title of applicable Specification Section.
e. Specification paragraph number and generic name of each item.

3. Disposition: Maintain sets of approved Samples at Project site, available for quality-control comparisons throughout the course of construction activity. Sample sets may be used to determine final acceptance of construction associated with each set.

a. Samples not incorporated into the Work, or otherwise designated as Owner's property, are the property of Contractor.

4. Samples for Initial Selection: Submit manufacturer's color charts consisting of units or sections of units showing the full range of colors, textures, and patterns available.

a. Number of Samples: Submit one full set(s) of available choices where color, pattern, texture, or similar characteristics are required to be selected from manufacturer's product line. Architect will return submittal with options selected.

5. Samples for Verification: Submit full-size units or Samples of size indicated, prepared from same material to be used for the Work, cured and finished in manner specified, and physically identical with material or product proposed for use, and that show full range of color and texture variations expected. Samples include, but are not limited to, the following: partial sections of manufactured or fabricated components; small cuts or containers of materials; complete units of repetitively used materials; swatches showing color, texture, and pattern; color range sets; and components used for independent testing and inspection.

a. Number of Samples: Submit three sets of Samples. Architect will retain two Sample sets; remainder will be returned.

1) Submit a single Sample where assembly details, workmanship, fabrication techniques, connections, operation, and other similar characteristics are to be demonstrated.
2) If variation in color, pattern, texture, or other characteristic is inherent in material or product represented by a Sample, submit at least three sets of paired units that show approximate limits of variations.

E. Coordination Drawing Submittals: Comply with requirements specified in Section 01 3100 "Project Management and Coordination."

F. Contractor's Construction Schedule: Comply with requirements specified in Section 01 3200 "Construction Progress Documentation."

G. Application for Payment and Schedule of Values: Comply with requirements specified in Section 01 2900 "Payment Procedures."

H. Test and Inspection Reports and Schedule of Tests and Inspections Submittals: Comply with requirements specified in Section 01 4000 "Quality Requirements."

I. Closeout Submittals and Maintenance Material Submittals: Comply with requirements specified in Section 01 7700 "Closeout Procedures."

J. Maintenance Data: Comply with requirements specified in Section 01 7823 "Operation and Maintenance Data."

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

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

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

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

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

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

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

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

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

1. Name of evaluation organization.
2. Date of evaluation.
3. Time period when report is in effect.
4. Product and manufacturers' names.
5. Description of product.
6. Test procedures and results.
7. Limitations of use.

T. Preconstruction Test Reports: Submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of tests performed before installation of product, for compliance with performance requirements in the Contract Documents.

U. Compatibility Test Reports: Submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of compatibility tests performed before installation of product. Include written recommendations for primers and substrate preparation needed for adhesion.

V. Field Test Reports: Submit written reports indicating and interpreting results of field tests performed either during installation of product or after product is installed in its final location, for compliance with requirements in the Contract Documents.

W. Design Data: Prepare and submit written and graphic information, including, but not limited to, performance and design criteria, list of applicable codes and regulations, and calculations. Include list of assumptions and other performance and design criteria and a summary of loads. Include load diagrams if applicable. Provide name and version of software, if any, used for calculations. Include page numbers.

PART 3 - EXECUTION

3.1 CONTRACTOR'S REVIEW

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

B. Project Closeout and Maintenance Material Submittals: See requirements in Section 01 7700 "Closeout Procedures."

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

3.2 ARCHITECT'S ACTION

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

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

C. Partial submittals prepared for a portion of the Work will be reviewed when use of partial submittals has received prior approval from Architect.

D. Incomplete submittals are unacceptable, will be considered nonresponsive, and will be returned for resubmittal without review.

E. Submittals not required by the Contract Documents may be returned by the Architect without action.

END OF SECTION 01 3300

SECTION 01 4000 - QUALITY REQUIREMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section includes administrative and procedural requirements for quality assurance and quality control.

B. Testing and inspecting services are required to verify compliance with requirements specified or indicated. These services do not relieve Contractor of responsibility for compliance with the Contract Document requirements.

1. Specific quality-assurance and -control requirements for individual construction activities are specified in the Sections that specify those activities. Requirements in those Sections may also cover production of standard products.
2. Specified tests, inspections, and related actions do not limit Contractor's other quality-assurance and -control procedures that facilitate compliance with the Contract Document requirements.
3. Requirements for Contractor to provide quality-assurance and -control services required by Architect, Owner, or authorities having jurisdiction are not limited by provisions of this Section.

1.3 DEFINITIONS

A. Quality-Assurance Services: Activities, actions, and procedures performed before and during execution of the Work to guard against defects and deficiencies and substantiate that proposed construction will comply with requirements.

B. Quality-Control Services: Tests, inspections, procedures, and related actions during and after execution of the Work to evaluate that actual products incorporated into the Work and completed construction comply with requirements. Services do not include contract enforcement activities performed by Architect.

C. Mockups: Full-size physical assemblies that are constructed on-site. Mockups are constructed to verify selections made under Sample submittals; to demonstrate aesthetic effects and, where indicated, qualities of materials and execution; to review coordination, testing, or operation; to show interface between dissimilar materials; and to demonstrate compliance with specified installation tolerances. Mockups are not Samples. Unless otherwise indicated, approved mockups establish the standard by which the Work will be judged.

D. Preconstruction Testing: Tests and inspections performed specifically for Project before products and materials are incorporated into the Work, to verify performance or compliance with specified criteria.

E. Product Testing: Tests and inspections that are performed by an NRTL, an NVLAP, or a testing agency qualified to conduct product testing and acceptable to authorities having jurisdiction, to establish product performance and compliance with specified requirements.

F. Source Quality-Control Testing: Tests and inspections that are performed at the source, e.g., plant, mill, factory, or shop.

G. Field Quality-Control Testing: Tests and inspections that are performed on-site for installation of the Work and for completed Work.

H. Testing Agency: An entity engaged to perform specific tests, inspections, or both. Testing laboratory shall mean the same as testing agency.

I. Installer/Applicator/Erector: Contractor or another entity engaged by Contractor as an employee, Subcontractor, or Sub-subcontractor, to perform a particular construction operation, including installation, erection, application, and similar operations.

1. Use of trade-specific terminology in referring to a trade or entity does not require that certain construction activities be performed by accredited or unionized individuals, or that requirements specified apply exclusively to specific trade(s).

J. Experienced: When used with an entity or individual, "experienced" means having successfully completed a minimum of five previous projects similar in nature, size, and extent to this Project; being familiar with special requirements indicated; and having complied with requirements of authorities having jurisdiction.

1.4 CONFLICTING REQUIREMENTS

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

B. Minimum Quantity or Quality Levels: The quantity or quality level shown or specified shall be the minimum provided or performed. The actual installation may comply exactly with the minimum quantity or quality specified, or it may exceed the minimum within reasonable limits. To comply with these requirements, indicated numeric values are minimum or maximum, as appropriate, for the context of requirements. Refer uncertainties to Architect for a decision before proceeding.

1.5 ACTION SUBMITTALS

A. Shop Drawings: For integrated exterior mockups, provide plans, sections, and elevations, indicating materials and size of mockup construction.

1. Indicate manufacturer and model number of individual components.
2. Provide axonometric drawings for conditions difficult to illustrate in two dimensions.

1.6 INFORMATIONAL SUBMITTALS

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

1.7 REPORTS AND DOCUMENTS

A. Test and Inspection Reports: Prepare and submit certified written reports specified in other Sections. Include the following:

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

B. Manufacturer's Technical Representative's Field Reports: Prepare written information documenting manufacturer's technical representative's tests and inspections specified in other Sections. Include the following:

1. Name, address, and telephone number of technical representative making report.
2. Statement on condition of substrates and their acceptability for installation of product.
3. Statement that products at Project site comply with requirements.
4. Summary of installation procedures being followed, whether they comply with requirements and, if not, what corrective action was taken.
5. Results of operational and other tests and a statement of whether observed performance complies with requirements.
6. Statement whether conditions, products, and installation will affect warranty.
7. Other required items indicated in individual Specification Sections.

C. Factory-Authorized Service Representative's Reports: Prepare written information documenting manufacturer's factory-authorized service representative's tests and inspections specified in other Sections. Include the following:

1. Name, address, and telephone number of factory-authorized service representative making report.
2. Statement that equipment complies with requirements.
3. Results of operational and other tests and a statement of whether observed performance complies with requirements.
4. Statement whether conditions, products, and installation will affect warranty.
5. Other required items indicated in individual Specification Sections.

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

1.8 QUALITY ASSURANCE

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

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

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

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

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

F. Testing Agency Qualifications: An NRTL, an NVLAP, or an independent agency with the experience and capability to conduct testing and inspecting indicated, as documented according to ASTM E 329; and with additional qualifications specified in individual Sections; and, where required by authorities having jurisdiction, that is acceptable to authorities.

1. NRTL: A nationally recognized testing laboratory according to 29 CFR 1910.7.
2. NVLAP: A testing agency accredited according to NIST's National Voluntary Laboratory Accreditation Program.

G. Manufacturer's Technical Representative Qualifications: An authorized representative of manufacturer who is trained and approved by manufacturer to observe and inspect installation of manufacturer's products that are similar in material, design, and extent to those indicated for this Project.

H. Factory-Authorized Service Representative Qualifications: An authorized representative of manufacturer who is trained and approved by manufacturer to inspect installation of manufacturer's products that are similar in material, design, and extent to those indicated for this Project.

1.9 QUALITY CONTROL

A. Owner Responsibilities: Where quality-control services are indicated as Owner's responsibility, Owner will engage a qualified testing agency to perform these services.

1. Owner will furnish Contractor with names, addresses, and telephone numbers of testing agencies engaged and a description of types of testing and inspecting they are engaged to perform.
2. Costs for retesting and reinspecting construction that replaces or is necessitated by work that failed to comply with the Contract Documents will be charged to Contractor.

B. Contractor Responsibilities: Tests and inspections not explicitly assigned to Owner are Contractor's responsibility. Perform additional quality-control activities required to verify that the Work complies with requirements, whether specified or not.

1. Notify testing agencies at least 24 hours in advance of time when Work that requires testing or inspecting will be performed.
2. Where quality-control services are indicated as Contractor's responsibility, submit a certified written report, in duplicate, of each quality-control service.
3. Testing and inspecting requested by Contractor and not required by the Contract Documents are Contractor's responsibility.
4. Submit additional copies of each written report directly to authorities having jurisdiction, when they so direct.

C. Manufacturer's Field Services: Where indicated, engage a factory-authorized service representative to inspect field-assembled components and equipment installation, including service connections. Report results in writing as specified in Section 01 3300 "Submittal Procedures."

D. Manufacturer's Technical Services: Where indicated, engage a manufacturer's technical representative to observe and inspect the Work. Manufacturer's technical representative's services include participation in preinstallation conferences, examination of substrates and conditions, verification of materials, observation of Installer activities, inspection of completed portions of the Work, and submittal of written reports.

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

F. Testing Agency Responsibilities: Cooperate with Architect, Commissioning Authority and Contractor in performance of duties. Provide qualified personnel to perform required tests and inspections.

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

G. Associated Services: Cooperate with agencies performing required tests, inspections, and similar quality-control services, and provide reasonable auxiliary services as requested. Notify agency sufficiently in advance of operations to permit assignment of personnel. Provide the following:

1. Access to the Work.
2. Incidental labor and facilities necessary to facilitate tests and inspections.
3. Adequate quantities of representative samples of materials that require testing and inspecting. Assist agency in obtaining samples.
4. Facilities for storage and field curing of test samples.
5. Delivery of samples to testing agencies.
6. Preliminary design mix proposed for use for material mixes that require control by testing agency.
7. Security and protection for samples and for testing and inspecting equipment at Project site.

H. Coordination: Coordinate sequence of activities to accommodate required quality-assurance and -control services with a minimum of delay and to avoid necessity of removing and replacing construction to accommodate testing and inspecting.

1. Schedule times for tests, inspections, obtaining samples, and similar activities.

1.10 SPECIAL TESTS AND INSPECTIONS

A. Special Tests and Inspections: Owner will engage a qualified testing agency to conduct special tests and inspections required by authorities having jurisdiction as the responsibility of Owner, and as follows:

1. Notifying Architect and Contractor promptly of irregularities and deficiencies observed in the Work during performance of its services.
2. Submitting a certified written report of each test, inspection, and similar quality-control service to Architect and Commissioning Authority with copy to Contractor and to authorities having jurisdiction.
3. Interpreting tests and inspections and stating in each report whether tested and inspected work complies with or deviates from the Contract Documents.
4. Retesting and reinspecting corrected work.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 TEST AND INSPECTION LOG

A. Test and Inspection Log: Prepare a record of tests and inspections. Include the following:

1. Date test or inspection was conducted.
2. Description of the Work tested or inspected.
3. Date test or inspection results were transmitted to Architect.
4. Identification of testing agency or special inspector conducting test or inspection.

B. Maintain log at Project site. Post changes and revisions as they occur. Provide access to test and inspection log for Architect's reference during normal working hours.

3.2 REPAIR AND PROTECTION

A. General: On completion of testing, inspecting, sample taking, and similar services, repair damaged construction and restore substrates and finishes.

1. Provide materials and comply with installation requirements specified in other Specification Sections or matching existing substrates and finishes. Restore patched areas and extend restoration into adjoining areas with durable

seams that are as invisible as possible. Comply with the Contract Document requirements for cutting and patching in Section 01 7300 "Execution."

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

C. Repair and protection are Contractor's responsibility, regardless of the assignment of responsibility for quality-control services.

END OF SECTION 01 4000

SECTION 01 4200 - REFERENCES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 DEFINITIONS

A. General: Basic Contract definitions are included in the Conditions of the Contract.

B. "Approved": When used to convey Architect's action on Contractor's submittals, applications, and requests, "approved" is limited to Architect's duties and responsibilities as stated in the Conditions of the Contract.

C. "Directed": A command or instruction by Architect. Other terms including "requested," "authorized," "selected," "required," and "permitted" have the same meaning as "directed."

D. "Indicated": Requirements expressed by graphic representations or in written form on Drawings, in Specifications, and in other Contract Documents. Other terms including "shown," "noted," "scheduled," and "specified" have the same meaning as "indicated."

E. "Regulations": Laws, ordinances, statutes, and lawful orders issued by authorities having jurisdiction, and rules, conventions, and agreements within the construction industry that control performance of the Work.

F. "Furnish": Supply and deliver to Project site, ready for unloading, unpacking, assembly, installation, and similar operations.

G. "Install": Unload, temporarily store, unpack, assemble, erect, place, anchor, apply, work to dimension, finish, cure, protect, clean, and similar operations at Project site.

H. "Provide": Furnish and install, complete and ready for the intended use.

I. "Project Site": Space available for performing construction activities. The extent of Project site is shown on Drawings and may or may not be identical with the description of the land on which Project is to be built.

1.3 INDUSTRY STANDARDS

A. Applicability of Standards: Unless the Contract Documents include more stringent requirements, applicable construction industry standards have the same force and effect as if bound or copied directly into the Contract Documents to the extent referenced. Such standards are made a part of the Contract Documents by reference.

B. Publication Dates: Comply with standards in effect as of date of the Contract Documents unless otherwise indicated.

1.4 ABBREVIATIONS AND ACRONYMS

A. Industry Organizations: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in the following list. This information is subject to change and is believed to be accurate as of the date of the Contract Documents.

1. AABC - Associated Air Balance Council; www.aabc.com.
2. AAMA - American Architectural Manufacturers Association; www.aamanet.org.
3. AASHTO - American Association of State Highway and Transportation Officials; www.transportation.org.
4. AATCC - American Association of Textile Chemists and Colorists; www.aatcc.org.
5. ABMA - American Bearing Manufacturers Association; www.americanbearings.org.

6. ACI - American Concrete Institute; (Formerly: ACI International); www.concrete.org.
7. ACPA - American Concrete Pipe Association; www.concrete-pipe.org.
8. AEIC - Association of Edison Illuminating Companies, Inc. (The); www.aeic.org.
9. AF&PA - American Forest & Paper Association; www.afandpa.org.
10. AGA - American Gas Association; www.aga.org.
11. AHRI - Air-Conditioning, Heating, and Refrigeration Institute (The); www.ahrinet.org.
12. AI - Asphalt Institute; www.asphaltinstitute.org.
13. AIA - American Institute of Architects (The); www.aia.org.
14. AISC - American Institute of Steel Construction; www.aisc.org.
15. AISI - American Iron and Steel Institute; www.steel.org.
16. AITC - American Institute of Timber Construction; www.aitc-glulam.org.
17. AMCA - Air Movement and Control Association International, Inc.; www.amca.org.
18. ANSI - American National Standards Institute; www.ansi.org.
19. APA - APA - The Engineered Wood Association; www.apawood.org.
20. APA - Architectural Precast Association; www.archprecast.org.
21. ARI - Air-Conditioning & Refrigeration Institute; (See AHRI).
22. ARI - American Refrigeration Institute; (See AHRI).
23. ASCE - American Society of Civil Engineers; www.asce.org.
24. ASCE/SEI - American Society of Civil Engineers/Structural Engineering Institute; (See ASCE).
25. ASHRAE - American Society of Heating, Refrigerating and Air-Conditioning Engineers; www.ashrae.org.
26. ASME - ASME International; (American Society of Mechanical Engineers); www.asme.org.
27. ASSE - American Society of Safety Engineers (The); www.asse.org.
28. ASSE - American Society of Sanitary Engineering; www.asse-plumbing.org.
29. ASTM - ASTM International; (American Society for Testing and Materials International); www.astm.org.
30. ATIS - Alliance for Telecommunications Industry Solutions; www.atis.org.
31. AWI - Architectural Woodwork Institute; www.awinet.org.
32. AWPA - American Wood Protection Association; (Formerly: American Wood-Preservers' Association); www.awpa.com.
33. AWS - American Welding Society; www.aws.org.
34. AWWA - American Water Works Association; www.awwa.org.
35. BHMA - Builders Hardware Manufacturers Association; www.buildershardware.com.
36. BOCA - BOCA; (Building Officials and Code Administrators International Inc.); (See ICC).
37. CDA - Copper Development Association; www.copper.org.
38. CEA - Consumer Electronics Association; www.ce.org.
39. CFFA - Chemical Fabrics & Film Association, Inc.; www.chemicalfabricsandfilm.com.
40. CFSEI - Cold-Formed Steel Engineers Institute; www.cfsei.org.
41. CISCA - Ceilings & Interior Systems Construction Association; www.cisca.org.
42. CISPI - Cast Iron Soil Pipe Institute; www.cispi.org.
43. CPA - Composite Panel Association; www.pbmdf.com.
44. CRI - Carpet and Rug Institute (The); www.carpet-rug.org.
45. CRSI - Concrete Reinforcing Steel Institute; www.crsi.org.
46. CSA - CSA International; (Formerly: IAS - International Approval Services); www.csa-international.org.
47. CSI - Construction Specifications Institute (The); www.csinet.org.
48. CTI - Cooling Technology Institute; (Formerly: Cooling Tower Institute); www.cti.org.
49. CWC - Composite Wood Council; (See CPA).
50. DASMA - Door and Access Systems Manufacturers Association; www.dasma.com.
51. DHI - Door and Hardware Institute; www.dhi.org.
52. ECA - Electronic Components Association; www.ec-central.org.
53. ECAMA - Electronic Components Assemblies & Materials Association; (See ECA).
54. EIA - Electronic Industries Alliance; (See TIA).
55. EIMA - EIFS Industry Members Association; www.eima.com.
56. EJMA - Expansion Joint Manufacturers Association, Inc.; www.ejma.org.
57. EVO - Efficiency Valuation Organization; www.evo-world.org.
58. FM Approvals - FM Approvals LLC; www.fmglobal.com.
59. FM Global - FM Global; (Formerly: FMG - FM Global); www.fmglobal.com.
60. FRSA - Florida Roofing, Sheet Metal & Air Conditioning Contractors Association, Inc.; www.floridaroof.com.

61. FSA - Fluid Sealing Association; www.fluidsealing.com.
62. FSC - Forest Stewardship Council U.S.; www.fscus.org.
63. GA - Gypsum Association; www.gypsum.org.
64. GANA - Glass Association of North America; www.glasswebsite.com.
65. GS - Green Seal; www.greenseal.org.
66. HI - Hydraulic Institute; www.pumps.org.
67. HMMA - Hollow Metal Manufacturers Association; (See NAAMM).
68. HPVA - Hardwood Plywood & Veneer Association; www.hpva.org.
69. HPW - H. P. White Laboratory, Inc.; www.hpwhite.com.
70. IAS - International Approval Services; (See CSA).
71. ICBO - International Conference of Building Officials; (See ICC).
72. ICC - International Code Council; www.iccsafe.org.
73. ICEA - Insulated Cable Engineers Association, Inc.; www.icea.net.
74. ICPA - International Cast Polymer Alliance; www.icpa-hq.org.
75. ICRI - International Concrete Repair Institute, Inc.; www.icri.org.
76. IEC - International Electrotechnical Commission; www.iec.ch.
77. IEEE - Institute of Electrical and Electronics Engineers, Inc. (The); www.ieee.org.
78. IES - Illuminating Engineering Society; (Formerly: Illuminating Engineering Society of North America); www.ies.org.
79. IESNA - Illuminating Engineering Society of North America; (See IES).
80. IEST - Institute of Environmental Sciences and Technology; www.iest.org.
81. IGMA - Insulating Glass Manufacturers Alliance; www.igmaonline.org.
82. Intertek - Intertek Group; (Formerly: ETL SEMCO; Intertek Testing Service NA); www.intertek.com.
83. ISA - International Society of Automation (The); (Formerly: Instrumentation, Systems, and Automation Society); www.isa.org.
84. ISAS - Instrumentation, Systems, and Automation Society (The); (See ISA).
85. ISFA - International Surface Fabricators Association; (Formerly: International Solid Surface Fabricators Association); www.isfanow.org.
86. ISO - International Organization for Standardization; www.iso.org.
87. ISSFA - International Solid Surface Fabricators Association; (See ISFA).
88. ITU - International Telecommunication Union; www.itu.int/home.
89. KCMA - Kitchen Cabinet Manufacturers Association; www.kcma.org.
90. LMA - Laminating Materials Association; (See CPA).
91. LPI - Lightning Protection Institute; www.lightning.org.
92. MBMA - Metal Building Manufacturers Association; www.mbma.com.
93. MCA - Metal Construction Association; www.metalconstruction.org.
94. MFMA - Metal Framing Manufacturers Association, Inc.; www.metalframingmfg.org.
95. MHIA - Material Handling Industry of America; www.mhia.org.
96. MIA - Marble Institute of America; www.marble-institute.com.
97. MMPA - Moulding & Millwork Producers Association; (Formerly: Wood Moulding & Millwork Producers Association); www.wmmpa.com.
98. MPI - Master Painters Institute; www.paintinfo.com.
99. MSS - Manufacturers Standardization Society of The Valve and Fittings Industry Inc.; www.mss-hq.org.
100. NAAMM - National Association of Architectural Metal Manufacturers; www.naamm.org.
101. NACE - NACE International; (National Association of Corrosion Engineers International); www.nace.org.
102. NADCA - National Air Duct Cleaners Association; www.nadca.com.
103. NAIMA - North American Insulation Manufacturers Association; www.naima.org.
104. NBGQA - National Building Granite Quarries Association, Inc.; www.nbgqa.com.
105. NCMA - National Concrete Masonry Association; www.ncma.org.
106. NEBB - National Environmental Balancing Bureau; www.nebb.org.
107. NECA - National Electrical Contractors Association; www.necanet.org.
108. NeLMA - Northeastern Lumber Manufacturers Association; www.nelma.org.
109. NEMA - National Electrical Manufacturers Association; www.nema.org.
110. NETA - InterNational Electrical Testing Association; www.netaworld.org.
111. NFHS - National Federation of State High School Associations; www.nfhs.org.
112. NFPA - NFPA; (National Fire Protection Association); www.nfpa.org.

113. NFPA - NFPA International; (See NFPA).
114. NFRC - National Fenestration Rating Council; www.nfrc.org.
115. NHLA - National Hardwood Lumber Association; www.nhla.com.
116. NLGA - National Lumber Grades Authority; www.nlga.org.
117. NOMMA - National Ornamental & Miscellaneous Metals Association; www.nomma.org.
118. NRCA - National Roofing Contractors Association; www.nrca.net.
119. NRMCA - National Ready Mixed Concrete Association; www.nrmca.org.
120. NSF - NSF International; (National Sanitation Foundation International); www.nsf.org.
121. NSPE - National Society of Professional Engineers; www.nspe.org.
122. NSSGA - National Stone, Sand & Gravel Association; www.nssga.org.
123. PCI - Precast/Prestressed Concrete Institute; www.pci.org.
124. PDI - Plumbing & Drainage Institute; www.pdionline.org.
125. PLASA - PLASA; (Formerly: ESTA - Entertainment Services and Technology Association); www.plasa.org.
126. RCSC - Research Council on Structural Connections; www.boltcouncil.org.
127. RFCI - Resilient Floor Covering Institute; www.rfci.com.
128. RIS - Redwood Inspection Service; www.redwoodinspection.com.
129. SAE - SAE International; (Society of Automotive Engineers); www.sae.org.
130. SDI - Steel Door Institute; www.steeldoor.org.
131. SEI/ASCE - Structural Engineering Institute/American Society of Civil Engineers; (See ASCE).
132. SIA - Security Industry Association; www.siaonline.org.
133. SMACNA - Sheet Metal and Air Conditioning Contractors' National Association; www.smacna.org.
134. SPIB - Southern Pine Inspection Bureau; www.spib.org.
135. SSINA - Specialty Steel Industry of North America; www.ssina.com.
136. SSPC - SSPC: The Society for Protective Coatings; www.sspc.org.
137. TCNA - Tile Council of North America, Inc.; (Formerly: Tile Council of America); www.tileusa.com.
138. TEMA - Tubular Exchanger Manufacturers Association, Inc.; www.tema.org.
139. TMS - The Masonry Society; www.masonrysociety.org.
140. TPI - Truss Plate Institute; www.tpinst.org.
141. TPI - Turfgrass Producers International; www.turfgrasssod.org.
142. UBC - Uniform Building Code; (See ICC).
143. UL - Underwriters Laboratories Inc.; www.ul.com.
144. UNI - Uni-Bell PVC Pipe Association; www.uni-bell.org.
145. USGBC - U.S. Green Building Council; www.usgbc.org.
146. WASTEC - Waste Equipment Technology Association; www.wastec.org.
147. WCLIB - West Coast Lumber Inspection Bureau; www.wclib.org.
148. WCMA - Window Covering Manufacturers Association; www.wcmanet.org.
149. WDMA - Window & Door Manufacturers Association; www.wdma.com.
150. WI - Woodwork Institute; (Formerly: WIC - Woodwork Institute of California); www.wicnet.org.
151. WMMPA - Wood Moulding & Millwork Producers Association; (See MMPA).
152. WSRCA - Western States Roofing Contractors Association; www.wsrca.com.
153. WPA - Western Wood Products Association; www.wwpa.org.

B. Code Agencies: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in the following list. This information is believed to be accurate as of the date of the Contract Documents.

1. IAPMO - International Association of Plumbing and Mechanical Officials; www.iapmo.org.
2. ICC - International Code Council; www.iccsafe.org.
3. ICC-ES - ICC Evaluation Service, LLC; www.icc-es.org.

C. Federal Government Agencies: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in the following list. Information is subject to change and is up-to-date as of the date of the Contract Documents.

1. COE - Army Corps of Engineers; www.usace.army.mil.
2. CPSC - Consumer Product Safety Commission; www.cpsc.gov.

3. DOC - Department of Commerce; National Institute of Standards and Technology; www.nist.gov.
4. DOD - Department of Defense; http://dodssp.daps.dla.mil.
5. DOE - Department of Energy; www.energy.gov.
6. EPA - Environmental Protection Agency; www.epa.gov.
7. FG - Federal Government Publications; www.gpo.gov.
8. GSA - General Services Administration; www.gsa.gov.
9. HUD - Department of Housing and Urban Development; www.hud.gov.
10. LBL - Lawrence Berkeley National Laboratory; Environmental Energy Technologies Division; http://eetd.lbl.gov.
11. OSHA - Occupational Safety & Health Administration; www.osha.gov.
12. SD - Department of State; www.state.gov.
13. TRB - Transportation Research Board; National Cooperative Highway Research Program; www.trb.org.
14. USDA - Department of Agriculture; Agriculture Research Service; U.S. Salinity Laboratory; www.ars.usda.gov.
15. USDJ - Department of Justice; Office of Justice Programs; National Institute of Justice; www.ojp.usdoj.gov.
16. USP - U.S. Pharmacopeia; www.usp.org.
17. USPS - United States Postal Service; www.usps.com.

D. Standards and Regulations: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the standards and regulations in the following list. This information is subject to change and is believed to be accurate as of the date of the Contract Documents.

1. CFR - Code of Federal Regulations; Available from Government Printing Office; www.gpo.gov/fdsys.
2. DOD - Department of Defense; Military Specifications and Standards; Available from Department of Defense Single Stock Point; http://dodssp.daps.dla.mil.
3. DSCC - Defense Supply Center Columbus; (See FS).
4. FED-STD - Federal Standard; (See FS).
5. FS - Federal Specification; Available from Department of Defense Single Stock Point; http://dodssp.daps.dla.mil.

    a. Available from Defense Standardization Program; www.dsp.dla.mil.
    b. Available from General Services Administration; www.gsa.gov.
    c. Available from National Institute of Building Sciences/Whole Building Design Guide; www.wbdg.org/ccb.

6. MILSPEC - Military Specification and Standards; (See DOD).
7. USAB - United States Access Board; www.access-board.gov.
8. USATBCB - U.S. Architectural & Transportation Barriers Compliance Board; (See USAB).

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 01 4200

SECTION 01 5000 - TEMPORARY FACILITIES AND CONTROLS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section includes requirements for temporary utilities, support facilities, and security and protection facilities.

B. Related Requirements:

1. Section 01 1000 "Summary" for work restrictions and limitations on utility interruptions.

1.3 USE CHARGES

A. General: Installation and removal of and use charges for temporary facilities shall be included in the Contract Sum unless otherwise indicated. Allow other entities to use temporary services and facilities without cost, including, but not limited to, Architect, testing agencies, and authorities having jurisdiction.

1.4 INFORMATIONAL SUBMITTALS

A. Fire-Safety Program: Show compliance with requirements of NFPA 241 and authorities having jurisdiction. Indicate Contractor personnel responsible for management of fire-prevention program.

1.5 QUALITY ASSURANCE

A. Electric Service Connections: Comply with NECA, NEMA, and UL standards and regulations for temporary electric service connections.

B. Tests and Inspections: Arrange for authorities having jurisdiction to test and inspect each temporary utility before use. Obtain required certifications and permits.

1.6 PROJECT CONDITIONS

A. Temporary Use of Permanent Facilities: Engage Installer of each permanent service to assume responsibility for operation, maintenance, and protection of each permanent service during its use as a construction facility before Owner's acceptance, regardless of previously assigned responsibilities.

PART 2 - PRODUCTS

2.1 TEMPORARY FACILITIES

A. Field Offices, General: Prefabricated or mobile units with serviceable finishes, temperature controls, and foundations adequate for normal loading.

B. Common-Use Field Office: Of sufficient size to accommodate needs of Owner, Architect, and construction personnel office activities and to accommodate Project meetings specified in other Division 01 Sections. Keep office clean and orderly.

C. Storage and Fabrication Sheds: Provide sheds sized, furnished, and equipped to accommodate materials and equipment for construction operations.

1. Store combustible materials apart from building.

2.2 EQUIPMENT

A. Fire Extinguishers: Portable, UL rated; with class and extinguishing agent as required by locations and classes of fire exposures.

B. HVAC Equipment: Unless Owner authorizes use of permanent HVAC system, provide vented, self-contained, liquid-propane-gas or fuel-oil heaters with individual space thermostatic control.

1. Use of gasoline-burning space heaters, open-flame heaters, or salamander-type heating units is prohibited.
2. Heating Units: Listed and labeled for type of fuel being consumed, by a qualified testing agency acceptable to authorities having jurisdiction, and marked for intended location and application.
3. Permanent HVAC System: If Owner authorizes use of permanent HVAC system for temporary use during construction, provide filter with MERV of 8 at each return-air grille in system and remove at end of construction.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

A. Locate facilities where they will serve Project adequately and result in minimum interference with performance of the Work. Relocate and modify facilities as required by progress of the Work.

B. Provide each facility ready for use when needed to avoid delay. Do not remove until facilities are no longer needed or are replaced by authorized use of completed permanent facilities.

3.2 TEMPORARY UTILITY INSTALLATION

A. General: Install temporary service or connect to existing service.

1. Arrange with utility company, Owner, and existing users for time when service can be interrupted, if necessary, to make connections for temporary services.

B. Water Service: Install water distribution piping in sizes and pressures adequate for construction.

C. Sanitary Facilities: Provide temporary toilets, wash facilities, and drinking water for use of construction personnel. Comply with requirements of authorities having jurisdiction for type, number, location, operation, and maintenance of fixtures and facilities.

D. Heating and Cooling: Provide temporary heating and cooling required by construction activities for curing or drying of completed installations or for protecting installed construction from adverse effects of low temperatures or high humidity. Select equipment that will not have a harmful effect on completed installations or elements being installed.

E. Electric Power Service: Provide electric power distribution system of sufficient size, capacity, and power characteristics required for construction operations.

F. Lighting: Provide temporary lighting with local switching that provides adequate illumination for construction operations, observations, inspections, and traffic conditions.

1. Install and operate temporary lighting that fulfills security and protection requirements without operating entire system.

G. Telephone Service: Provide temporary telephone service in common-use facilities for use by all construction personnel. Install one telephone line(s) for each field office.

1. At each telephone, post a list of important telephone numbers.

    a. Police and fire departments.
    b. Ambulance service.
    c. Contractor's home office.
    d. Contractor's emergency after-hours telephone number.
    e. Architect's office.
    f. Engineers' offices.
    g. Owner's office.
    h. Principal subcontractors' field and home offices.

2. Provide superintendent with cellular telephone for use when away from field office.

3.3 SUPPORT FACILITIES INSTALLATION

A. General: Comply with the following:

1. Provide construction for temporary offices, shops, and sheds located within construction area or within 30 feet of building lines that is noncombustible according to ASTM E 136. Comply with NFPA 241.
2. Maintain support facilities until Architect schedules Substantial Completion inspection. Remove before Substantial Completion. Personnel remaining after Substantial Completion will be permitted to use permanent facilities, under conditions acceptable to Owner.

B. Traffic Controls: Comply with requirements of authorities having jurisdiction.

1. Protect existing site improvements to remain including curbs, pavement, and utilities.
2. Maintain access for fire-fighting equipment and access to fire hydrants.

C. Project Signs: Provide Project Identification sign. Unauthorized signs are not permitted.

1. Identification Sign: Architect will provide sign design.
2. Temporary Signs: Provide other signs as indicated and as required to inform public and individuals seeking entrance to Project.

    a. Provide temporary, directional signs for construction personnel and visitors.

3. Maintain and touchup signs so they are legible at all times.

D. Lifts and Hoists: Provide facilities necessary for hoisting materials and personnel.

1. Truck cranes and similar devices used for hoisting materials are considered "tools and equipment" and not temporary facilities.

3.4 SECURITY AND PROTECTION FACILITIES INSTALLATION

A. Protection of Existing Facilities: Protect existing vegetation, equipment, structures, utilities, and other improvements on site and adjacent properties, except those indicated to be removed or altered. Repair damage to existing facilities.

B. Environmental Protection: Provide protection, operate temporary facilities, and conduct construction as required to comply with environmental regulations and that minimize possible air, waterway, and subsoil contamination or pollution or other undesirable effects.

1. Comply with work restrictions specified in Section 01 1000 "Summary."

C. Security Enclosure and Lockup: Install temporary enclosure around partially completed areas of construction. Provide lockable entrances to prevent unauthorized entrance, vandalism, theft, and similar violations of security. Lock entrances at end of each work day.

D. Barricades, Warning Signs, and Lights: Comply with requirements of authorities having jurisdiction for erecting structurally adequate barricades, including warning signs and lighting.

E. Temporary Enclosures: Provide temporary enclosures for protection of construction, in progress and completed, from exposure, foul weather, other construction operations, and similar activities. Provide temporary weathertight enclosure for building exterior.

1. Where heating or cooling is needed and permanent enclosure is incomplete, insulate temporary enclosures.

F. Temporary Fire Protection: Install and maintain temporary fire-protection facilities of types needed to protect against reasonably predictable and controllable fire losses. Comply with NFPA 241; manage fire-prevention program.

1. Prohibit smoking in construction areas.
2. Supervise welding operations, combustion-type temporary heating units, and similar sources of fire ignition according to requirements of authorities having jurisdiction.
3. Develop and supervise an overall fire-prevention and -protection program for personnel at Project site. Review needs with local fire department and establish procedures to be followed. Instruct personnel in methods and procedures. Post warnings and information.

3.5 OPERATION, TERMINATION, AND REMOVAL

A. Supervision: Enforce strict discipline in use of temporary facilities. To minimize waste and abuse, limit availability of temporary facilities to essential and intended uses.

B. Maintenance: Maintain facilities in good operating condition until removal.

1. Maintain operation of temporary enclosures, heating, cooling, humidity control, ventilation, and similar facilities on a 24-hour basis where required to achieve indicated results and to avoid possibility of damage.

C. Temporary Facility Changeover: Do not change over from using temporary security and protection facilities to permanent facilities until Substantial Completion.

D. Termination and Removal: Remove each temporary facility when need for its service has ended, when it has been replaced by authorized use of a permanent facility, or no later than Substantial Completion. Complete or, if necessary, restore permanent construction that may have been delayed because of interference with temporary facility. Repair damaged Work, clean exposed surfaces, and replace construction that cannot be satisfactorily repaired.

1. Materials and facilities that constitute temporary facilities are property of Contractor. Owner reserves right to take possession of Project identification signs.
2. At Substantial Completion, repair, renovate, and clean permanent facilities used during construction period. Comply with final cleaning requirements specified in Section 01 7700 "Closeout Procedures."

END OF SECTION 01 5000

SECTION 01 6000 - PRODUCT REQUIREMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section includes administrative and procedural requirements for selection of products for use in Project; product delivery, storage, and handling; manufacturers' standard warranties on products; special warranties; and comparable products.

B. Related Requirements:

1. Section 01 2500 "Substitution Procedures" for requests for substitutions.
2. Section 01 4200 "References" for applicable industry standards for products specified.

1.3 DEFINITIONS

A. Products: Items obtained for incorporating into the Work, whether purchased for Project or taken from previously purchased stock. The term "product" includes the terms "material," "equipment," "system," and terms of similar intent.

1. Named Products: Items identified by manufacturer's product name, including make or model number or other designation shown or listed in manufacturer's published product literature, that is current as of date of the Contract Documents.
2. New Products: Items that have not previously been incorporated into another project or facility. Products salvaged or recycled from other projects are not considered new products.
3. Comparable Product: Product that is demonstrated and approved through submittal process to have the indicated qualities related to type, function, dimension, in-service performance, physical properties, appearance, and other characteristics that equal or exceed those of specified product.

B. Basis-of-Design Product Specification: A specification in which a specific manufacturer's product is named and accompanied by the words "basis-of-design product," including make or model number or other designation, to establish the significant qualities related to type, function, dimension, in-service performance, physical properties, appearance, and other characteristics for purposes of evaluating comparable products of additional manufacturers named in the specification.

1.4 ACTION SUBMITTALS

A. Comparable Product Requests: Submit request for consideration of each comparable product. Identify product or fabrication or installation method to be replaced. Include Specification Section number and title and Drawing numbers and titles.

1. Include data to indicate compliance with the requirements specified in "Comparable Products" Article.
2. Architect's Action: If necessary, Architect will request additional information or documentation for evaluation within one week of receipt of a comparable product request. Architect will notify Contractor of approval or rejection of proposed comparable product request within 15 days of receipt of request, or seven days of receipt of additional information or documentation, whichever is later.

    a. Form of Approval: As specified in Section 01 3300 "Submittal Procedures."
    b. Use product specified if Architect does not issue a decision on use of a comparable product request within time allocated.

B. Basis-of-Design Product Specification Submittal: Comply with requirements in Section 01 3300 "Submittal Procedures." Show compliance with requirements.

1.5 QUALITY ASSURANCE

A. Compatibility of Options: If Contractor is given option of selecting between two or more products for use on Project, select product compatible with products previously selected, even if previously selected products were also options.

1. Each contractor is responsible for providing products and construction methods compatible with products and construction methods of other contractors.
2. If a dispute arises between contractors over concurrently selectable but incompatible products, Architect will determine which products shall be used.

1.6 PRODUCT DELIVERY, STORAGE, AND HANDLING

A. Deliver, store, and handle products using means and methods that will prevent damage, deterioration, and loss, including theft and vandalism. Comply with manufacturer's written instructions.

B. Delivery and Handling:

1. Schedule delivery to minimize long-term storage at Project site and to prevent overcrowding of construction spaces.
2. Coordinate delivery with installation time to ensure minimum holding time for items that are flammable, hazardous, easily damaged, or sensitive to deterioration, theft, and other losses.
3. Deliver products to Project site in an undamaged condition in manufacturer's original sealed container or other packaging system, complete with labels and instructions for handling, storing, unpacking, protecting, and installing.
4. Inspect products on delivery to determine compliance with the Contract Documents and to determine that products are undamaged and properly protected.

C. Storage:

1. Store products to allow for inspection and measurement of quantity or counting of units.
2. Store materials in a manner that will not endanger Project structure.
3. Store products that are subject to damage by the elements, under cover in a weathertight enclosure above ground, with ventilation adequate to prevent condensation.
4. Protect foam plastic from exposure to sunlight, except to extent necessary for period of installation and concealment.
5. Comply with product manufacturer's written instructions for temperature, humidity, ventilation, and weather-protection requirements for storage.
6. Protect stored products from damage and liquids from freezing.
7. Provide a secure location and enclosure at Project site for storage of materials and equipment by Owner's construction forces. Coordinate location with Owner.

1.7 PRODUCT WARRANTIES

A. Warranties specified in other Sections shall be in addition to, and run concurrent with, other warranties required by the Contract Documents. Manufacturer's disclaimers and limitations on product warranties do not relieve Contractor of obligations under requirements of the Contract Documents.

1. Manufacturer's Warranty: Written warranty furnished by individual manufacturer for a particular product and specifically endorsed by manufacturer to Owner.
2. Special Warranty: Written warranty required by the Contract Documents to provide specific rights for Owner.

B. Special Warranties: Prepare a written document that contains appropriate terms and identification, ready for execution.

1. Manufacturer's Standard Form: Modified to include Project-specific information and properly executed.
2. See other Sections for specific content requirements and particular requirements for submitting special warranties.

C. Submittal Time: Comply with requirements in Section 01 7700 "Closeout Procedures."

PART 2 - PRODUCTS

2.1 PRODUCT SELECTION PROCEDURES

A. General Product Requirements: Provide products that comply with the Contract Documents, are undamaged and, unless otherwise indicated, are new at time of installation.

1. Provide products complete with accessories, trim, finish, fasteners, and other items needed for a complete installation and indicated use and effect.
2. Standard Products: If available, and unless custom products or nonstandard options are specified, provide standard products of types that have been produced and used successfully in similar situations on other projects.
3. Owner reserves the right to limit selection to products with warranties not in conflict with requirements of the Contract Documents.
4. Where products are accompanied by the term "as selected," Architect will make selection.
5. Descriptive, performance, and reference standard requirements in the Specifications establish salient characteristics of products.
6. Or Equal: For products specified by name and accompanied by the term "or equal," or "or approved equal," or "or approved," comply with requirements in "Comparable Products" Article to obtain approval for use of an unnamed product.

B. Product Selection Procedures:

1. Product: Where Specifications name a single manufacturer and product, provide the named product that complies with requirements. Comparable products or substitutions for Contractor's convenience will not be considered.
2. Manufacturer/Source: Where Specifications name a single manufacturer or source, provide a product by the named manufacturer or source that complies with requirements. Comparable products or substitutions for Contractor's convenience will not be considered.
3. Products:

    a. Restricted List: Where Specifications include a list of names of both manufacturers and products, provide one of the products listed that complies with requirements. Comparable products or substitutions for Contractor's convenience will not be considered unless otherwise indicated.

4. Manufacturers:

    a. Restricted List: Where Specifications include a list of manufacturers' names, provide a product by one of the manufacturers listed that complies with requirements. Comparable products or substitutions for Contractor's convenience will not be considered.

5. Basis-of-Design Product: Where Specifications name a product, or refer to a product indicated on Drawings, and include a list of manufacturers, provide the specified or indicated product or a comparable product by one of the other named manufacturers. Drawings and Specifications indicate sizes, profiles, dimensions, and other characteristics that are based on the product named. Comply with requirements in "Comparable Products" Article for consideration of an unnamed product by one of the other named manufacturers.

2.2 COMPARABLE PRODUCTS

A. Conditions for Consideration: Architect will consider Contractor's request for comparable product when the following conditions are satisfied. If the following conditions are not satisfied, Architect may return requests without action, except to record noncompliance with these requirements:

1. Evidence that the proposed product does not require revisions to the Contract Documents, that it is consistent with the Contract Documents and will produce the indicated results, and that it is compatible with other portions of the Work.

2. Detailed comparison of significant qualities of proposed product with those named in the Specifications. Significant qualities include attributes such as performance, weight, size, durability, visual effect, and specific features and requirements indicated.
3. Evidence that proposed product provides specified warranty.
4. List of similar installations for completed projects with project names and addresses and names and addresses of architects and owners, if requested.
5. Samples, if requested.

PART 3 - EXECUTION (Not Used)

END OF SECTION 01 6000

SUBSTITUTION REQUEST
(After the Bidding/Negotiating Phase)

Project: _____ Substitution Request Number: _____

_____ From: _____

To: _____ Date: _____

_____ A/E Project Number: _____

Re: _____ Contract For: _____

Specification Title: _____ Description: _____

Section: _____ Page: _____ Article/Paragraph: _____

Proposed Substitution: _____

Manufacturer: _____ Address: _____ Phone: _____

Trade Name: _____ Model No.: _____

Installer: _____ Address: _____ Phone: _____

History: ☐ New product ☐ 1-4 years old ☐ 5-10 years old ☐ More than 10 years old

Differences between proposed substitution and specified product: _____

_____

_____

☐ Point-by-point comparative data attached — REQUIRED BY A/E

Reason for not providing specified item: _____

_____

Similar Installation:

Project: _____ Architect: _____

Address: _____ Owner: _____

_____ Date Installed: _____

Proposed substitution affects other parts of Work: ☐ No ☐ Yes; explain _____

_____

Savings to Owner for accepting substitution: _____ ($ _____).

Proposed substitution changes Contract Time: ☐ No ☐ Yes [Add] [Deduct] _____ days.

Supporting Data Attached: ☐ Drawings ☐ Product Data ☐ Samples ☐ Tests ☐ Reports ☐ _____

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SECTION 01 7300 - EXECUTION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section includes general administrative and procedural requirements governing execution of the Work including, but not limited to, the following:

1. Construction layout.
2. Installation of the Work.
3. Cutting and patching.
4. Coordination of Owner-installed products.
5. Progress cleaning.
6. Starting and adjusting.
7. Protection of installed construction.

B. Related Requirements:

1. Section 01 1000 "Summary" for limits on use of Project site.
2. Section 01 7700 "Closeout Procedures" for submitting final property survey with Project Record Documents, recording of Owner-accepted deviations from indicated lines and levels, and final cleaning.

1.3 DEFINITIONS

A. Cutting: Removal of in-place construction necessary to permit installation or performance of other work.

B. Patching: Fitting and repair work required to restore construction to original conditions after installation of other work.

1.4 QUALITY ASSURANCE

A. Cutting and Patching: Comply with requirements for and limitations on cutting and patching of construction elements.

1. Structural Elements: When cutting and patching structural elements, notify Architect of locations and details of cutting and await directions from Architect before proceeding. Shore, brace, and support structural elements during cutting and patching. Do not cut and patch structural elements in a manner that could change their load-carrying capacity or increase deflection
2. Operational Elements: Do not cut and patch operating elements and related components in a manner that results in reducing their capacity to perform as intended or that results in increased maintenance or decreased operational life or safety.
3. Other Construction Elements: Do not cut and patch other construction elements or components in a manner that could change their load-carrying capacity, that results in reducing their capacity to perform as intended, or that results in increased maintenance or decreased operational life or safety.
4. Visual Elements: Do not cut and patch construction in a manner that results in visual evidence of cutting and patching. Do not cut and patch exposed construction in a manner that would, in Architect's opinion, reduce the building's aesthetic qualities. Remove and replace construction that has been cut and patched in a visually unsatisfactory manner.

B. Manufacturer's Installation Instructions: Obtain and maintain on-site manufacturer's written recommendations and instructions for installation of products and equipment.

PART 2 - PRODUCTS

2.1 MATERIALS

A. General: Comply with requirements specified in other Sections.

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

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

PART 3 - EXECUTION

3.1 EXAMINATION

A. Existing Conditions: The existence and location of underground and other utilities and construction indicated as existing are not guaranteed. Before beginning sitework, investigate and verify the existence and location of underground utilities, and other construction affecting the Work.

1. Before construction, verify the location and invert elevation at points of connection of sanitary sewer, storm sewer, and water-service piping; underground electrical services, and other utilities.
2. Furnish location data for work related to Project that must be performed by public utilities serving Project site.

B. Examination and Acceptance of Conditions: Before proceeding with each component of the Work, examine substrates, areas, and conditions, with Installer or Applicator present where indicated, for compliance with requirements for installation tolerances and other conditions affecting performance. Record observations.

1. Examine roughing-in for mechanical and electrical systems to verify actual locations of connections before equipment and fixture installation.
2. Examine walls, floors, and roofs for suitable conditions where products and systems are to be installed.
3. Verify compatibility with and suitability of substrates, including compatibility with existing finishes or primers.

C. Written Report: Where a written report listing conditions detrimental to performance of the Work is required by other Sections, include the following:

1. Description of the Work.
2. List of detrimental conditions, including substrates.
3. List of unacceptable installation tolerances.
4. Recommended corrections.

D. Proceed with installation only after unsatisfactory conditions have been corrected. Proceeding with the Work indicates acceptance of surfaces and conditions.

3.2 PREPARATION

A. Field Measurements: Take field measurements as required to fit the Work properly. Recheck measurements before installing each product. Where portions of the Work are indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication. Coordinate fabrication schedule with construction progress to avoid delaying the Work.

B. Space Requirements: Verify space requirements and dimensions of items shown diagrammatically on Drawings.

C. Review of Contract Documents and Field Conditions: Immediately on discovery of the need for clarification of the Contract Documents caused by differing field conditions outside the control of Contractor, submit a request for information to Architect according to requirements in Section 01 3100 "Project Management and Coordination."

3.3 CONSTRUCTION LAYOUT

A. Verification: Before proceeding to lay out the Work, verify layout information shown on Drawings, in relation to existing building dimensions and structural components. If discrepancies are discovered, notify Architect promptly.

3.4 INSTALLATION

A. General: Locate the Work and components of the Work accurately, in correct alignment and elevation, as indicated.

1. Make vertical work plumb and make horizontal work level.
2. Where space is limited, install components to maximize space available for maintenance and ease of removal for replacement.
3. Conceal pipes, ducts, and wiring in finished areas unless otherwise indicated.

B. Comply with manufacturer's written instructions and recommendations for installing products in applications indicated.

C. Install products at the time and under conditions that will ensure the best possible results. Maintain conditions required for product performance until Substantial Completion.

D. Conduct construction operations so no part of the Work is subjected to damaging operations or loading in excess of that expected during normal conditions of occupancy.

E. Sequence the Work and allow adequate clearances to accommodate movement of construction items on site and placement in permanent locations.

F. Tools and Equipment: Do not use tools or equipment that produce harmful noise levels.

G. Templates: Obtain and distribute to the parties involved templates for work specified to be factory prepared and field installed. Check Shop Drawings of other work to confirm that adequate provisions are made for locating and installing products to comply with indicated requirements.

H. Attachment: Provide blocking and attachment plates and anchors and fasteners of adequate size and number to securely anchor each component in place, accurately located and aligned with other portions of the Work. Where size and type of attachments are not indicated, verify size and type required for load conditions.

1. Mounting Heights: Where mounting heights are not indicated, mount components at heights directed by Architect.
2. Allow for building movement, including thermal expansion and contraction.
3. Coordinate installation of anchorages. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.

I. Joints: Make joints of uniform width. Where joint locations in exposed work are not indicated, arrange joints for the best visual effect. Fit exposed connections together to form hairline joints.

J. Hazardous Materials: Use products, cleaners, and installation materials that are not considered hazardous.

3.5 CUTTING AND PATCHING

A. Cutting and Patching, General: Employ skilled workers to perform cutting and patching. Proceed with cutting and patching at the earliest feasible time, and complete without delay.

1. Cut in-place construction to provide for installation of other components or performance of other construction, and subsequently patch as required to restore surfaces to their original condition.

B. Existing Warranties: Remove, replace, patch, and repair materials and surfaces cut or damaged during installation or cutting and patching operations, by methods and with materials so as not to void existing warranties.

C. Temporary Support: Provide temporary support of work to be cut.

D. Protection: Protect in-place construction during cutting and patching to prevent damage. Provide protection from adverse weather conditions for portions of Project that might be exposed during cutting and patching operations.

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

1. In general, use hand or small power tools designed for sawing and grinding, not hammering and chopping. Cut holes and slots neatly to minimum size required, and with minimum disturbance of adjacent surfaces. Temporarily cover openings when not in use.
2. Finished Surfaces: Cut or drill from the exposed or finished side into concealed surfaces.
3. Concrete and Masonry: Cut using a cutting machine, such as an abrasive saw or a diamond-core drill.
4. Excavating and Backfilling: Comply with requirements in applicable Sections where required by cutting and patching operations.
5. Proceed with patching after construction operations requiring cutting are complete.

F. Patching: Patch construction by filling, repairing, refinishing, closing up, and similar operations following performance of other work. Patch with durable seams that are as invisible as practicable. Provide materials and comply with installation requirements specified in other Sections, where applicable.

1. Inspection: Where feasible, test and inspect patched areas after completion to demonstrate physical integrity of installation.
2. Exposed Finishes: Restore exposed finishes of patched areas and extend finish restoration into retained adjoining construction in a manner that will minimize evidence of patching and refinishing.

    a. Clean piping, conduit, and similar features before applying paint or other finishing materials.
    b. Restore damaged pipe covering to its original condition.

G. Cleaning: Clean areas and spaces where cutting and patching are performed. Remove paint, mortar, oils, putty, and similar materials from adjacent finished surfaces.

3.6 OWNER-INSTALLED PRODUCTS

A. Site Access: Provide access to Project site for Owner's construction personnel.

B. Coordination: Coordinate construction and operations of the Work with work performed by Owner's construction personnel.

1. Construction Schedule: Inform Owner of Contractor's preferred construction schedule for Owner's portion of the Work. Adjust construction schedule based on a mutually agreeable timetable. Notify Owner if changes to schedule are required due to differences in actual construction progress.
2. Preinstallation Conferences: Include Owner's construction personnel at preinstallation conferences covering portions of the Work that are to receive Owner's work. Attend preinstallation conferences conducted by Owner's construction personnel if portions of the Work depend on Owner's construction.

3.7 PROGRESS CLEANING

A. General: Clean Project site and work areas daily, including common areas. Enforce requirements strictly. Dispose of materials lawfully.

1. Comply with requirements in NFPA 241 for removal of combustible waste materials and debris.
2. Do not hold waste materials more than seven days during normal weather or three days if the temperature is expected to rise above 80 deg F
3. Containerize hazardous and unsanitary waste materials separately from other waste. Mark containers appropriately and dispose of legally, according to regulations.

    a. Use containers intended for holding waste materials of type to be stored.

B. Site: Maintain Project site free of waste materials and debris.

C. Work Areas: Clean areas where work is in progress to the level of cleanliness necessary for proper execution of the Work.

1. Remove liquid spills promptly.
2. Where dust would impair proper execution of the Work, broom-clean or vacuum the entire work area, as appropriate.

D. Installed Work: Keep installed work clean. Clean installed surfaces according to written instructions of manufacturer or fabricator of product installed, using only cleaning materials specifically recommended. If specific cleaning materials are not recommended, use cleaning materials that are not hazardous to health or property and that will not damage exposed surfaces.

E. Concealed Spaces: Remove debris from concealed spaces before enclosing the space.

F. Exposed Surfaces in Finished Areas: Clean exposed surfaces and protect as necessary to ensure freedom from damage and deterioration at time of Substantial Completion.

G. Waste Disposal: Do not bury or burn waste materials on-site. Do not wash waste materials down sewers or into waterways.

H. During handling and installation, clean and protect construction in progress and adjoining materials already in place. Apply protective covering where required to ensure protection from damage or deterioration at Substantial Completion.

I. Clean and provide maintenance on completed construction as frequently as necessary through the remainder of the construction period. Adjust and lubricate operable components to ensure operability without damaging effects.

J. Limiting Exposures: Supervise construction operations to assure that no part of the construction, completed or in progress, is subject to harmful, dangerous, damaging, or otherwise deleterious exposure during the construction period.

3.8 STARTING AND ADJUSTING

A. Start equipment and operating components to confirm proper operation. Remove malfunctioning units, replace with new units, and retest.

B. Adjust equipment for proper operation. Adjust operating components for proper operation without binding.

C. Test each piece of equipment to verify proper operation. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

D. Manufacturer's Field Service: Comply with qualification requirements in Section 01 4000 "Quality Requirements."

3.9 PROTECTION OF INSTALLED CONSTRUCTION

A. Provide final protection and maintain conditions that ensure installed Work is without damage or deterioration at time of Substantial Completion.

B. Comply with manufacturer's written instructions for temperature and relative humidity.

END OF SECTION 01 7300

SECTION 01 7419 - CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 QUALITY ASSURANCE

A. Regulatory Requirements: Comply with hauling and disposal regulations of authorities having jurisdiction.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 IMPLEMENTATION

A. General: Provide handling, containers, storage, signage, transportation, and other items as required during the entire duration of the Contract.

1. Comply with operation, termination, and removal requirements in Section 01 5000 "Temporary Facilities and Controls."

B. Training: Train workers, subcontractors, and suppliers on proper waste management procedures, as appropriate for the Work.

C. Site Access and Temporary Controls: Conduct waste management operations to ensure minimum interference with roads, streets, walks, walkways, and other adjacent occupied and used facilities.

1. Comply with Section 01 5000 "Temporary Facilities and Controls" for controlling dust and dirt, environmental protection, and noise control.

END OF SECTION 01 7419

SECTION 01 7700 - CLOSEOUT PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section includes administrative and procedural requirements for contract closeout, including, but not limited to, the following:

1. Substantial Completion procedures.
2. Final completion procedures.
3. Warranties.
4. Final cleaning.
5. Repair of the Work.

B. Related Requirements:

1. Section 01 7300 "Execution" for progress cleaning of Project site.
2. Section 01 7823 "Operation and Maintenance Data" for operation and maintenance manual requirements.
3. Section 01 7839 "Project Record Documents" for submitting record Drawings, record Specifications, and record Product Data.
4. Section 01 7900 "Demonstration and Training" for requirements for instructing Owner's personnel.

1.3 ACTION SUBMITTALS

A. Product Data: For cleaning agents.

B. Contractor's List of Incomplete Items: Initial submittal at Substantial Completion.

C. Certified List of Incomplete Items: Final submittal at Final Completion.

1.4 CLOSEOUT SUBMITTALS

A. Certificates of Release: From authorities having jurisdiction.

B. Certificate of Insurance: For continuing coverage.

1.5 MAINTENANCE MATERIAL SUBMITTALS

A. Schedule of Maintenance Material Items: For maintenance material submittal items specified in other Sections.

1.6 SUBSTANTIAL COMPLETION PROCEDURES

A. Contractor's List of Incomplete Items: Prepare and submit a list of items to be completed and corrected (Contractor's punch list), indicating the value of each item on the list and reasons why the Work is incomplete.

B. Submittals Prior to Substantial Completion: Complete the following a minimum of 10 days prior to requesting inspection for determining date of Substantial Completion. List items below that are incomplete at time of request.

1. Certificates of Release: Obtain and submit releases from authorities having jurisdiction permitting Owner unrestricted use of the Work and access to services and utilities. Include occupancy permits, operating certificates, and similar releases.
2. Submit closeout submittals specified in other Division 01 Sections, including project record documents, operation and maintenance manuals, final completion construction photographic documentation, damage or settlement surveys, property surveys, and similar final record information.
3. Submit closeout submittals specified in individual Sections, including specific warranties, workmanship bonds, maintenance service agreements, final certifications, and similar documents.
4. Submit maintenance material submittals specified in individual Sections, including tools, spare parts, extra materials, and similar items, and deliver to location designated by Architect. Label with manufacturer's name and model number where applicable.

    a. Schedule of Maintenance Material Items: Prepare and submit schedule of maintenance material submittal items, including name and quantity of each item and name and number of related Specification Section. Obtain Architect's signature for receipt of submittals.

5. Submit test/adjust/balance records.
6. Submit changeover information related to Owner's occupancy, use, operation, and maintenance.

C. Procedures Prior to Substantial Completion: Complete the following a minimum of 10 days prior to requesting inspection for determining date of Substantial Completion. List items below that are incomplete at time of request.

1. Advise Owner of pending insurance changeover requirements.
2. Make final changeover of permanent locks and deliver keys to Owner. Advise Owner's personnel of changeover in security provisions.
3. Complete startup and testing of systems and equipment.
4. Perform preventive maintenance on equipment used prior to Substantial Completion.
5. Instruct Owner's personnel in operation, adjustment, and maintenance of products, equipment, and systems. Submit demonstration and training video recordings specified in Section 01 7900 "Demonstration and Training."
6. Participate with Owner in conducting inspection and walkthrough with local emergency responders.
7. Terminate and remove temporary facilities from Project site, along with mockups, construction tools, and similar elements.
8. Complete final cleaning requirements, including touchup painting.
9. Touch up and otherwise repair and restore marred exposed finishes to eliminate visual defects.

D. Inspection: Submit a written request for inspection to determine Substantial Completion a minimum of 10 days prior to date the work will be completed and ready for final inspection and tests. On receipt of request, Architect will either proceed with inspection or notify Contractor of unfulfilled requirements. Architect will prepare the Certificate of Substantial Completion after inspection or will notify Contractor of items, either on Contractor's list or additional items identified by Architect, that must be completed or corrected before certificate will be issued.

1. Reinspection: Request reinspection when the Work identified in previous inspections as incomplete is completed or corrected.
2. Results of completed inspection will form the basis of requirements for final completion.

1.7 FINAL COMPLETION PROCEDURES

A. Submittals Prior to Final Completion: Before requesting final inspection for determining final completion, complete the following:

1. Submit a final Application for Payment according to Section 01 2900 "Payment Procedures."
2. Certified List of Incomplete Items: Submit certified copy of Architect's Substantial Completion inspection list of items to be completed or corrected (punch list), endorsed and dated by Architect. Certified copy of the list shall state that each item has been completed or otherwise resolved for acceptance.

B. Inspection: Submit a written request for final inspection to determine acceptance a minimum of 10 days prior to date the work will be completed and ready for final inspection and tests. On receipt of request, Architect will either proceed with inspection or notify Contractor of unfulfilled requirements. Architect will prepare a final Certificate for Payment after inspection or will notify Contractor of construction that must be completed or corrected before certificate will be issued.

1. Reinspection: Request reinspection when the Work identified in previous inspections as incomplete is completed or corrected.

1.8 LIST OF INCOMPLETE ITEMS (PUNCH LIST)

A. Organization of List: Include name and identification of each space and area affected by construction operations for incomplete items and items needing correction including, if necessary, areas disturbed by Contractor that are outside the limits of construction.

1. Organize list of spaces in sequential order, starting with exterior areas first.
2. Organize items applying to each space by major element, including categories for ceiling, individual walls, floors, equipment, and building systems.
3. Include the following information at the top of each page:

    a. Project name.
    b. Date.
    c. Name of Architect.
    d. Name of Contractor.
    e. Page number.

4. Submit list of incomplete items in the following format:

    a. PDF electronic file. Architect will return annotated file.

1.9 SUBMITTAL OF PROJECT WARRANTIES

A. Time of Submittal: Submit written warranties on request of Architect for designated portions of the Work where commencement of warranties other than date of Substantial Completion is indicated, or when delay in submittal of warranties might limit Owner's rights under warranty.

B. Organize warranty documents into an orderly sequence based on the table of contents of Project Manual.

1. Bind warranties and bonds in heavy-duty, three-ring, vinyl-covered, loose-leaf binders, thickness as necessary to accommodate contents, and sized to receive 8-1/2-by-11-inch paper.
2. Provide heavy paper dividers with plastic-covered tabs for each separate warranty. Mark tab to identify the product or installation. Provide a typed description of the product or installation, including the name of the product and the name, address, and telephone number of Installer.
3. Identify each binder on the front and spine with the typed or printed title "WARRANTIES," Project name, and name of Contractor.
4. Warranty Electronic File: Scan warranties and bonds and assemble complete warranty and bond submittal package into a single indexed electronic PDF file with links enabling navigation to each item. Provide bookmarked table of contents at beginning of document.

C. Provide additional copies of each warranty to include in operation and maintenance manuals.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Cleaning Agents: Use cleaning materials and agents recommended by manufacturer or fabricator of the surface to be cleaned. Do not use cleaning agents that are potentially hazardous to health or property or that might damage finished surfaces.

PART 3 - EXECUTION

3.1 FINAL CLEANING

A. General: Perform final cleaning. Conduct cleaning and waste-removal operations to comply with local laws and ordinances and Federal and local environmental and antipollution regulations.

B. Cleaning: Employ experienced workers or professional cleaners for final cleaning. Clean each surface or unit to condition expected in an average commercial building cleaning and maintenance program. Comply with manufacturer's written instructions.

1. Complete the following cleaning operations before requesting inspection for certification of Substantial Completion for entire Project or for a designated portion of Project:

    a. Clean Project site, yard, and grounds, in areas disturbed by construction activities, including landscape development areas, of rubbish, waste material, litter, and other foreign substances.
    b. Sweep paved areas broom clean. Remove petrochemical spills, stains, and other foreign deposits.
    c. Remove tools, construction equipment, machinery, and surplus material from Project site.
    d. Clean exposed exterior and interior hard-surfaced finishes to a dirt-free condition, free of stains, films, and similar foreign substances. Avoid disturbing natural weathering of exterior surfaces. Restore reflective surfaces to their original condition.
    e. Remove debris and surface dust from limited access spaces, including roofs, plenums, shafts, trenches, equipment vaults, manholes, attics, and similar spaces.
    f. Vacuum carpet and similar soft surfaces, removing debris and excess nap; clean according to manufacturer's recommendations if visible soil or stains remain.
    g. Clean transparent materials, including mirrors and glass in doors and windows. Remove glazing compounds and other noticeable, vision-obscuring materials. Polish mirrors and glass, taking care not to scratch surfaces.
    h. Remove labels that are not permanent.
    i. Wipe surfaces of mechanical and electrical equipment and similar equipment. Remove excess lubrication, paint and mortar droppings, and other foreign substances.
    j. Clean plumbing fixtures to a sanitary condition, free of stains, including stains resulting from water exposure.
    k. Replace disposable air filters and clean permanent air filters. Clean exposed surfaces of diffusers, registers, and grills.
    l. Clean ducts, blowers, and coils if units were operated without filters during construction or that display contamination with particulate matter on inspection.

        1) Clean HVAC system in compliance with NADCA Standard 1992-01. Provide written report on completion of cleaning.

    m. Clean light fixtures, lamps, globes, and reflectors to function with full efficiency.
    n. Leave Project clean and ready for occupancy.

C. Construction Waste Disposal: Comply with waste disposal requirements in Section 01 7419 "Construction Waste Management and Disposal."

3.2 REPAIR OF THE WORK

A. Complete repair and restoration operations before requesting inspection for determination of Substantial Completion.

B. Repair or remove and replace defective construction. Repairing includes replacing defective parts, refinishing damaged surfaces, touching up with matching materials, and properly adjusting operating equipment. Where damaged or worn items cannot be repaired or restored, provide replacements. Remove and replace operating components that cannot be repaired. Restore damaged construction and permanent facilities used during construction to specified condition.

1. Remove and replace chipped, scratched, and broken glass, reflective surfaces, and other damaged transparent materials.
2. Touch up and otherwise repair and restore marred or exposed finishes and surfaces. Replace finishes and surfaces that that already show evidence of repair or restoration.

    a. Do not paint over "UL" and other required labels and identification, including mechanical and electrical nameplates. Remove paint applied to required labels and identification.

3. Replace parts subject to operating conditions during construction that may impede operation or reduce longevity.
4. Replace burned-out bulbs, bulbs noticeably dimmed by hours of use, and defective and noisy starters in fluorescent and mercury vapor fixtures to comply with requirements for new fixtures.

END OF SECTION 01 7700

SECTION 01 7823 - OPERATION AND MAINTENANCE DATA

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section includes administrative and procedural requirements for preparing operation and maintenance manuals, including the following:

1. Operation and maintenance documentation directory.
2. Operation manuals for systems, subsystems, and equipment.
3. Product maintenance manuals.
4. Systems and equipment maintenance manuals.

B. Related Requirements:

1. Section 01 3300 "Submittal Procedures" for submitting copies of submittals for operation and maintenance manuals.

1.3 DEFINITIONS

A. System: An organized collection of parts, equipment, or subsystems united by regular interaction.

B. Subsystem: A portion of a system with characteristics similar to a system.

1.4 CLOSEOUT SUBMITTALS

A. Manual Content: Operations and maintenance manual content is specified in individual Specification Sections to be reviewed at the time of Section submittals. Submit reviewed manual content formatted and organized as required by this Section.

1. Architect will comment on whether content of operations and maintenance submittals are acceptable.
2. Where applicable, clarify and update reviewed manual content to correspond to revisions and field conditions.

B. Format: Submit operations and maintenance manuals in the following format:

1. PDF electronic file. Assemble each manual into a composite electronically indexed file. Submit on digital media acceptable to Architect.

    a. Name each indexed document file in composite electronic index with applicable item name. Include a complete electronically linked operation and maintenance directory.
    b. Enable inserted reviewer comments on draft submittals.

2. Three paper copies. Include a complete operation and maintenance directory. Enclose title pages and directories in clear plastic sleeves. Architect will return two copies.

C. Manual Submittal: Submit each manual in final form prior to requesting inspection for Substantial Completion and at least 15 days before commencing demonstration and training. Architect will return copy with comments.

1. Correct or revise each manual to comply with Architect's comments. Submit copies of each corrected manual within 15 days of receipt of Architect's comments and prior to commencing demonstration and training.

PART 2 - PRODUCTS

2.1 OPERATION AND MAINTENANCE DOCUMENTATION DIRECTORY

A. Directory: Prepare a single, comprehensive directory of emergency, operation, and maintenance data and materials, listing items and their location to facilitate ready access to desired information. Include a section in the directory for each of the following:

1. List of documents.
2. List of systems.
3. List of equipment.
4. Table of contents.

B. List of Systems and Subsystems: List systems alphabetically. Include references to operation and maintenance manuals that contain information about each system.

C. List of Equipment: List equipment for each system, organized alphabetically by system. For pieces of equipment not part of system, list alphabetically in separate list.

D. Tables of Contents: Include a table of contents for each emergency, operation, and maintenance manual.

E. Identification: In the documentation directory and in each operation and maintenance manual, identify each system, subsystem, and piece of equipment with same designation used in the Contract Documents. If no designation exists, assign a designation according to ASHRAE Guideline 4, "Preparation of Operating and Maintenance Documentation for Building Systems."

2.2 REQUIREMENTS FOR EMERGENCY, OPERATION, AND MAINTENANCE MANUALS

A. Organization: Unless otherwise indicated, organize each manual into a separate section for each system and subsystem, and a separate section for each piece of equipment not part of a system. Each manual shall contain the following materials, in the order listed:

1. Title page.
2. Table of contents.
3. Manual contents.

B. Title Page: Include the following information:

1. Subject matter included in manual.
2. Name and address of Project.
3. Name and address of Owner.
4. Date of submittal.
5. Name and contact information for Contractor.
6. Name and contact information for Construction Manager.
7. Name and contact information for Architect.
8. Name and contact information for Commissioning Authority.
9. Names and contact information for major consultants to the Architect that designed the systems contained in the manuals.
10. Cross-reference to related systems in other operation and maintenance manuals.

C. Table of Contents: List each product included in manual, identified by product name, indexed to the content of the volume, and cross-referenced to Specification Section number in Project Manual.

1. If operation or maintenance documentation requires more than one volume to accommodate data, include comprehensive table of contents for all volumes in each volume of the set.

D. Manual Contents: Organize into sets of manageable size. Arrange contents alphabetically by system, subsystem, and equipment. If possible, assemble instructions for subsystems, equipment, and components of one system into a single binder.

E. Manuals, Paper Copy: Submit manuals in the form of hard copy, bound and labeled volumes.

1. Binders: Heavy-duty, three-ring, vinyl-covered, loose-leaf binders, in thickness necessary to accommodate contents, sized to hold 8-1/2-by-11-inch paper; with clear plastic sleeve on spine to hold label describing contents and with pockets inside covers to hold folded oversize sheets.

a. If two or more binders are necessary to accommodate data of a system, organize data in each binder into groupings by subsystem and related components. Cross-reference other binders if necessary to provide essential information for proper operation or maintenance of equipment or system.
b. Identify each binder on front and spine, with printed title "OPERATION AND MAINTENANCE MANUAL," Project title or name, subject matter of contents, and indicate Specification Section number on bottom of spine. Indicate volume number for multiple-volume sets.

2. Dividers: Heavy-paper dividers with plastic-covered tabs for each section of the manual. Mark each tab to indicate contents. Include typed list of products and major components of equipment included in the section on each divider, cross-referenced to Specification Section number and title of Project Manual.
3. Protective Plastic Sleeves: Transparent plastic sleeves designed to enclose diagnostic software storage media for computerized electronic equipment.
4. Supplementary Text: Prepared on 8-1/2-by-11-inch white bond paper.
5. Drawings: Attach reinforced, punched binder tabs on drawings and bind with text.

a. If oversize drawings are necessary, fold drawings to same size as text pages and use as foldouts.
b. If drawings are too large to be used as foldouts, fold and place drawings in labeled envelopes and bind envelopes in rear of manual. At appropriate locations in manual, insert typewritten pages indicating drawing titles, descriptions of contents, and drawing locations.

2.3 OPERATION MANUALS

A. Content: In addition to requirements in this Section, include operation data required in individual Specification Sections and the following information:

1. System, subsystem, and equipment descriptions. Use designations for systems and equipment indicated on Contract Documents.
2. Performance and design criteria if Contractor has delegated design responsibility.
3. Operating standards.
4. Operating procedures.
5. Operating logs.
6. Wiring diagrams.
7. Control diagrams.
8. Piped system diagrams.
9. Precautions against improper use.
10. License requirements including inspection and renewal dates.

B. Descriptions: Include the following:

1. Product name and model number. Use designations for products indicated on Contract Documents.
2. Manufacturer's name.
3. Equipment identification with serial number of each component.
4. Equipment function.

5. Operating characteristics.
6. Limiting conditions.
7. Performance curves.
8. Engineering data and tests.
9. Complete nomenclature and number of replacement parts.

C. Operating Procedures: Include the following, as applicable:

1. Startup procedures.
2. Equipment or system break-in procedures.
3. Routine and normal operating instructions.
4. Regulation and control procedures.
5. Instructions on stopping.
6. Normal shutdown instructions.
7. Seasonal and weekend operating instructions.
8. Required sequences for electric or electronic systems.
9. Special operating instructions and procedures.

D. Systems and Equipment Controls: Describe the sequence of operation, and diagram controls as installed.

E. Piped Systems: Diagram piping as installed, and identify color-coding where required for identification.

2.4 PRODUCT MAINTENANCE MANUALS

A. Content: Organize manual into a separate section for each product, material, and finish. Include source information, product information, maintenance procedures, repair materials and sources, and warranties and bonds, as described below.

B. Source Information: List each product included in manual, identified by product name and arranged to match manual's table of contents. For each product, list name, address, and telephone number of Installer or supplier and maintenance service agent, and cross-reference Specification Section number and title in Project Manual and drawing or schedule designation or identifier where applicable.

C. Product Information: Include the following, as applicable:

1. Product name and model number.
2. Manufacturer's name.
3. Color, pattern, and texture.
4. Material and chemical composition.
5. Reordering information for specially manufactured products.

D. Maintenance Procedures: Include manufacturer's written recommendations and the following:

1. Inspection procedures.
2. Types of cleaning agents to be used and methods of cleaning.
3. List of cleaning agents and methods of cleaning detrimental to product.
4. Schedule for routine cleaning and maintenance.
5. Repair instructions.

E. Repair Materials and Sources: Include lists of materials and local sources of materials and related services.

2.5 SYSTEMS AND EQUIPMENT MAINTENANCE MANUALS

A. Content: For each system, subsystem, and piece of equipment not part of a system, include source information, manufacturers' maintenance documentation, maintenance procedures, maintenance and service schedules, spare parts list and source information, maintenance service contracts, and warranty and bond information, as described below.

B. Source Information: List each system, subsystem, and piece of equipment included in manual, identified by product name and arranged to match manual's table of contents. For each product, list name, address, and telephone number of Installer or supplier and maintenance service agent, and cross-reference Specification Section number and title in Project Manual and drawing or schedule designation or identifier where applicable.

C. Manufacturers' Maintenance Documentation: Manufacturers' maintenance documentation including the following information for each component part or piece of equipment:

1. Standard maintenance instructions and bulletins.
2. Drawings, diagrams, and instructions required for maintenance, including disassembly and component removal, replacement, and assembly.
3. Identification and nomenclature of parts and components.
4. List of items recommended to be stocked as spare parts.

D. Maintenance Procedures: Include the following information and items that detail essential maintenance procedures:

1. Test and inspection instructions.
2. Troubleshooting guide.
3. Precautions against improper maintenance.
4. Disassembly; component removal, repair, and replacement; and reassembly instructions.
5. Aligning, adjusting, and checking instructions.
6. Demonstration and training video recording, if available.

E. Maintenance and Service Schedules: Include service and lubrication requirements, list of required lubricants for equipment, and separate schedules for preventive and routine maintenance and service with standard time allotment.

1. Scheduled Maintenance and Service: Tabulate actions for daily, weekly, monthly, quarterly, semiannual, and annual frequencies.
2. Maintenance and Service Record: Include manufacturers' forms for recording maintenance.

F. Spare Parts List and Source Information: Include lists of replacement and repair parts, with parts identified and cross-referenced to manufacturers' maintenance documentation and local sources of maintenance materials and related services.

G. Warranties and Bonds: Include copies of warranties and bonds and lists of circumstances and conditions that would affect validity of warranties or bonds.

1. Include procedures to follow and required notifications for warranty claims.

PART 3 - EXECUTION

3.1 MANUAL PREPARATION

A. Operation and Maintenance Manuals: Assemble a complete set of operation and maintenance data indicating operation and maintenance of each system, subsystem, and piece of equipment not part of a system.

1. Engage a factory-authorized service representative to assemble and prepare information for each system, subsystem, and piece of equipment not part of a system.
2. Prepare a separate manual for each system and subsystem, in the form of an instructional manual for use by Owner's operating personnel.

B. Manufacturers' Data: Where manuals contain manufacturers' standard printed data, include only sheets pertinent to product or component installed. Mark each sheet to identify each product or component incorporated into the Work. If data include more than one item in a tabular format, identify each item using appropriate references from the Contract Documents. Identify data applicable to the Work and delete references to information not applicable.

1. Prepare supplementary text if manufacturers' standard printed data are not available and where the information is necessary for proper operation and maintenance of equipment or systems.

C. Drawings: Prepare drawings supplementing manufacturers' printed data to illustrate the relationship of component parts of equipment and systems and to illustrate control sequence and flow diagrams. Coordinate these drawings with information contained in record Drawings to ensure correct illustration of completed installation.

1. Do not use original project record documents as part of operation and maintenance manuals.
2. Comply with requirements of newly prepared record Drawings in Section 017839 "Project Record Documents."

D. Comply with Section 01 7700 "Closeout Procedures" for schedule for submitting operation and maintenance documentation.

END OF SECTION 01 7823

SECTION 01 7839 - PROJECT RECORD DOCUMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section includes administrative and procedural requirements for project record documents, including the following:

1. Record Drawings.
2. Record Specifications.

B. Related Requirements:

1. Section 01 7700 "Closeout Procedures" for general closeout procedures.
2. Section 01 7823 "Operation and Maintenance Data" for operation and maintenance manual requirements.

1.3 CLOSEOUT SUBMITTALS

A. Record Drawings: Submit one set of marked-up record drawings.

B. Record Specifications: Submit one paper copy of Project's Specifications, including addenda and contract modifications.

PART 2 - PRODUCTS

2.1 RECORD DRAWINGS

A. Record Prints: Maintain one set of marked-up paper copies of the Contract Drawings and Shop Drawings, incorporating new and revised drawings as modifications are issued.

1. Preparation: Mark record prints to show the actual installation where installation varies from that shown originally. Require individual or entity who obtained record data, whether individual or entity is Installer, subcontractor, or similar entity, to provide information for preparation of corresponding marked-up record prints.

    a. Give particular attention to information on concealed elements that would be difficult to identify or measure and record later.
    b. Accurately record information in an acceptable drawing technique.
    c. Record data as soon as possible after obtaining it.
    d. Record and check the markup before enclosing concealed installations.
    e. Cross-reference record prints to corresponding archive photographic documentation.

2. Content: Types of items requiring marking include, but are not limited to, the following:

    a. Dimensional changes to Drawings.
    b. Revisions to details shown on Drawings.
    c. Locations and depths of underground utilities.
    d. Revisions to routing of piping and conduits.
    e. Revisions to electrical circuitry.
    f. Actual equipment locations.
    g. Locations of concealed internal utilities.
    h. Changes made by Change Order or Construction Change Directive.

i. Changes made following Architect's written orders.
j. Details not on the original Contract Drawings.
k. Field records for variable and concealed conditions.
l. Record information on the Work that is shown only schematically.

3. Mark the Contract Drawings and Shop Drawings completely and accurately. Use personnel proficient at recording graphic information in production of marked-up record prints.
4. Mark record sets with erasable, red-colored pencil. Use other colors to distinguish between changes for different categories of the Work at same location.
5. Mark important additional information that was either shown schematically or omitted from original Drawings.
6. Note Construction Change Directive numbers, alternate numbers, Change Order numbers, and similar identification, where applicable.

2.2 RECORD SPECIFICATIONS

A. Preparation: Mark Specifications to indicate the actual product installation where installation varies from that indicated in Specifications, addenda, and contract modifications.

1. Give particular attention to information on concealed products and installations that cannot be readily identified and recorded later.

PART 3 - EXECUTION

3.1 RECORDING AND MAINTENANCE

A. Recording: Maintain one copy of each submittal during the construction period for project record document purposes. Post changes and revisions to project record documents as they occur; do not wait until end of Project.

B. Maintenance of Record Documents and Samples: Store record documents and Samples in the field office apart from the Contract Documents used for construction. Do not use project record documents for construction purposes. Maintain record documents in good order and in a clean, dry, legible condition, protected from deterioration and loss. Provide access to project record documents for Architect's reference during normal working hours.

END OF SECTION 01 7839

SECTION 01 7900 - DEMONSTRATION AND TRAINING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section includes administrative and procedural requirements for instructing Owner's personnel, including the following:

1. Demonstration of operation of systems, subsystems, and equipment.
2. Training in operation and maintenance of systems, subsystems, and equipment.

1.3 QUALITY ASSURANCE

A. Instructor Qualifications: A factory-authorized service representative, complying with requirements in Section 01 4000 "Quality Requirements," experienced in operation and maintenance procedures and training.

1.4 COORDINATION

A. Coordinate instruction schedule with Owner's operations. Adjust schedule as required to minimize disrupting Owner's operations and to ensure availability of Owner's personnel.

B. Coordinate instructors, including providing notification of dates, times, length of instruction time, and course content.

PART 2 - PRODUCTS

2.1 INSTRUCTION PROGRAM

A. Program Structure: Develop an instruction program that includes individual training modules for each system and for equipment not part of a system, as required by individual Specification Sections, and as follows:

1. Basis of System Design, Operational Requirements, and Criteria: Include the following:

a. System, subsystem, and equipment descriptions.
b. Performance and design criteria if Contractor is delegated design responsibility.
c. Operating standards.
d. Regulatory requirements.
e. Equipment function.
f. Operating characteristics.
g. Limiting conditions.
h. Performance curves.

2. Documentation: Review the following items in detail:

a. Emergency manuals.
b. Operations manuals.
c. Maintenance manuals.
d. Project record documents.
e. Identification systems.
f. Warranties and bonds.
g. Maintenance service agreements and similar continuing commitments.

3. Emergencies: Include the following, as applicable:

    a. Instructions on meaning of warnings, trouble indications, and error messages.
    b. Instructions on stopping.
    c. Shutdown instructions for each type of emergency.
    d. Operating instructions for conditions outside of normal operating limits.
    e. Sequences for electric or electronic systems.
    f. Special operating instructions and procedures.

4. Operations: Include the following, as applicable:

    a. Startup procedures.
    b. Equipment or system break-in procedures.
    c. Routine and normal operating instructions.
    d. Regulation and control procedures.
    e. Control sequences.
    f. Safety procedures.
    g. Instructions on stopping.
    h. Normal shutdown instructions.
    i. Operating procedures for emergencies.
    j. Operating procedures for system, subsystem, or equipment failure.
    k. Seasonal and weekend operating instructions.
    l. Required sequences for electric or electronic systems.
    m. Special operating instructions and procedures.

5. Adjustments: Include the following:

    a. Alignments.
    b. Checking adjustments.
    c. Noise and vibration adjustments.
    d. Economy and efficiency adjustments.

6. Troubleshooting: Include the following:

    a. Diagnostic instructions.
    b. Test and inspection procedures.

7. Maintenance: Include the following:

    a. Inspection procedures.
    b. Types of cleaning agents to be used and methods of cleaning.
    c. List of cleaning agents and methods of cleaning detrimental to product.
    d. Procedures for routine cleaning
    e. Procedures for preventive maintenance.
    f. Procedures for routine maintenance.
    g. Instruction on use of special tools.

8. Repairs: Include the following:

    a. Diagnosis instructions.
    b. Repair instructions.
    c. Disassembly; component removal, repair, and replacement; and reassembly instructions.
    d. Instructions for identifying parts and components.
    e. Review of spare parts needed for operation and maintenance.

PART 3 - EXECUTION

3.1 PREPARATION

A. Assemble educational materials necessary for instruction, including documentation and training module.

3.2 INSTRUCTION

A. Engage qualified instructors to instruct Owner's personnel to adjust, operate, and maintain systems, subsystems, and equipment not part of a system.

B. Scheduling: Provide instruction at mutually agreed on times. For equipment that requires seasonal operation, provide similar instruction at start of each season.

1. Schedule training with Owner, through Architect, with at least seven days' advance notice.

C. Training Location and Reference Material: Conduct training on-site in the completed and fully operational facility using the actual equipment in-place. Conduct training using final operation and maintenance data submittals.

END OF SECTION 01 7900

DIVISION 03 – CONCRETE

03 3000	Cast-In-Place Concrete
03 4800	Precast Concrete Specialties

SECTION 03 3000 - CAST-IN-PLACE CONCRETE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section includes cast-in-place concrete, including formwork, reinforcement, concrete materials, mixture design, placement procedures, finishes, curing, and sealing.

B. Related Sections:

1. Section 31 2000 "Earth Moving" for drainage fill under slabs-on-grade.
2. Section 32 1313 "Concrete Paving" for concrete pavement and walks.

1.3 DEFINITIONS

A. Cementitious Materials: Portland Cement alone or in combination with one or more of the following: blended hydraulic cement, fly ash and other pozzolans, ground granulated blast-furnace slag, and silica fume; subject to compliance with requirements.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product indicated, including concrete sealer.

B. Design Mixtures: For each concrete mixture. Submit alternate design mixtures when characteristics of materials, Project conditions, weather, test results, or other circumstances warrant adjustments.

C. Steel Reinforcement Shop Drawings: Placing drawings that detail fabrication, bending, and placement.

1.5 INFORMATIONAL SUBMITTALS

A. Material Test Reports: For the following, from a qualified testing agency, indicating compliance with requirements:

1. Aggregates.

1.6 QUALITY ASSURANCE

A. Manufacturer Qualifications: A firm experienced in manufacturing ready-mixed concrete products and that complies with ASTM C 94/C 94M requirements for production facilities and equipment.

1. Manufacturer certified according to NRMCA's "Certification of Ready Mixed Concrete Production Facilities."

B. Testing Agency Qualifications: An independent agency, acceptable to authorities having jurisdiction, qualified according to ASTM C 1077 and ASTM E 329 for testing indicated.

C. Source Limitations: Obtain each type or class of cementitious material of the same brand from the same manufacturer's plant, obtain aggregate from single source, and obtain admixtures from single source from single manufacturer.

D. ACI Publications: Comply with the following unless modified by requirements in the Contract Documents:

1. ACI 301, "Specifications for Structural Concrete," Sections 1 through 5.
2. ACI 117, "Specifications for Tolerances for Concrete Construction and Materials."

E. Concrete Testing Service: Engage a qualified independent testing agency to perform material evaluation tests and to design concrete mixtures.

F. Preinstallation Conference: Conduct conference at Project site.

PART 2 - PRODUCTS

2.1 FORM-FACING MATERIALS

A. Smooth-Formed Finished Concrete: Form-facing panels that will provide continuous, true, and smooth concrete surfaces. Furnish in largest practicable sizes to minimize number of joints.

1. Plywood, metal, or other approved panel materials.

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

C. Chamfer Strips: Wood, metal, PVC, or rubber strips, size as shown on drawings.

D. Form-Release Agent: Commercially formulated form-release agent that will not bond with, stain, or adversely affect concrete surfaces and will not impair subsequent treatments of concrete surfaces.

1. Formulate form-release agent with rust inhibitor for steel form-facing materials.

E. Form Ties: Factory-fabricated, removable or snap-off metal or glass-fiber-reinforced plastic form ties designed to resist lateral pressure of fresh concrete on forms and to prevent spalling of concrete on removal.

1. Furnish units that will leave no corrodible metal closer than 1 inch to the plane of exposed concrete surface.
2. Furnish ties that, when removed, will leave holes no larger than 1 inch in diameter in concrete surface.
3. Furnish ties with integral water-barrier plates to walls indicated to receive dampproofing or waterproofing.

2.2 STEEL REINFORCEMENT

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

2.3 REINFORCEMENT ACCESSORIES

A. Joint Dowel Bars: ASTM A 615/A 615M, Grade 60 plain-steel bars, cut true to length with ends square and free of burrs.

B. Bar Supports: Bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars and welded wire reinforcement in place. Manufacture bar supports from steel wire, plastic, or precast concrete according to CRSI's "Manual of Standard Practice," of greater compressive strength than concrete and as follows:

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

2.4 CONCRETE MATERIALS

A. Cementitious Material: Use the following cementitious materials, of the same type, brand, and source, throughout Project:

1. Portland Cement: ASTM C 150,Type I or IA, gray. Supplement with the following:

a. Fly Ash: ASTM C 618, Class F or C.

B. Normal-Weight Aggregates: ASTM C 33, Class 3M coarse aggregate or better, graded. Provide aggregates from a single source with documented service record data of at least 10 years' satisfactory service in similar applications and service conditions using similar aggregates and cementitious materials.

1. Maximum Coarse-Aggregate Size: 1-1/2 inches nominal.
2. Fine Aggregate: Free of materials with deleterious reactivity to alkali in cement.

C. Water: ASTM C 94/C 94M and potable.

2.5 ADMIXTURES

A. Air-Entraining Admixture: ASTM C 260.

B. Chemical Admixtures: Provide admixtures certified by manufacturer to be compatible with other admixtures and that will not contribute water-soluble chloride ions exceeding those permitted in hardened concrete. Do not use calcium chloride or admixtures containing calcium chloride.

1. Water-Reducing Admixture: ASTM C 494/C 494M, Type A.
2. Retarding Admixture: ASTM C 494/C 494M, Type B.
3. Water-Reducing and Retarding Admixture: ASTM C 494/C 494M, Type D.
4. High-Range, Water-Reducing Admixture: ASTM C 494/C 494M, Type F.
5. High-Range, Water-Reducing and Retarding Admixture: ASTM C 494/C 494M, Type G.
6. Plasticizing and Retarding Admixture: ASTM C 1017/C 1017M, Type II.

2.6 VAPOR RETARDERS

A. Sheet Vapor Retarder: ASTM E 1745, Class A. Include manufacturer's recommended adhesive or pressure-sensitive tape.

B. Granular Fill: Clean mixture of crushed stone or crushed or uncrushed gravel; ASTM D 448, Size 57, with 100 percent passing a 1-1/2-inchieve and 0 to 5 percent passing a No. 8ieve.

2.7 CURING MATERIALS

A. Evaporation Retarder: Waterborne, monomolecular film forming, manufactured for application to fresh concrete.

B. Water: Potable.

C. Clear, Waterborne, Membrane-Forming Curing Compound: ASTM C 309, Type 1, Class B, dissipating.

2.8 CONCRETE SEALERS

A. Concrete sealers are used on new exterior concrete surfaces exposed to freeze/thaw cycles and deicing salts.

B. Concrete sealers: As used in this specification, are sealers applied to concrete surfaces to protect from surface damage, corrosion, and staining. Sealers either block pores in concrete to reduce absorption of water and salts or form impermeable layer which prevents such materials from passing. Concrete sealer, when selected and applied properly, will prevent intrusion of water and deicers, minimizing freeze/thaw damage.

C. Regulatory Agency sustainability Approvals:

1. Comply with applicable VOC standards and other local requirements.

D. Qualifications:

1. Applicator:

   a. Applicator shall be acceptable to Manufacturer as applicator of its product.
   b. Minimum five (5) Satisfactorily completed installations of comparable quality, scope, similar size, and complexity in past two (2) years before bidding. Include contact information of person with oversight of each project.

E. Field Conditions:

1. Follow Printed Manufacturer's instruction for environmental hazards:
2. Follow Printed Manufacturer's instruction for ambient conditions for application of product including:

   a. Minimum and maximum application temperatures.
   b. Application precautions when rain is expected.

F. Products:

1. Design Criteria:

   a. General:

      1) Penetrating water repellant silane concrete sealers are to be used.
      2) Siloxanes are not to be used to replace silane sealers.

   b. Silane Based Sealers:

      1) Protects concrete from freeze/thaw cycles and deicing salts.
      2) Resists penetration of water and deicing salts.
      3) 100 percent silane active ingredient content.
      4) Penetrating sealer.
      5) Water repellant.
      6) Clear (colorless, non-yellowing). Surface appearance after application: unchanged.

2. Acceptable Products:

   a. Saline Based Sealers:

      1) MasterProtect H 1000 by BASF, Cleveland, OH www.master-builders-solutions.basf.us.

         a) Low VOC.

      2) Weather Worker J29A by Dayton Superior Corporation, Miamisburg. OH www.daytonsuperior.com.
      3) Baracade Silane 100 by Euclid, Cleveland, OH www.euclindchemical.com.

         a) Low VOC.

      4) Sikagard 705L by Sika Corporation, Lyndhurst, NJ www.usa.sika.com.

         a) Low VOC.

      5) TK-590-100 by TK Products, Minnetonka, MN www.tkproducts.com.
      6) Equal product meeting design criteria requirements as approved by Architect/Owner's Representative before BID.

2.9 RELATED MATERIALS

A. Expansion- and Isolation-Joint-Filler Strips: ASTM D 1751, asphalt-saturated cellulosic fiber.

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

2.10 REPAIR MATERIALS

A. Repair Underlayment: Cement-based, polymer-modified, self-leveling product that can be applied in thicknesses from 1/8 inch and that can be feathered at edges to match adjacent floor elevations.

1. Cement Binder: ASTM C 150, portland cement or hydraulic or blended hydraulic cement as defined in ASTM C 219.
2. Primer: Product of underlayment manufacturer recommended for substrate, conditions, and application.
3. Aggregate: Well-graded, washed gravel, 1/8 to 1/4 inch or coarse sand as recommended by underlayment manufacturer.
4. Compressive Strength: Not less than 4100 psi at 28 days when tested according to ASTM C 109/C 109M.

B. Repair Overlayment: Cement-based, polymer-modified, self-leveling product that can be applied in thicknesses from 1/4 inch and that can be filled in over a scarified surface to match adjacent floor elevations.

1. Cement Binder: ASTM C 150, portland cement or hydraulic or blended hydraulic cement as defined in ASTM C 219.
2. Primer: Product of topping manufacturer recommended for substrate, conditions, and application.
3. Aggregate: Well-graded, washed gravel, 1/8 to 1/4 inch or coarse sand as recommended by topping manufacturer.
4. Compressive Strength: Not less than 5000 psi at 28 days when tested according to ASTM C 109/C 109M.

2.11 CONCRETE MIXTURES, GENERAL

A. Prepare design mixtures for each type and strength of concrete, proportioned on the basis of laboratory trial mixture or field test data, or both, according to ACI 301.

B. Cementitious Materials: Limit percentage, by weight, of cementitious materials other than portland cement in concrete as follows:

1. Fly Ash: 25 percent.
2. Combined Fly Ash and Pozzolan: 25 percent.

C. Admixtures: Use admixtures according to manufacturer's written instructions.

1. Use water-reducing, high-range water-reducing, or plasticizing admixture in concrete, as required, for placement and workability.
2. Use water-reducing and retarding admixture when required by high temperatures, low humidity, or other adverse placement conditions.
3. Use water-reducing admixture in pumped concrete, concrete for heavy-use industrial slabs and parking structure slabs, concrete required to be watertight, and concrete with a water-cementitious materials ratio below 0.50.

2.12 CONCRETE MIXTURES FOR BUILDING ELEMENTS

A. Footings and Interior Slabs on Grade: Proportion normal-weight concrete mixture as indicated in the structural notes and as follows:

1. Minimum Compressive Strength: 3000 psi at 28 days.
2. Maximum Water-Cementitious Materials Ratio: 0.45.
3. Slump Limit: 4 inches, 8 inches for concrete with verified slump of 2 to 4 inches before adding high-range water-reducing admixture or plasticizing admixture, plus or minus 1 inch.

B. Foundation Walls: Proportion normal-weight concrete mixture as indicated in the structural notes and as follows:

1. Minimum Compressive Strength: 4500 psi at 28 days.
2. Maximum Water-Cementitious Materials Ratio: 0.45.
3. Slump Limit: 4 inches, 8 inches or concrete with verified slump of 2 to 4 inches before adding high-range water-reducing admixture or plasticizing admixture, plus or minus 1 inch
4. Air Content: 6 percent, plus or minus 1.5 percent at point of delivery for 1-inch nominal maximum aggregate size.

C. Exterior Slabs-on-Grade: Proportion normal-weight concrete mixture as indicated in the structural notes and as follows:

1. Minimum Compressive Strength: 4500 psi at 28 days.
2. Slump Limit: 4 inches plus or minus 1 inch
3. Air Content: Do not allow air content of trowel-finished floors to exceed 3 percent.

2.13 FABRICATING REINFORCEMENT

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

2.14 CONCRETE MIXING

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

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.

PART 3 - EXECUTION

3.1 FORMWORK

A. Design, erect, shore, brace, and maintain formwork, according to ACI 301, to support vertical, lateral, static, and dynamic loads, and construction loads that might be applied, until structure can support such loads.

B. Construct formwork so concrete members and structures are of size, shape, alignment, elevation, and position indicated, within tolerance limits of ACI 117.

C. Construct forms tight enough to prevent loss of concrete mortar.

D. Fabricate forms for easy removal without hammering or prying against concrete surfaces. Provide crush or wrecking plates where stripping may damage cast concrete surfaces.

E. Set edge forms, bulkheads, and intermediate screed strips for slabs to achieve required elevations and slopes in finished concrete surfaces. Provide and secure units to support screed strips; use strike-off templates or compacting-type screeds.

F. Clean forms and adjacent surfaces to receive concrete. Remove chips, wood, sawdust, dirt, and other debris just before placing concrete.

G. Retighten forms and bracing before placing concrete, as required, to prevent mortar leaks and maintain proper alignment.

H. Coat contact surfaces of forms with form-release agent, according to manufacturer's written instructions, before placing reinforcement.

3.2 EMBEDDED ITEMS

A. Place and secure anchorage devices and other embedded items required for adjoining work that is attached to or supported by cast-in-place concrete. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.

1. Install anchor rods, accurately located, to elevations required and complying with tolerances in Section 7.5 of AISC's "Code of Standard Practice for Steel Buildings and Bridges."

3.3 REMOVING AND REUSING FORMS

A. General: Formwork for walls, columns, and similar parts of the Work that does not support weight of concrete may be removed after cumulatively curing at not less than 50 deg F for 24 hours after placing concrete. Concrete has to be hard enough to not be damaged by form-removal operations and curing and protection operations need to be maintained.

B. Clean and repair surfaces of forms to be reused in the Work. Split, frayed, delaminated, or otherwise damaged form-facing material will not be acceptable for exposed surfaces. Apply new form-release agent.

C. When forms are reused, clean surfaces, remove fins and laitance, and tighten to close joints. Align and secure joints to avoid offsets. Do not use patched forms for exposed concrete surfaces unless approved by Architect.

3.4 VAPOR RETARDERS

A. Sheet Vapor Retarders: Place, protect, and repair sheet vapor retarder according to ASTM E 1643 and manufacturer's written instructions.

1. Lap joints 6 inches and seal with manufacturers recommended tape.

B. Granular Course: Cover vapor retarder with granular fill, moisten, and compact with mechanical equipment to elevation tolerances of plus 0 inch or minus 3/4 inch

3.5 STEEL REINFORCEMENT

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

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

B. Clean reinforcement of loose rust and mill scale, earth, ice, and other foreign materials that would reduce bond to concrete.

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

D. Set wire ties with ends directed into concrete, not toward exposed concrete surfaces.

3.6 JOINTS

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

B. Construction Joints: Install so strength and appearance of concrete are not impaired, at locations indicated or as approved by Architect.

C. Contraction Joints in Slabs-on-Grade: Form weakened-plane contraction joints, sectioning concrete into areas as indicated. Construct contraction joints for a depth equal to at least one-fourth of concrete thickness as follows:

1. Grooved Joints: Form contraction joints after initial floating by grooving and finishing each edge of joint to a radius of 1/8 inch. Repeat grooving of contraction joints after applying surface finishes. Eliminate groove or tool marks on concrete surfaces.
2. Sawed Joints: Form contraction joints with power saws equipped with shatterproof abrasive or diamond-rimmed blades. Cut 1/8-inch-de joints into concrete when cutting action will not tear, abrade, or otherwise damage surface and before concrete develops random contraction cracks.

D. Doweled Joints: Install dowel bars and support assemblies at joints where indicated. Lubricate or asphalt coat one-half of dowel length to prevent concrete bonding to one side of joint.

3.7 CONCRETE PLACEMENT

A. Before placing concrete, verify that installation of formwork, reinforcement, and embedded items is complete and that required inspections have been performed.

B. Do not add water to concrete during delivery, at Project site, or during placement unless approved by Architect.

C. Before test sampling and placing concrete, water may be added at Project site, subject to limitations of ACI 301.

1. Do not add water to concrete after adding high-range water-reducing admixtures to mixture.

D. Deposit concrete continuously in one layer or in horizontal layers of such thickness that no new concrete will be placed on concrete that has hardened enough to cause seams or planes of weakness. If a section cannot be placed continuously, provide construction joints as indicated. Deposit concrete to avoid segregation.

1. Deposit concrete in horizontal layers of depth to not exceed formwork design pressures and in a manner to avoid inclined construction joints.
2. Consolidate placed concrete with mechanical vibrating equipment according to ACI 301.
3. Do not use vibrators to transport concrete inside forms. Insert and withdraw vibrators vertically at uniformly spaced locations to rapidly penetrate placed layer and at least 6 inches into preceding layer. Do not insert vibrators into lower layers of concrete that have begun to lose plasticity. At each insertion, limit duration of vibration to time necessary to consolidate concrete and complete embedment of reinforcement and other embedded items without causing mixture constituents to segregate.

E. Deposit and consolidate concrete for floors and slabs in a continuous operation, within limits of construction joints, until placement of a panel or section is complete.

1. Consolidate concrete during placement operations so concrete is thoroughly worked around reinforcement and other embedded items and into corners.
2. Maintain reinforcement in position on chairs during concrete placement.
3. Screed slab surfaces with a straightedge and strike off to correct elevations.
4. Slope surfaces uniformly to drains where required.
5. Begin initial floating using bull floats or darbies to form a uniform and open-textured surface plane, before excess bleedwater appears on the surface. Do not further disturb slab surfaces before starting finishing operations.

F. Cold-Weather Placement: Comply with ACI 306.1 and as follows. Protect concrete work from physical damage or reduced strength that could be caused by frost, freezing actions, or low temperatures.

1. When average high and low temperature is expected to fall below 40 deg For three successive days, maintain delivered concrete mixture temperature within the temperature range required by ACI 301.
2. Do not use frozen materials or materials containing ice or snow. Do not place concrete on frozen subgrade or on subgrade containing frozen materials.
3. Do not use calcium chloride, salt, or other materials containing antifreeze agents or chemical accelerators unless otherwise specified and approved in mixture designs.

G. Hot-Weather Placement: Comply with ACI 301 and as follows:

1. Maintain concrete temperature below 90 deg Ft time of placement. Chilled mixing water or chopped ice may be used to control temperature, provided water equivalent of ice is calculated to total amount of mixing water. Using liquid nitrogen to cool concrete is Contractor's option.
2. Fog-spray forms, steel reinforcement, and subgrade just before placing concrete. Keep subgrade uniformly moist without standing water, soft spots, or dry areas.

3.8 FINISHING FORMED SURFACES

A. Rubbed Finish: Apply the following to smooth-formed finished as-cast concrete where indicated:

1. Smooth-Rubbed Finish: Not later than one day after form removal, moisten concrete surfaces and rub with carborundum brick or another abrasive until producing a uniform color and texture. Do not apply cement grout other than that created by the rubbing process.

B. Related Unformed Surfaces: At tops of walls, horizontal offsets, and similar unformed surfaces adjacent to formed surfaces, strike off smooth and finish with a texture matching adjacent formed surfaces. Continue final surface treatment of formed surfaces uniformly across adjacent unformed surfaces unless otherwise indicated.

3.9 FINISHING FLOORS AND SLABS

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

B. Scratch Finish: While still plastic, texture concrete surface that has been screeded and bull-floated or darbied. Use stiff brushes, brooms, or rakes to produce a profile amplitude of ¼ inch in one direction.

1. Apply scratch finish to surfaces to receive mortar setting beds for bonded cementitious floor finishes.

C. Trowel Finish: After applying float finish, apply first troweling and consolidate concrete by hand or power-driven trowel. Continue troweling passes and restraighten until surface is free of trowel marks and uniform in texture and appearance. Grind smooth any surface defects that would telegraph through applied coatings or floor coverings.

1. Apply a trowel finish to surfaces, exposed to view, to be covered with resilient flooring, carpet, ceramic or quarry tile set over a cleavage membrane, paint, or another thin-film-finish coating system.
2. Finish surfaces to the following tolerances, according to ASTM E 1155 for a randomly trafficked floor surface:

a. Specified overall values of flatness, F(F) 30; and of levelness, F(L) 20; with minimum local values of flatness, F(F) 24; and of levelness, F(L) 15; for suspended slabs.

D. Broom Finish: Apply a broom finish to exterior concrete platforms, steps, ramps, and elsewhere as indicated.

1. Immediately after float finishing, slightly roughen trafficked surface by brooming with fiber-bristle broom perpendicular to main traffic route. Coordinate required final finish with Architect before application.

3.10 MISCELLANEOUS CONCRETE ITEMS

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

3.11 CONCRETE SEALING AND CURING

A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures. Comply with ACI 306.1 for cold-weather protection and ACI 301 for hot-weather protection during curing.

B. Evaporation Retarder: Apply evaporation retarder to unformed concrete surfaces if hot, dry, or windy conditions cause moisture loss approaching 0.2 lb/sq. ft. x h before and during finishing operations. Apply according to manufacturer's written instructions after placing, screeding, and bull floating or darbying concrete, but before float finishing.

C. Formed Surfaces: Cure formed concrete surfaces, including supported slabs, and other similar surfaces. If forms remain during curing period, moist cure after loosening forms. If removing forms before end of curing period, continue curing for the remainder of the curing period.

D. Unformed Surfaces: Begin curing immediately after finishing concrete. Cure unformed surfaces, including floors and slabs and other surfaces.

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

1. Curing Compound: Apply uniformly in continuous operation by power spray or roller according to manufacturer's written instructions. Recoat areas subjected to heavy rainfall within three hours after initial application. Maintain continuity of coating and repair damage during curing period.

a. Removal: After curing period has elapsed, remove curing compound without damaging concrete surfaces by method recommended by curing compound manufacturer unless manufacturer certifies curing compound will not interfere with bonding of floor covering used on Project.

F. Concrete Sealer:

1. General:

a. Apply concrete sealer after surface preparation has been completed as per Manufacturer's recommendations.
b. Follow Manufacturer's ambient conditions for minimum and maximum application temperatures and application precautions when rain is expected.
c. Stir material thoroughly before and during application if required by Manufacturer.
d. Do not apply sealer if standing water is visible on concrete surface to be treated.
e. Apply even distribution of sealer.
f. Do NOT over apply. All product should be penetrate substrate with no surface build-up. Any excess or puddles of material must be removed.

2. Apply concrete Sealer:

a. Silane Based Sealers:

1) Apply at rate of about 1 gallon per 300 sq ft or as per Manufacturer's recommendations depending upon absorbency of concrete surface.

3. Allow Concrete Sealer to dry as per Manufacturer's recommendations.

3.12 CONCRETE SURFACE REPAIRS

A. Defective Concrete: Repair and patch defective areas when approved by Architect. Remove and replace concrete that cannot be repaired and patched to Architect's approval.

B. Perform structural repairs of concrete, subject to Architect's approval, using epoxy adhesive and patching mortar.

C. Repair materials and installation not specified above may be used, subject to Architect's approval.

3.13 FIELD QUALITY CONTROL

A. Testing and Inspecting: Owner will engage a qualified testing and inspecting agency to perform field tests and inspections and prepare test reports.

END OF SECTION 03 3000

SECTION 03 4800 - PRECAST CONCRETE SPECIALTIES

PART 1 - GENERAL

1.1 SUMMARY

A. Products Furnished But Not Installed Under This Section:

1. Precast concrete wall caps.

B. Related Requirements:

1. Section 04 2200: Installation of precast members.
2. Section 07 9200: 'Joint Sealants'.

1.2 REFERENCES

A. Reference Standards:

1. ASTM International:

a. ASTM A185/A185M-07, 'Standard Specification for Steel Welded Wire Fabric, Plain, for Concrete'.
b. ASTM A615/A615M-12, 'Standard Specification for Deformed and Plain Steel Bars for Concrete Reinforcement'.
c. ASTM C33/C33M-11a, 'Standard Specification for Concrete Aggregates'.
d. ASTM C150/C150M-12, 'Standard Specification for Portland Cement'.
e. ASTM C260/C260M-10a, 'Standard Specification for Air-Entraining Admixtures for Concrete'.
f. ASTM C494/C494M-12, 'Standard Specification for Chemical Admixtures for Concrete'.
g. ASTM C496/C496M-11, 'Standard Test Method for Splitting Tensile Strength of Cylindrical Concrete Specimens'.
h. ASTM C672/C672M-12, 'Standard Test Method for Scaling Resistance of Concrete Surfaces Exposed to Deicing Chemicals'.
i. ASTM C779/C779M-05(2010), 'Standard Test Method for Abrasion Resistance of Horizontal Concrete Surfaces'.
j. ASTM C947-03(2009), 'Standard Test Method for Flexural Properties of Thin-Section Glass-Fiber-Reinforced Concrete (Using Simple Beam With Third-Point Loading)'.
k. ASTM C979/C979M-10, 'Standard Specification for Pigments for Integrally Colored Concrete'.
l. ASTM C1645/C1645M-11, 'Standard Test Method for Freeze-thaw and De-icing Salt Durability of Solid Concrete Interlocking Paving Units'.

1.3 SUBMITTALS

A. Action Submittals:

1. Product Data:

a. Manufacturer product literature for each type of product indicated.

2. Shop Drawings:

a. Precast concrete elements:

1) Detail fabrication and installation of architectural precast concrete units.
2) Indicate locations, plans, elevations, dimensions, shapes, and cross sections of each unit.
3) Indicate joints, reveals, and extent and location of each surface finish. Indicate details at corners.

4) Indicate locations, tolerances, and details of anchorage devices to be embedded in or attached to structure or other construction.
5) Indicate location of each architectural precast concrete unit by same identification mark placed on panel.
6) Indicate relationship of architectural precast concrete units to adjacent materials.
7) Indicate locations and details of stone facings, anchors, and joint widths.

3. Samples:

a. Precast concrete elements:

1) For each type of finish indicated on exposed surfaces of architectural precast concrete units, in sets of 3, illustrating full range of finish, color, and texture variations expected; approximately 12 by 12 by 2 inches

a) When other faces of precast concrete unit are exposed, include Samples illustrating workmanship, color, and texture of backup concrete as well as facing concrete.

B. Informational Submittals:

1. Certificates:

a. Precast concrete elements:

1) Material Certificates: For the following items, signed by manufacturers:

a) Admixtures.
b) Cementitious materials.
c) Reinforcing materials.

2. Design Submittals:

a. Precast concrete elements:

1) Design Modifications:

a) If design modifications are proposed to meet performance requirements and field conditions, submit design calculations and Shop Drawings.
b) Do not adversely affect the appearance, durability, or strength of units when modifying details or materials and maintain the general design concept.

3. Test And Evaluation Reports:

a. Material Test Reports:

1) Precast concrete units:

a) Aggregates.

4. Qualification Statements:

a. Precast concrete units:

1) Installer and Fabricator:

a) Letter certifying level of training and experience of Installer and Fabricator.

1.4 DELIVERY, STORAGE, AND HANDLING

A. Delivery And Acceptance Requirements:

1. Check, carefully unload, and deliver material to site in such manner as to avoid soiling and damaging.

B. Storage And Handling Requirements:

1. Store material on planks clear of ground and protect from damage.

PART 2 - PRODUCTS

2.1 MANUFACTURED UNITS

A. Materials:

1. Design Criteria:

a. Precast Concrete:

1) Air Entrainment: Wet cast mixture maintains 5 to 7 percent air entrainment where surfaces are exposed to freeze-thaw. Admixture conforms to ASTM C260.
2) Aggregates: ASTM C33/C33M.
3) Cement: ASTM C150/C150M, Type II.
4) Compressive Strength: 4500 psi concrete minimum.
5) Water: Potable water free from impurities.

b. Reinforcing:

1) Bars: ASTM A615/A615M, Grade 60.
2) Reinforcing Mesh: ASTM A185/A185M.

c. Color:

1) Add Natural Grey color to mix.

2.2 ACCESSORIES

A. Mastic: Asphalt based plastic roofing cement.

2.3 FABRICATION

A. General:

1. Chamfered edges.
2. Smooth finish free from pits and rock pockets.

B. Concrete Wall Caps Covers:

1. Color: As selected by the Architect.
2. Provide minimum of two (2) mounting dowels for each cap.
3. Provide 3/4 inch overhang (both sides of wall).
4. Sloped coping.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Concrete wall caps.

1. Install at exterior trash enclosures.

END OF SECTION

DIVISION 04 – MASONRY:

04 2200	Concrete Unit Masonry
04 7300	Manufactured Stone Masonry

SECTION 04 2200 - CONCRETE UNIT MASONRY

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Concrete masonry units.
2. Mortar and grout.
3. Steel reinforcing bars.
4. Masonry joint reinforcement.

B. Related Sections:

1. Section 03 4800 "Pre-Cast Concrete Specialties" for furnishing wall cap.

1.3 DEFINITIONS

A. CMU(s): Concrete masonry unit(s).

B. Reinforced Masonry: Masonry containing reinforcing steel in grouted cells.

1.4 QUALITY ASSURANCE

A. Source Limitations for Masonry Units: Obtain exposed masonry units of a uniform texture and color, or a uniform blend within the ranges accepted for these characteristics, from single source from single manufacturer for each product required.

B. Source Limitations for Mortar Materials: Obtain mortar ingredients of a uniform quality, including color for exposed masonry, from single manufacturer for each cementitious component and from single source or producer for each aggregate.

C. Masonry Standard: Comply with ACI 530.1/ASCE 6/TMS 602 unless modified by requirements in the Contract Documents.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Store masonry units on elevated platforms in a dry location. If units are not stored in an enclosed location, cover tops and sides of stacks with waterproof sheeting, securely tied. If units become wet, do not install until they are dry.

B. Store cementitious materials on elevated platforms, under cover, and in a dry location. Do not use cementitious materials that have become damp.

C. Store aggregates where grading and other required characteristics can be maintained and contamination avoided.

D. Deliver preblended, dry mortar mix in moisture-resistant containers designed for use with dispensing silos. Store preblended, dry mortar mix in delivery containers on elevated platforms, under cover, and in a dry location or in covered weatherproof dispensing silos.

E. Store masonry accessories, including metal items, to prevent corrosion and accumulation of dirt and oil.

1.6 PROJECT CONDITIONS

A. Protection of Masonry: During construction, cover tops of walls, projections, and sills with waterproof sheeting at end of each day's work. Cover partially completed masonry when construction is not in progress.

1. Extend cover a minimum of 24 inches down both sides of walls and hold cover securely in place.

B. Stain Prevention: Prevent grout, mortar, and soil from staining the face of masonry to be left exposed or painted. Immediately remove grout, mortar, and soil that come in contact with such masonry.

1. Protect base of walls from rain-splashed mud and from mortar splatter by spreading coverings on ground and over wall surface.

C. Cold-Weather Requirements: Do not use frozen materials or materials mixed or coated with ice or frost. Do not build on frozen substrates. Remove and replace unit masonry damaged by frost or by freezing conditions. Comply with cold-weather construction requirements contained in ACI 530.1/ASCE 6/TMS 602.

1. Cold-Weather Cleaning: Use liquid cleaning methods only when air temperature is 40 deg F and higher and will remain so until masonry has dried, but not less than 7 days after completing cleaning.

D. Hot-Weather Requirements: Comply with hot-weather construction requirements contained in ACI 530.1/ASCE 6/TMS 602.

PART 2 - PRODUCTS

2.1 MASONRY UNITS, GENERAL

A. Defective Units: Referenced masonry unit standards may allow a certain percentage of units to contain chips, cracks, or other defects exceeding limits stated in the standard. Do not use units where such defects will be exposed in the completed Work.

2.2 CONCRETE MASONRY UNITS

A. Shapes: Provide shapes indicated and as follows, with exposed surfaces matching exposed faces of adjacent units unless otherwise indicated.

1. Provide square-edged units for outside corners unless otherwise indicated.

B. CMUs: ASTM C 90.

1. Density Classification: Lightweight.
2. Size (Width): Manufactured to dimensions 3/8 inch less than nominal dimensions.

2.3 MORTAR AND GROUT MATERIALS

A. Portland Cement: ASTM C 150, Type I or II, except Type III may be used for cold-weather construction.

B. Hydrated Lime: ASTM C 207, Type S.

C. Portland Cement-Lime Mix: Packaged blend of portland cement and hydrated lime containing no other ingredients.

D. Aggregate for Mortar: ASTM C 144.

1. For mortar that is exposed to view, use washed aggregate consisting of natural sand or crushed stone.
2. For joints less than 1/4 inch thick, use aggregate graded with 100 percent passing the No. 16 sieve.

E. Aggregate for Grout: ASTM C 404.

F. Water: Potable.

2.4 REINFORCEMENT

A. Uncoated Steel Reinforcing Bars: ASTM A 615/A 615M or ASTM A 996/A 996M, Grade 60

B. Masonry Joint Reinforcement, General: ASTM A 951/A 951M.

1. Exterior Walls: Hot-dip galvanized, carbon steel.
2. Wire Size for Side Rods: 0.187-inch diameter.
3. Wire Size for Cross Rods: 0.187-inch diameter.
4. Spacing of Cross Rods, Tabs, and Cross Ties: Not more than 16 inches o.c.
5. Provide in lengths of not less than 10 feet**,** with prefabricated corner and tee units.

C. Masonry Joint Reinforcement for Single-Wythe Masonry: Either ladder or truss type with single pair of side rods.

2.5 MORTAR AND GROUT MIXES

A. General: Do not use admixtures, including pigments, air-entraining agents, accelerators, retarders, water-repellent agents, antifreeze compounds, or other admixtures unless otherwise indicated.

1. Do not use calcium chloride in mortar or grout.
2. Use portland cement-lime mortar unless otherwise indicated.
3. For exterior masonry, use portland cement-lime mortar.
4. For reinforced masonry, use portland cement-lime mortar.
5. Add cold-weather admixture (if used) at same rate for all mortar that will be exposed to view, regardless of weather conditions, to ensure that mortar color is consistent.

B. Preblended, Dry Mortar Mix: Furnish dry mortar ingredients in form of a preblended mix. Measure quantities by weight to ensure accurate proportions, and thoroughly blend ingredients before delivering to Project site.

C. Mortar for Unit Masonry: Comply with ASTM C 270, Proportion Specification. Provide the following types of mortar for applications stated unless another type is indicated or needed to provide required compressive strength of masonry.

1. For reinforced masonry, use Type S.

D. Grout for Unit Masonry: Comply with ASTM C 476.

1. Use grout of type indicated or, if not otherwise indicated, of type (fine or coarse) that will comply with Table 1.15.1 in ACI 530.1/ASCE 6/TMS 602 for dimensions of grout spaces and pour height.
2. Proportion grout in accordance with ASTM C 476, Table 1.
3. Provide grout with a slump of 8 to 11 inches as measured according to ASTM C 143/C 143M.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

1. For the record, prepare written report, endorsed by Installer, listing conditions detrimental to performance of work.
2. Verify that foundations are within tolerances specified.
3. Verify that reinforcing dowels are properly placed.

B. Before installation, examine rough-in and built-in construction for piping systems to verify actual locations of piping connections.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION, GENERAL

A. Use full-size units without cutting if possible. If cutting is required to provide a continuous pattern or to fit adjoining construction, cut units with motor-driven saws; provide clean, sharp, unchipped edges. Allow units to dry before laying unless wetting of units is specified. Install cut units with cut surfaces and, where possible, cut edges concealed.

3.3 TOLERANCES

A. Dimensions and Locations of Elements:

1. For dimensions in cross section or elevation do not vary by more than plus 1/2 inch minus 1/4 inch
2. For location of elements in plan do not vary from that indicated by more than plus or minus 1/2 inch

B. Lines and Levels:

1. For bed joints and top surfaces of bearing walls do not vary from level by more than 1/4 inch in 10 feet or 1/2 inch maximum.
2. For vertical lines and surfaces do not vary from plumb by more than 1/4 inch in 10 feet 3/8 inch in 20 feet or 1/2 inch maximum.
3. For conspicuous vertical lines, such as external corners, do not vary from plumb by more than 1/8 inch in 10 feet 1/4 inch in 20 feet or 1/2 inch maximum.
4. For lines and surfaces do not vary from straight by more than 1/4 inch in 10 feet 3/8 inch in 20 feet or 1/2 inch maximum.

C. Joints:

1. For bed joints, do not vary from thickness indicated by more than plus or minus 1/8 inch with a maximum thickness limited to 1/2 inch
2. For exposed bed joints, do not vary from bed-joint thickness of adjacent courses by more than 1/8 inch

3.4 LAYING MASONRY WALLS

A. Lay out walls in advance for accurate spacing of surface bond patterns with uniform joint thicknesses and for accurate location of openings, movement-type joints, returns, and offsets. Avoid using less-than-half-size units, particularly at corners, jambs, and, where possible, at other locations.

B. Bond Pattern for Exposed Masonry: Unless otherwise indicated, lay exposed masonry in running bond; do not use units with less than nominal 4-inch horizontal face dimensions at corners or jambs.

C. Stopping and Resuming Work: Stop work by racking back units in each course from those in course below; do not tooth. When resuming work, clean masonry surfaces that are to receive mortar before laying fresh masonry.

D. Built-in Work: As construction progresses, build in items specified in this and other Sections. Fill in solidly with masonry around built-in items.

3.5 MORTAR BEDDING AND JOINTING

A. Lay hollow CMUs as follows:

1. With face shells fully bedded in mortar and with head joints of depth equal to bed joints.
2. With webs fully bedded in mortar in all courses of piers, columns, and pilasters.

3. With webs fully bedded in mortar in grouted masonry.
4. With entire units, including areas under cells, fully bedded in mortar at starting course on footings where cells are not grouted.

B. Set precast trim units in full bed of mortar with full vertical joints.

1. Clean soiled surfaces with fiber brush and soap powder and rinse thoroughly with clear water.

C. Tool exposed joints slightly concave when thumbprint hard, using a jointer larger than joint thickness unless otherwise indicated.

3.6 MASONRY JOINT REINFORCEMENT

A. General: Install entire length of longitudinal side rods in mortar with a minimum cover of 5/8 inch on exterior side of walls, 1/2 inch elsewhere. Lap reinforcement a minimum of 6 inches

1. Space reinforcement not more than 16 inches o.c.

B. Provide continuity at corners by using prefabricated L-shaped units.

3.7 REINFORCED UNIT MASONRY INSTALLATION

A. Placing Reinforcement: Comply with requirements in ACI 530.1/ASCE 6/TMS 602.

B. Grouting: Do not place grout until entire height of masonry to be grouted has attained enough strength to resist grout pressure.

1. Comply with requirements in ACI 530.1/ASCE 6/TMS 602 for cleanouts and for grout placement, including minimum grout space and maximum pour height.

3.8 REPAIRING, POINTING, AND CLEANING

A. Remove and replace masonry units that are loose, chipped, broken, stained, or otherwise damaged or that do not match adjoining units. Install new units to match adjoining units; install in fresh mortar, pointed to eliminate evidence of replacement.

B. Pointing: During the tooling of joints, enlarge voids and holes, except weep holes, and completely fill with mortar. Point up joints, including corners, openings, and adjacent construction, to provide a neat, uniform appearance. Prepare joints for sealant application, where indicated.

C. In-Progress Cleaning: Clean unit masonry as work progresses by dry brushing to remove mortar fins and smears before tooling joints.

D. Final Cleaning: After mortar is thoroughly set and cured, clean exposed masonry as follows:

1. Remove large mortar particles by hand with wooden paddles and nonmetallic scrape hoes or chisels.
2. Protect adjacent stone and nonmasonry surfaces from contact with cleaner by covering them with liquid strippable masking agent or polyethylene film and waterproof masking tape.
3. Wet wall surfaces with water before applying cleaners; remove cleaners promptly by rinsing surfaces thoroughly with clear water.
4. Clean concrete masonry by cleaning method indicated in NCMA TEK 8-2A applicable to type of stain on exposed surfaces.

3.9 MASONRY WASTE DISPOSAL

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

B. Excess Masonry Waste: Remove excess clean masonry waste and other masonry waste, and legally dispose of off Owner's property.

END OF SECTION 04 2200

SECTION 04 7300 – MANUFACTURED STONE MASONRY

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section Includes manufactured stone and related work as shown and specified.

B. Installation of exterior rigid insulation (Furnished by section 07 2100).

1.3 SUBMITTALS

A. Product Data: Submit manufacturer's specifications, data, and installation instructions for review.

B. Samples: Submit 2 minimum 12 x 12 inch sample boards for each color specified.

C. Installer Qualifications: If requested, provide evidence that installers meet the requirements of Article 1.4.

D. Closeout Submittals: Provide completed Guarantee form per Article 1.5.

E. Provide drawings and calculations for the fasteners and their attachments through continuous rigid insulation to the 2 x 6 studs for gravity and out-of-plane loading. The calculations and drawings are to be stamped by a Professional Engineer licensed in the state of Utah.

1.4 QUALITY ASSURANCE

A. Installer Qualifications:

1. Minimum of 3 years of experience on similar work; knowledge and understanding of standards referenced herein; skill necessary to perform in compliance with this specification. Installers failing to demonstrate the required experience, knowledge, or skill shall be removed from the project.
2. Certified installer by manufacturer.

B. Mock-up: 4'-0" x 4'-0" sample panel; mock-up may be incorporated into project subject to approval of Architect. Approved mock-up will set the standard of quality of the work of this section.

1.5 GUARANTEE

A. Installation: Provide in required form for a period of 1 year from date of acceptance by Owner.

B. Material: Provide warranty on manufacturer's form that products are to be free from defects in materials and workmanship for 50 years beginning at date of acceptance by Owner.

PART 2 - PRODUCTS

2.1 MANUFACTURED STONE VENEER

A. Acceptable Manufacturers: G.S. Harris Co., Inc. Contact: 2795 Pennsylvania Avenue, Ogden, UT 84401; Telephone: (888) 878-6631, (801) 621-1380; Fax: (801) 621-8252; e-mail: info@harristone.com; website: www.harristone.co .

B. Alternate Manufacturers: No acceptable equals.

C. Stone Pattern: Uintah Dry Stack Ledgestone; color to be selected by Architect.

D. Electrical Box Stones:

1. 6" x 7.5".
2. Color: To match selected stone veneer color.

E. Watertable Sill:

1. Size: 2.5" high, 3" deep, and 19.5" length.
2. Color: To match selected stone veneer color.
3. Provide sloped top surface and drip edge.

F. Hose Bib Stones:

1. 4" x 4", two piece surround.
2. Color: To match selected stone veneer color.

2.2 LATH AND ACCESSORIES

A. Lath: Per ASTM C847; galvanized expanded metal diamond mesh, self-furring lath, 2.5 pound per square yard.

B. Fasteners: Galvanized, self-drilling, ¼ inch diameter, pancake-head screws sufficient length to penetrate through continuous rigid insulation and into studs 1 3/8 inches minimum, with ¼-inch minimum spacer.

1. Fasteners shall have a weather resistant coating acceptable to stone system manufacturer.

C. Backing Paper: Fluid applied membrane.

2.3 MORTAR MATERIALS

A. Premixed Type N or S.

B. Materials Mixture:

1. Portland Cement: ASTM C150, Type 1; use 1 brand throughout.
2. Sand: ASTM C144; Silica; light grey color.
3. Line: ASTM C207, Type S.
4. Water: Clean and Potable.

C. Mortar Remover: Water with bristle brush.

D. Mortar Color: Mineral oxide pigment; natural gray.

2.4 MORTAR MIXES

A. General: Accurately measure mortar materials by volume; shovel measurements not permitted.

B. At Contractor's option, mix one of the following for Type N mortar:

1. Option One: 1 part Portland Cement; 1 part hydrated line; 4 ½ to 6 parts aggregate; water.
2. Option Two: 1 part masonry cement Type N; 2 ¼ to 3 parts aggregate; water.
3. Option Three: Premixed mortar.

2.5 CONSTRUCTIVE ADHESIVE

A. Acceptable Products: Liquid Nails, as manufactured by Macco Adhesives.

B. Alternate Products: Proposed equals are subject to substitution process per section 01 3300 Product Submittals and Substitutions.

2.6 SEALANTS

A. Refer to section 07 9200 – Joint Sealants.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrate before beginning work; report defects.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Take field measurements; report variance between plan and field dimensions.

B. Environmental requirements:

1. Cold Weather: Do not proceed with installation unless materials and surrounding air temperature are at least 40 degrees F prior to, during, and for 48 hours after installation. Protect installed work from damage from cold weather.
2. Hot Weather: Do not proceed with installation when surrounding air temperature exceeds 90 degrees F or during dry windy conditions. Protect installed work from damage from hot or windy weather.

C. Substrate: Allow at least 28 days for concrete unit masonry to cure prior to installing stone. Substrate must be clean before application of mortar.

D. Protection: Protect manufactured stone from damage; protect work of others from damage or staining resulting from stone work.

3.3 INSTALLATION

A. Install in conformance with referenced standards, manufacturer's written directions, as shown, and as specified.

B. Mortar Scratch Coat:

1. Backing: Verify proper installation of fluid applied membrane over sheathing before commencing work.
2. Insulation: Install 1 ½" Rigid Insulation over fluid applied membrane to height of sill stone veneer. Fasten with 2 ½" galvanized screws, pre-assembled with 2 inch washers. Maximum spacing 12" on center both directions, 3" from edges and seams.
3. Lath: Fastened to studs at 6 inches on center vertically. Lap lath continuously 16 inches minimum beyond inside and outside corners. Lap 4 inches on horizontal and vertical joints.
4. Scratch Coat: Apply ½ inch thickness (minimum) scratch coat of Type S mortar onto lath.
5. Allow scratch coat to cure 48 hours minimum.

C. Installation over CMU or Mortar Scratch Coat:

1. Immediately prior to applying mortar, dampen substrate evenly with water. Take care to dampen surface and not leave surface water.
2. Dampen the back of each stone before applying ½ inch thickness (minimum) of Type S mortar onto concrete substrate or back of each stone.
3. Press stone firmly in place. Apply sufficient pressure to squeeze mortar from all edges of unit, to assure bond.

D. Layout Pattern: Random; install stones with tight fit pattern with mortarless joints.

E. Handle units in manner to prevent chipping and breakage.

F. Cut and shape stones for fit with tools per manufacturer's instructions.

G. Keep finished edge of stones 4 inches minimum above grade and 2 inches above sidewalks.

H. Apply construction adhesive to bond stone sills at brackets and as shown.

I. Outside Corners; Use outside corner pieces or lintel corner pieces at all vertical or horizontal outside corners.

J. Keep work clean; remove excess materials and mortar droppings daily. Remove mortar droppings on connecting and adjoining work immediately.

K. Seal pipe and conduit penetrations per section 07 9200 – Joint Sealers.

L. Defective Work; Remove and replace defective materials; correct defective workmanship. Mortar stains which cannot be cleaned from brick surface will be considered defective work.

3.4 POINTING AND CLEANING

A. As work progressed, point holes in joints; fill solid with joint mortar; tool properly.

B. As soon as mortar has hardened, wet finished surfaces and clean manufactured stone with water and bristle brush. Thoroughly rinse surfaces with clean water, immediately after cleaning.

3.5 PROTECTION

A. Protect finished work from rain for 48 hours after installation.

END OF SECTION 04 7300

DIVISION 5 - METALS:

05 1200	Structural Steel Framing
05 5000	Metal Fabrications

SECTION 05 1200 - STRUCTURAL STEEL FRAMING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Structural steel.
2. Grout.

B. Related Requirements:

1. Section 05 5000 "Metal Fabrications" for miscellaneous steel fabrications, and other steel items not defined as structural steel.
2. Section 09 9113 "Exterior Painting" and Section 09 9123 "Interior Painting" for surface-preparation and priming requirements.

1.3 DEFINITIONS

A. Structural Steel: Elements of the structural frame indicated on Drawings and as described in AISC 303, "Code of Standard Practice for Steel Buildings and Bridges."

B. Protected Zone: Structural members or portions of structural members indicated as "Protected Zone" on Drawings. Connections of structural and nonstructural elements to protected zones are limited.

C. Demand Critical Welds: Those welds, the failure of which would result in significant degradation of the strength and stiffness of the Seismic-Load-Resisting System and which are indicated as "Demand Critical" or "Seismic Critical" on Drawings.

1.4 COORDINATION

A. Coordinate selection of shop primers with topcoats to be applied over them. Comply with paint and coating manufacturers' written recommendations to ensure that shop primers and topcoats are compatible with one another.

B. Coordinate installation of anchorage items to be embedded in or attached to other construction without delaying the Work. Provide setting diagrams, sheet metal templates, instructions, and directions for installation.

1.5 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1.6 ACTION SUBMITTALS

A. Shop Drawings: Show fabrication of structural-steel components.

1. Include details of cuts, connections, splices, camber, holes, and other pertinent data.
2. Include embedment Drawings.
3. Indicate welds by standard AWS symbols, distinguishing between shop and field welds, and show size, length, and type of each weld. Show backing bars that are to be removed and supplemental fillet welds where backing bars are to remain.

4. Indicate type, size, and length of bolts, distinguishing between shop and field bolts. Identify pretensioned and slip-critical, high-strength bolted connections.
5. Identify members and connections of the Seismic-Load-Resisting System.
6. Indicate locations and dimensions of protected zones.
7. Identify demand critical welds.

1.7 QUALITY ASSURANCE

A. Welding Qualifications: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."

1. Welders and welding operators performing work on bottom-flange, demand-critical welds shall pass the supplemental welder qualification testing, as required by AWS D1.8/D1.8M. FCAW-S and FCAW-G shall be considered separate processes for welding personnel qualification.

B. Comply with applicable provisions of the following specifications and documents:

1. AISC 303.
2. AISC 341 and AISC 341s1.
3. AISC 360.
4. RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts."

1.8 DELIVERY, STORAGE, AND HANDLING

A. Store materials to permit easy access for inspection and identification. Keep steel members off ground and spaced by using pallets, dunnage, or other supports and spacers. Protect steel members and packaged materials from corrosion and deterioration.

1. Do not store materials on structure in a manner that might cause distortion, damage, or overload to members or supporting structures. Repair or replace damaged materials or structures as directed.

B. Store fasteners in a protected place in sealed containers with manufacturer's labels intact.

1. Fasteners may be repackaged provided Owner's testing and inspecting agency observes repackaging and seals containers.
2. Clean and relubricate bolts and nuts that become dry or rusty before use.
3. Comply with manufacturers' written recommendations for cleaning and lubricating ASTM F 1852 fasteners and for retesting fasteners after lubrication.

PART 2 - PRODUCTS

2.1 STRUCTURAL-STEEL MATERIALS

A. W-Shapes: ASTM A 992/A 992M, Grade 50.

B. Channels, Angles, M, S-Shapes: ASTM A 36/A 36M, Grade 36, and ASTM A 572/A 572M, Grade 50.

C. Plate and Bar: ASTM A 36/A 36M and ASTM A50 or as indicated in the structural drawings.

2.2 BOLTS, CONNECTORS, AND ANCHORS

A. High-Strength Bolts, Nuts, and Washers: ASTM A 325, Type 1, heavy-hex steel structural bolts; ASTM A 563, Grade C, heavy-hex carbon-steel nuts; and ASTM F 436, Type 1, hardened carbon-steel washers; all with plain finish or as indicated in the structural drawings.

1. Direct-Tension Indicators: ASTM F 959, Type 325, compressible-washer type with plain finish or as indicated in the structural drawings.

2.3 PRIMER

A. Primer: Comply with Section 09 9113 "Exterior Painting" and Section 09 9123 "Interior Painting."

2.4 GROUT

A. Nonmetallic, Shrinkage-Resistant Grout: ASTM C 1107/C 1107M, factory-packaged, nonmetallic aggregate grout, noncorrosive and nonstaining, mixed with water to consistency suitable for application and a 30-minute working time.

2.5 FABRICATION

A. Structural Steel: Fabricate and assemble in shop to greatest extent possible. Fabricate according to AISC 303, "Code of Standard Practice for Steel Buildings and Bridges," and to AISC 360.

1. Camber structural-steel members where indicated.
2. Fabricate beams with rolling camber up.
3. Identify high-strength structural steel according to ASTM A 6/A 6M and maintain markings until structural steel has been erected.
4. Mark and match-mark materials for field assembly.
5. Complete structural-steel assemblies, including welding of units, before starting shop-priming operations.

B. Bolt Holes: Cut, drill, mechanically thermal cut, or punch standard bolt holes perpendicular to metal surfaces.

C. Finishing: Accurately finish ends of columns and other members transmitting bearing loads.

D. Shear Connectors: Prepare steel surfaces as recommended by manufacturer of shear connectors. Use automatic end welding of headed-stud shear connectors according to AWS D1.1/D1.1M and manufacturer's written instructions.

E. Holes: Provide holes required for securing other work to structural steel and for other work to pass through steel members.

1. Cut, drill, or punch holes perpendicular to steel surfaces. [Do not thermally cut bolt holes or enlarge holes by burning.]
2. Baseplate Holes: Cut, drill, mechanically thermal cut, or punch holes perpendicular to steel surfaces.
3. Weld threaded nuts to framing and other specialty items indicated to receive other work.

2.6 SHOP PRIMING

A. Shop prime steel surfaces except the following:

1. Surfaces embedded in concrete or mortar. Extend priming of partially embedded members to a depth of 2 inches.
2. Surfaces to be field welded.

B. Surface Preparation: Clean surfaces to be painted. Remove loose rust and mill scale and spatter, slag, or flux deposits. Prepare surfaces according to the following specifications and standards:

1. SSPC-SP 2, "Hand Tool Cleaning."

C. Priming: Immediately after surface preparation, apply primer according to manufacturer's written instructions and at rate recommended by SSPC to provide a minimum dry film thickness of 1.5 mils. Use priming methods that result in full coverage of joints, corners, edges, and exposed surfaces.

1. Stripe paint corners, crevices, bolts, welds, and sharp edges.

2. Apply two coats of shop paint to surfaces that are inaccessible after assembly or erection. Change color of second coat to distinguish it from first.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify, with certified steel erector present, elevations of concrete- and masonry-bearing surfaces and locations of anchor rods, bearing plates, and other embedments for compliance with requirements.

1. Prepare a certified survey of existing conditions. Include bearing surfaces, anchor rods, bearing plates, and other embedments showing dimensions, locations, angles, and elevations.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Provide temporary shores, guys, braces, and other supports during erection to keep structural steel secure, plumb, and in alignment against temporary construction loads and loads equal in intensity to design loads. Remove temporary supports when permanent structural steel, connections, and bracing are in place unless otherwise indicated.

3.3 ERECTION

A. Set structural steel accurately in locations and to elevations indicated and according to AISC 303 and AISC 360.

B. Baseplates Leveling Plates: Clean concrete- and masonry-bearing surfaces of bond-reducing materials, and roughen surfaces prior to setting plates. Clean bottom surface of plates.

1. Set plates for structural members on wedges, shims, or setting nuts as required.
2. Weld plate washers to top of baseplate.
3. Snug-tighten anchor rods after supported members have been positioned and plumbed. Do not remove wedges or shims but, if protruding, cut off flush with edge of plate before packing with grout.
4. Promptly pack grout solidly between bearing surfaces and plates so no voids remain. Neatly finish exposed surfaces; protect grout and allow to cure. Comply with manufacturer's written installation instructions for shrinkage-resistant grouts.

C. Maintain erection tolerances of structural steel within AISC 303, "Code of Standard Practice for Steel Buildings and Bridges."

D. Align and adjust various members that form part of complete frame or structure before permanently fastening. Before assembly, clean bearing surfaces and other surfaces that are in permanent contact with members. Perform necessary adjustments to compensate for discrepancies in elevations and alignment.

1. Level and plumb individual members of structure.
2. Make allowances for difference between temperature at time of erection and mean temperature when structure is completed and in service.

E. Splice members only where indicated.

F. Do not use thermal cutting during erection [unless approved by Architect. Finish thermally cut sections within smoothness limits in AWS D1.1/D1.1M].

G. Do not enlarge unfair holes in members by burning or using drift pins. Ream holes that must be enlarged to admit bolts.

3.4 FIELD CONNECTIONS

A. High-Strength Bolts: Install high-strength bolts according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts" for type of bolt and type of joint specified.

1. Joint Type: Snug tightened or as indicated in the structural drawings.

B. Weld Connections: Comply with AWS D1.1/D1.1M [and AWS D1.8/D1.8M] for tolerances, appearances, welding procedure specifications, weld quality, and methods used in correcting welding work.

1. Comply with AISC 303 and AISC 360 for bearing, alignment, adequacy of temporary connections, and removal of paint on surfaces adjacent to field welds.
2. Remove backing bars or runoff tabs where indicated, back gouge, and grind steel smooth.

3.5 REPAIRS AND PROTECTION

A. Touchup Painting: Cleaning and touchup painting are specified in Section 09 9113 "Exterior Painting" and Section 09 9123 "Interior Painting."

END OF SECTION 05 1200

SECTION 05 5000 - METAL FABRICATIONS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Steel framing and supports for countertops.
2. Steel pipe bollards
3. Dumpster enclosure gate.
4. Stainless steel sheeting on wall at electric water cooler.
5. Miscellaneous steel not specified elsewhere.

B. Related Requirements:

1. Section 03 3000 "Cast-in-Place Concrete" for installing items cast into concrete.
2. Section 05 1200 "Structural Steel Framing."

1.3 COORDINATION

A. Coordinate selection of shop primers with topcoats to be applied over them. Comply with paint and coating manufacturers' written recommendations to ensure that shop primers and topcoats are compatible with one another.

B. Coordinate installation of metal fabrications that are anchored to or that receive other work. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.

1.4 ACTION SUBMITTALS

A. Product Data: For the following:

1. Paint products.
2. Grout.

B. Shop Drawings: Show fabrication and installation details. Include plans, elevations, sections, and details of metal fabrications and their connections. Show anchorage and accessory items. Provide Shop Drawings for the following:

1. Steel framing and supports for countertops.
2. Steel pipe bollards.
3. Dumpster enclosure gate.
4. Stainless steel sheeting on wall at electric water cooler.

1.5 QUALITY ASSURANCE

A. Welding Qualifications: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."

B. Welding Qualifications: Qualify procedures and personnel according to the following:

1. AWS D1.1/D1.1M, "Structural Welding Code - Steel."

1.6 FIELD CONDITIONS

A. Field Measurements: Verify actual locations of walls and other construction contiguous with metal fabrications by field measurements before fabrication.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes acting on exterior metal fabrications by preventing buckling, opening of joints, overstressing of components, failure of connections, and other detrimental effects.

1. Temperature Change: 120 deg F, ambient; 180 deg F, material surfaces.

2.2 METALS

A. Metal Surfaces, General: Provide materials with smooth, flat surfaces unless otherwise indicated. For metal fabrications exposed to view in the completed Work, provide materials without seam marks, roller marks, rolled trade names, or blemishes.

B. Steel Plates, Shapes, and Bars: ASTM A 36/A 36M.

C. Steel Tubing: ASTM A 500/A 500M, cold-formed steel tubing.

D. Steel Pipe: ASTM A 53/A 53M, Standard Weight (Schedule 40) unless otherwise indicated.

E. Stainless Steel Sheet: ASTM A 240/A/240M or ASTM A 666, Type 304, 20 gauge.

2.3 MISCELLANEOUS MATERIALS

A. Shop Primers: Provide primers that comply with Section 09 9123 Interior Painting."

B. Nonshrink, Nonmetallic Grout: Factory-packaged, nonstaining, noncorrosive, nongaseous grout complying with ASTM C 1107/C 1107M. Provide grout specifically recommended by manufacturer for interior and exterior applications.

2.4 FABRICATION, GENERAL

A. Shop Assembly: Preassemble items in the shop to greatest extent possible. Disassemble units only as necessary for shipping and handling limitations. Use connections that maintain structural value of joined pieces. Clearly mark units for reassembly and coordinated installation.

B. Cut, drill, and punch metals cleanly and accurately. Remove burrs and ease edges to a radius of approximately 1/32 inch unless otherwise indicated. Remove sharp or rough areas on exposed surfaces.

C. Form bent-metal corners to smallest radius possible without causing grain separation or otherwise impairing work.

D. Form exposed work with accurate angles and surfaces and straight edges.

E. Weld corners and seams continuously to comply with the following:

1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
2. Obtain fusion without undercut or overlap.
3. Remove welding flux immediately.

4. At exposed connections, finish exposed welds and surfaces smooth and blended so no roughness shows after finishing and contour of welded surface matches that of adjacent surface.

F. Form exposed connections with hairline joints, flush and smooth, using concealed fasteners or welds where possible. Where exposed fasteners are required, use Phillips flat-head (countersunk) fasteners unless otherwise indicated. Locate joints where least conspicuous.

G. Fabricate seams and other connections that are exposed to weather in a manner to exclude water. Provide weep holes where water may accumulate.

H. Cut, reinforce, drill, and tap metal fabrications as indicated to receive finish hardware, screws, and similar items.

I. Provide for anchorage of type indicated; coordinate with supporting structure. Space anchoring devices to secure metal fabrications rigidly in place and to support indicated loads.

J. Where units are indicated to be cast into concrete or built into masonry, equip with integrally welded steel strap anchors, 1/8 by 1-1/2 inches, with a minimum 6-inch embedment and 2-inch hook, not less than 8 inches from ends and corners of units and 24 inches o.c., unless otherwise indicated.

2.5 MISCELLANEOUS FRAMING AND SUPPORTS

A. General: Provide steel framing and supports not specified in other Sections as needed to complete the Work.

B. Fabricate units from steel shapes, plates, and bars of welded construction unless otherwise indicated. Fabricate to sizes, shapes, and profiles indicated and as necessary to receive adjacent construction.

1. Fabricate units from slotted channel framing where indicated.
2. Furnish inserts for units installed after concrete is placed.

C. Galvanize miscellaneous framing and supports where indicated.

D. Prime miscellaneous framing and supports with zinc-rich primer where indicated.

2.6 METAL BOLLARDS

A. Fabricate bollards from schedule 40 steel pipe.

B. Prime bollards with zinc-rich primer.

2.7 FINISHES, GENERAL

A. Finish metal fabrications after assembly.

B. Finish exposed surfaces to remove tool and die marks and stretch lines, and to blend into surrounding surface.

2.8 STEEL AND IRON FINISHES

A. Galvanizing: Hot-dip galvanize items as indicated to comply with ASTM A 153/A 153M for steel and iron hardware and with ASTM A 123/A 123M for other steel and iron products.

1. Do not quench or apply post galvanizing treatments that might interfere with paint adhesion.

B. Shop prime iron and steel items not indicated to be galvanized unless they are to be embedded in concrete, sprayed-on fireproofing, or masonry, or unless otherwise indicated.

1. Shop prime with primers specified in Section 09 9123 "Interior Painting" unless

C. Preparation for Shop Priming: Prepare surfaces to comply with requirements indicated below:

1. Exterior Items: SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning."
2. Items Indicated to Receive Zinc-Rich Primer: SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning."
3. Items Indicated to Receive Primers Specified in Section 09 9600 "High-Performance Coatings": SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning."
4. Other Items: SSPC-SP 3, "Power Tool Cleaning."

D. Shop Priming: Apply shop primer to comply with SSPC-PA 1, "Paint Application Specification No. 1: Shop, Field, and Maintenance Painting of Steel," for shop painting.

1. Stripe paint corners, crevices, bolts, welds, and sharp edges.

2.9 DUMPSTER ENCLOSURE GATE

A. Gate frame constructed of steel channels C4 x 5.4 with mitered welded joints. Provide ¼" holes at 4" o.c. in bottom rail for drainage.

B. Vision slats of 16 gauge steel plate, 6 inch minimum width, in 'Z' shape as detailed on drawings.

C. Galvanize framing slats and supports where indicated.

D. Prime with zinc-rich primer.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

A. Cutting, Fitting, and Placement: Perform cutting, drilling, and fitting required for installing metal fabrications. Set metal fabrications accurately in location, alignment, and elevation; with edges and surfaces level, plumb, true, and free of rack; and measured from established lines and levels.

B. Fit exposed connections accurately together to form hairline joints. Weld connections that are not to be left as exposed joints but cannot be shop welded because of shipping size limitations. Do not weld, cut, or abrade surfaces of exterior units that have been hot-dip galvanized after fabrication and are for bolted or screwed field connections.

C. Field Welding: Comply with the following requirements:

1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
2. Obtain fusion without undercut or overlap.
3. Remove welding flux immediately.
4. At exposed connections, finish exposed welds and surfaces smooth and blended so no roughness shows after finishing and contour of welded surface matches that of adjacent surface.

D. Fastening to In-Place Construction: Provide anchorage devices and fasteners where metal fabrications are required to be fastened to in-place construction. Provide threaded fasteners for use with concrete and masonry inserts, toggle bolts, through bolts, lag screws, wood screws, and other connectors.

E. Provide temporary bracing or anchors in formwork for items that are to be built into concrete, masonry, or similar construction.

3.2 INSTALLING MISCELLANEOUS FRAMING AND SUPPORTS

A. General: Install framing and supports to comply with requirements of items being supported, including manufacturers' written instructions and requirements indicated on Shop Drawings.

3.3 INSTALLING PIPE BOLLARDS

A. Fill bollards solidly with concrete, mounding top surface to shed water.

3.4 ADJUSTING AND CLEANING

A. Touchup Painting: Immediately after erection, clean field welds, bolted connections, and abraded areas. Paint uncoated and abraded areas with the same material as used for shop painting to comply with SSPC-PA 1 for touching up shop-painted surfaces.

1. Apply by brush or spray to provide a minimum **2.0-mil** dry film thickness.

B. Touchup Painting: Cleaning and touchup painting of field welds, bolted connections, and abraded areas of shop paint are specified in Section 09 9123 "Interior Painting."

END OF SECTION 05 5000

DIVISION 6 - WOOD AND PLASTICS:

06 1000	Rough Carpentry
06 1600	Sheathing
06 1753	Shop-Fabricated Wood Trusses
06 2023	Interior Finish Carpentry
06 4116	Plastic-Laminate-Faced Architectural Cabinets
06 4216	Flush Wood Paneling
06 6001	Miscellaneous Plastic Fabrications

SECTION 06 1000 - ROUGH CARPENTRY

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Framing with dimension lumber.
2. Framing with engineered wood products.

B. Related Requirements:

1. Section 06 1600 "Sheathing."
2. Section 06 1753 "Shop-Fabricated Wood Trusses" for wood trusses made from dimension lumber.

1.3 DEFINITIONS

A. Exposed Framing: Framing not concealed by other construction.

B. Dimension Lumber: Lumber of 2 inches nominal or greater but less than 5 inches nominal in least dimension.

C. Lumber grading agencies, and the abbreviations used to reference them, include the following:

1. NLGA: National Lumber Grades Authority.
2. SPIB: The Southern Pine Inspection Bureau.
3. WCLIB: West Coast Lumber Inspection Bureau.
4. WWPA: Western Wood Products Association.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of process and factory-fabricated product. Indicate component materials and dimensions and include construction and application details.

1. Include data for wood-preservative treatment from chemical treatment manufacturer and certification by treating plant that treated materials comply with requirements. Indicate type of preservative used and net amount of preservative retained.
2. For products receiving a waterborne treatment, include statement that moisture content of treated materials was reduced to levels specified before shipment to Project site.
3. Include copies of warranties from chemical treatment manufacturers for each type of treatment.

1.5 INFORMATIONAL SUBMITTALS

A. Material Certificates: For dimension lumber specified to comply with minimum allowable unit stresses. Indicate species and grade selected for each use and design values approved by the ALSC Board of Review.

B. Evaluation Reports: For the following, from ICC-ES:

1. Wood-preservative-treated wood.
2. Engineered wood products.

3. Power-driven fasteners.
4. Powder-actuated fasteners.
5. Expansion anchors.
6. Metal framing anchors.

1.6 QUALITY ASSURANCE

A. Testing Agency Qualifications: For testing agency providing classification marking for fire-retardant treated material, an inspection agency acceptable to authorities having jurisdiction that periodically performs inspections to verify that the material bearing the classification marking is representative of the material tested.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Stack lumber flat with spacers beneath and between each bundle to provide air circulation. Protect lumber from weather by covering with waterproof sheeting, securely anchored. Provide for air circulation around stacks and under coverings.

PART 2 - PRODUCTS

2.1 WOOD PRODUCTS, GENERAL

A. Lumber: DOC PS 20 and applicable rules of grading agencies indicated. If no grading agency is indicated, provide lumber that complies with the applicable rules of any rules-writing agency certified by the ALSC Board of Review. Provide lumber graded by an agency certified by the ALSC Board of Review to inspect and grade lumber under the rules indicated.

1. Factory mark each piece of lumber with grade stamp of grading agency.
2. Where nominal sizes are indicated, provide actual sizes required by DOC PS 20 for moisture content specified. Where actual sizes are indicated, they are minimum dressed sizes for dry lumber.
3. Provide dressed lumber, S4S, unless otherwise indicated.

B. Maximum Moisture Content of Lumber: 19 percent unless otherwise indicated.

C. Engineered Wood Products: Provide engineered wood products acceptable to authorities having jurisdiction and for which current model code research or evaluation reports exist that show compliance with building code in effect for Project.

1. Allowable Design Stresses: Provide engineered wood products with allowable design stresses, as published by manufacturer, that meet or exceed those indicated. Manufacturer's published values shall be determined from empirical data or by rational engineering analysis and demonstrated by comprehensive testing performed by a qualified independent testing agency.

2.2 WOOD-PRESERVATIVE-TREATED LUMBER

A. Preservative Treatment by Pressure Process: AWPA U1; Use Category UC2.

1. Preservative Chemicals: Acceptable to authorities having jurisdiction and containing no arsenic or chromium.

B. Kiln-dry lumber after treatment to a maximum moisture content of 19 percent. Do not use material that is warped or that does not comply with requirements for untreated material.

C. Mark lumber with treatment quality mark of an inspection agency approved by the ALSC Board of Review.

D. Application: Treat items indicated on Drawings, and the following:

1. Wood floor plates that are installed over concrete slabs-on-grade.

2.3 DIMENSION LUMBER FRAMING

A. Load-Bearing Partitions: No. 2 grade.

1. Application: Exterior walls.

2. Species:

a. Southern pine; SPIB.
b. Douglas fir-larch; WCLIB or WWPA.
c. Douglas fir-south; WWPA.
d. Hem-fir; WCLIB or WWPA.

B. Joists, Rafters, and Other Framing Not Listed Above: No. 2 grade.

1. Species:

a. Southern pine; SPIB.
b. Douglas fir-larch; WCLIB or WWPA.
c. Douglas fir-south; WWPA.
d. Hem-fir; WCLIB or WWPA.

2.4 ENGINEERED WOOD PRODUCTS

A. Engineered Wood Products, General: Products shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

B. Source Limitations: Obtain each type of engineered wood product from single source from a single manufacturer.

C. Laminated-Veneer Lumber: Structural composite lumber made from wood veneers with grain primarily parallel to member lengths, evaluated and monitored according to ASTM D 5456 and manufactured with an exterior-type adhesive complying with ASTM D 2559.

2.5 MISCELLANEOUS LUMBER

A. For items of dimension lumber size, provide Construction or No. 2 grade lumber and any of the following species:
1. Western woods; WCLIB or WWPA.

B. For blocking not used for attachment of other construction, Utility, Stud, or No. 3 grade lumber of any species may be used provided that it is cut and selected to eliminate defects that will interfere with its attachment and purpose.

2.6 PLYWOOD PHONE BOARD

A. Phone Board: DOC PS 1, Exterior, AC, in thickness indicated or, if not indicated, not less than 3/4-inch nominal thickness.

2.7 FASTENERS

A. General: Provide fasteners of size and type indicated that comply with requirements specified in this article for material and manufacture.

1. Where rough carpentry is exposed to weather, in ground contact, pressure-preservative treated, or in area of high relative humidity, provide fasteners with hot-dip zinc coating complying with ASTM A 153/A 153M.

B. Nails, Brads, and Staples: ASTM F 1667.

C. Power-Driven Fasteners: NES NER-272.

D. Wood Screws: ASME B18.6.1.

E. Lag Bolts: ASME B18.2.1

F. Bolts: Steel bolts complying with ASTM A 307, Grade A with ASTM A 563ex nuts and, where indicated, flat washers.

G. Expansion Anchors: Anchor bolt and sleeve assembly of material indicated below with capability to sustain, without failure, a load equal to six times the load imposed when installed in unit masonry assemblies and equal to four times the load imposed when installed in concrete as determined by testing per ASTM E 488 conducted by a qualified independent testing and inspecting agency.

1. Material: Carbon-steel components, zinc plated to comply with ASTM B 633, Class Fe/Zn 5.

2.8 METAL FRAMING ANCHORS

A. Allowable Design Loads: Provide products with allowable design loads, as published by manufacturer, that meet or exceed those indicated. Manufacturer's published values shall be determined from empirical data or by rational engineering analysis and demonstrated by comprehensive testing performed by a qualified independent testing agency.

B. Galvanized-Steel Sheet: Hot-dip, zinc-coated steel sheet complying with ASTM A 653/A 653M, G60oating designation.

1. Use for interior locations unless otherwise indicated.

C. Joist Hangers: U-shaped joist hangers with 2-inch-ng seat and 1-1/4-inch-de nailing flanges at least 85 percent of joist depth.

D. Top Flange Hangers: U-shaped joist hangers, full depth of joist, formed from metal strap with tabs bent to extend over and be fastened to supporting member.

E. Joist Ties: Flat straps, with holes for fasteners, for tying joists together over supports.

F. Rafter Tie-Downs (Hurricane or Seismic Ties): Bent strap tie for fastening rafters or roof trusses to wall studs below. Tie fits over top of rafter or truss and fastens to both sides of rafter or truss, face of top plates, and side of stud below.

G. Hold-Downs: Brackets for bolting to wall studs and securing to foundation walls with anchor bolts or to other hold-downs with threaded rods and designed with first of two bolts placed seven bolt diameters from reinforced base.

2.9 MISCELLANEOUS MATERIALS

A. Sill-Sealer Gaskets: Closed-cell neoprene foam, 1/4 inch thick, selected from manufacturer's standard widths to suit width of sill members indicated. Retain "Flexible Flashing" Paragraph below if required as a separator between preservative-treated wood and top of foundation.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

A. Set rough carpentry to required levels and lines, with members plumb, true to line, cut, and fitted. Fit rough carpentry to other construction; scribe and cope as needed for accurate fit. Locate nailers, blocking, and similar supports to comply with requirements for attaching other construction.

B. Framing Standard: Comply with AF&PA's WCD 1, "Details for Conventional Wood Frame Construction," unless otherwise indicated.

C. Framing with Engineered Wood Products: Install engineered wood products to comply with manufacturer's written instructions.

D. Metal Framing Anchors: Install metal framing anchors to comply with manufacturer's written instructions. Install fasteners through each fastener hole.

E. Install sill sealer gasket to form continuous seal between sill plates and foundation walls.

F. Do not splice structural members between supports unless otherwise indicated.

G. Sort and select lumber so that natural characteristics will not interfere with installation or with fastening other materials to lumber. Do not use materials with defects that interfere with function of member or pieces that are too small to use with minimum number of joints or optimum joint arrangement.

H. Comply with AWPA M4 for applying field treatment to cut surfaces of preservative-treated lumber.

1. Use inorganic boron for items that are continuously protected from liquid water.
2. Use copper naphthenate for items not continuously protected from liquid water.

I. Securely attach rough carpentry work to substrate by anchoring and fastening as indicated, complying with the following:

1. NES NER-272 for power-driven fasteners.
2. Table 2304.9.1, "Fastening Schedule," in ICC's International Building Code.
3. Table R602.3(1), "Fastener Schedule for Structural Members," and Table R602.3(2), "Alternate Attachments," in ICC's International Residential Code for One- and Two-Family Dwellings.

J. Use steel common nails unless otherwise indicated. Select fasteners of size that will not fully penetrate members where opposite side will be exposed to view or will receive finish materials. Make tight connections between members. Install fasteners without splitting wood. Drive nails snug but do not countersink nail heads unless otherwise indicated.

3.2 WALL AND PARTITION FRAMING INSTALLATION

A. General: Provide single bottom plate and double top plates using members of 2-inch nominal thickness whose widths equal that of studs, except single top plate may be used for non-load-bearing partitions. Fasten plates to supporting construction unless otherwise indicated.

1. For exterior walls, provide 2-by-6-inch nominal size wood studs spaced 16 inches o.c. unless otherwise indicated.

B. Construct corners and intersections with three or more studs.

C. Frame openings with multiple studs and headers. Provide nailed header members of thickness equal to width of studs. Support headers on jamb studs.

1. For load-bearing walls, provide double-jamb studs for openings 60 inches and less in width, and triple-jamb studs for wider openings. Provide headers of depth indicated.

3.3 CEILING JOIST AND RAFTER FRAMING INSTALLATION

A. Rafters: Notch to fit exterior wall plates and toe nail or use metal framing anchors. Double rafters to form headers and trimmers at openings in roof framing, if any, and support with metal hangers. Where rafters abut at ridge, place directly opposite each other and nail to ridge member or use metal ridge hangers.

1. At valleys, provide double-valley rafters of size indicated or, if not indicated, of same thickness as regular rafters and 2 inches deeper. Bevel ends of jack rafters for full bearing against valley rafters.
2. At hips, provide hip rafter of size indicated or, if not indicated, of same thickness as regular rafters and 2 inches deeper. Bevel ends of jack rafters for full bearing against hip rafter.

B. Provide special framing as indicated for eaves, overhangs, and similar conditions if any.

3.4 PROTECTION

A. Protect wood that has been treated with inorganic boron (SBX) from weather. If, despite protection, inorganic boron-treated wood becomes wet, apply EPA-registered borate treatment. Apply borate solution by spraying to comply with EPA-registered label.

B. Protect rough carpentry from weather. If, despite protection, rough carpentry becomes sufficiently wet that moisture content exceeds that specified, apply EPA-registered borate treatment. Apply borate solution by spraying to comply with EPA-registered label.

END OF SECTION 06 1000

SECTION 06 1600 - SHEATHING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Wall sheathing.
2. Roof sheathing.

B. Related Requirements:

1. Section 06 1000 "Rough Carpentry" for plywood backing and blocking.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of process and factory-fabricated product. Indicate component materials and dimensions and include construction and application details.

1. For products receiving a waterborne treatment, include statement that moisture content of treated materials was reduced to levels specified before shipment to Project site.
2. Include copies of warranties from chemical treatment manufacturers for each type of treatment.

1.4 QUALITY ASSURANCE

A. Testing Agency Qualifications: For testing agency providing classification marking for fire-retardant-treated material, an inspection agency acceptable to authorities having jurisdiction that periodically performs inspections to verify that the material bearing the classification marking is representative of the material tested.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Stack panels flat with spacers beneath and between each bundle to provide air circulation. Protect sheathing from weather by covering with waterproof sheeting, securely anchored. Provide for air circulation around stacks and under coverings.

PART 2 - PRODUCTS

2.1 WOOD PANEL PRODUCTS

A. Plywood: Either DOC PS 1 or DOC PS 2 unless otherwise indicated.

B. Oriented Strand Board: DOC PS 2.

C. Thickness: As needed to comply with requirements specified, but not less than thickness indicated.

D. Factory mark panels to indicate compliance with applicable standard.

2.2 WALL SHEATHING

A. Plywood Wall Sheathing: Exterior, Structural I sheathing.

1. Span Rating: See Structural Notes.
2. Nominal Thickness: See Structural Notes.

B. Oriented-Strand-Board Wall Sheathing: Exposure 1, Structural I sheathing.

1. Span Rating: See Structural Notes.
2. Nominal Thickness: See Structural Notes.

2.3 ROOF SHEATHING

A. Plywood Roof Sheathing: Exterior, Structural I sheathing.

1. Span Rating: See Structural Notes.
2. Nominal Thickness: See Structural Notes.

B. Oriented-Strand-Board Roof Sheathing: Exposure 1, Structural I sheathing.

1. Span Rating: See Structural Notes.
2. Nominal Thickness: See Structural Notes.

2.4 FASTENERS

A. General: Provide fasteners of size and type indicated that comply with requirements specified in this article for material and manufacture.

1. For roof and wall sheathing, provide fasteners with hot-dip zinc coating complying with ASTM A 153/A 153M.

B. Nails, Brads, and Staples: ASTM F 1667.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

A. Do not use materials with defects that impair quality of sheathing or pieces that are too small to use with minimum number of joints or optimum joint arrangement. Arrange joints so that pieces do not span between fewer than three support members.

B. Cut panels at penetrations, edges, and other obstructions of work; fit tightly against abutting construction unless otherwise indicated.

C. Securely attach to substrate by fastening as indicated, complying with the following:

1. Table 2304.9.1, "Fastening Schedule," in ICC's "International Building Code."

D. Use common wire nails unless otherwise indicated. Select fasteners of size that will not fully penetrate members where opposite side will be exposed to view or will receive finish materials. Make tight connections. Install fasteners without splitting wood.

E. Coordinate wall and roof sheathing installation with flashing and joint-sealant installation so these materials are installed in sequence and manner that prevent exterior moisture from passing through completed assembly.

F. Coordinate sheathing installation with installation of materials installed over sheathing so sheathing is not exposed to precipitation or left exposed at end of the workday when rain is forecast.

3.2 WOOD STRUCTURAL PANEL INSTALLATION

A. General: Comply with applicable recommendations in APA Form No. E30, "Engineered Wood Construction Guide," for types of structural-use panels and applications indicated.

B. Fastening Methods: Fasten panels as indicated below:

1. Wall and Roof Sheathing:

a. Nail to wood framing.
b. Space panels 1/8 inch apart at edges and ends.

END OF SECTION 06 1600

SECTION 06 1753 - SHOP-FABRICATED WOOD TRUSSES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Wood roof trusses.
2. Wood girder trusses.
3. Wood truss bracing.

B. Related Requirements:

1. Section 06 1600 "Sheathing" for wall and roof sheathing.

1.3 DEFINITIONS

A. Metal-Plate-Connected Wood Trusses: Planar structural units consisting of metal-plate-connected members fabricated from dimension lumber and cut and assembled before delivery to Project site.

1.4 ACTION SUBMITTALS

A. Shop Drawings: Show fabrication and installation details for trusses.

1. Show location, pitch, span, camber, configuration, and spacing for each type of truss required.
2. Indicate sizes, stress grades, and species of lumber.
3. Indicate locations, sizes, and materials for permanent bracing required to prevent buckling of individual truss members due to design loads.
4. Indicate type, size, material, finish, design values, orientation, and location of metal connector plates.
5. Show splice details and bearing details.
6. Indicate fascia member size and connection requirements for support of jack and hip-jack trusses – see structural drawings for more information.

B. Delegated-Design Submittal: For metal-plate-connected wood trusses indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

1.5 INFORMATIONAL SUBMITTALS

A. Qualification Data: For metal connector-plate manufacturer, professional engineer, and fabricator.

B. Material Certificates: For dimension lumber specified to comply with minimum specific gravity. Indicate species and grade selected for each use and specific gravity.

C. Product Certificates: For metal-plate-connected wood trusses, signed by officer of truss fabricating firm.

D. Evaluation Reports: For the following, from ICC-ES:

1. Metal-plate connectors.

1.6 QUALITY ASSURANCE

A. Metal Connector-Plate Manufacturer Qualifications: A manufacturer that is a member of TPI and that complies with quality-control procedures in TPI 1 for manufacture of connector plates.

1. Manufacturer's responsibilities include providing professional engineering services needed to assume engineering responsibility.
2. Engineering Responsibility: Preparation of Shop Drawings and comprehensive engineering analysis by a qualified professional engineer.

B. Fabricator Qualifications: Shop that participates in a recognized quality-assurance program that complies with quality-control procedures in TPI 1 and that involves third-party inspection by an independent testing and inspecting agency acceptable to Architect and authorities having jurisdiction and is certified for chain of custody by an FSC-accredited certification body.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Handle and store trusses to comply with recommendations in TPI BCSI, "Building Component Safety Information: Guide to Good Practice for Handling, Installing, Restraining, & Bracing Metal Plate Connected Wood Trusses."

1. Store trusses flat, off of ground, and adequately supported to prevent lateral bending.
2. Protect trusses from weather by covering with waterproof sheeting, securely anchored.
3. Provide for air circulation around stacks and under coverings.

B. Inspect trusses showing discoloration, corrosion, or other evidence of deterioration. Discard and replace trusses that are damaged or defective.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Delegated Design: Engage a qualified professional engineer, as defined in Section 01 4000 "Quality Requirements," to design metal-plate-connected wood trusses.

B. Structural Performance: Provide metal-plate-connected wood trusses capable of withstanding design loads within limits and under conditions indicated. Comply with requirements in TPI 1 unless more stringent requirements are specified below.

1. Design Loads: As indicated.
2. Maximum Deflection Under Design Loads:

    a. Roof Trusses: Vertical deflection of1/240 of span.

C. Comply with applicable requirements and recommendations of the following publications:

1. TPI 1, "National Design Standard for Metal Plate Connected Wood Truss Construction."
2. TPI DSB, "Recommended Design Specification for Temporary Bracing of Metal Plate Connected Wood Trusses."
3. TPI BCSI, "Building Component Safety Information: Guide to Good Practice for Handling, Installing, Restraining, & Bracing Metal Plate Connected Wood Trusses."

D. Wood Structural Design Standard: Comply with applicable requirements in AF&PA's "National Design Specifications for Wood Construction" and its "Supplement."

2.2 DIMENSION LUMBER

A. Lumber: DOC PS 20 and applicable rules of grading agencies indicated. If no grading agency is indicated, provide lumber that complies with the applicable rules of any rules writing agency certified by the ALSC Board of Review. Provide lumber graded by an agency certified by the ALSC Board of Review to inspect and grade lumber under the rules indicated.

1. Factory mark each piece of lumber with grade stamp of grading agency.
2. Provide dressed lumber, S4S.
3. Provide dry lumber with 19 percent maximum moisture content at time of dressing.

B. Permanent Bracing: Provide wood bracing that complies with requirements for miscellaneous lumber in Section 06 1000 "Rough Carpentry."

2.3 METAL CONNECTOR PLATES

A. Source Limitations: Obtain metal connector plates from single manufacturer.

B. General: Fabricate connector plates to comply with TPI 1.

C. Hot-Dip Galvanized-Steel Sheet: ASTM A 653/A 653M; Structural Steel (SS), high-strength low-alloy steel Type A (HSLAS Type A), or high-strength low-alloy steel Type B (HSLAS Type B); G60oating designation; and not less than 0.036 inch thick.

1. Use for interior locations unless otherwise indicated.

2.4 FASTENERS

A. General: Provide fasteners of size and type indicated that comply with requirements specified in this article for material and manufacture.

1. Provide fasteners for use with metal framing anchors that comply with written recommendations of metal framing manufacturer.
2. Where trusses are exposed to weather, in ground contact, made from pressure-preservative treated wood, or in area of high relative humidity, provide fasteners with hot-dip zinc coating complying with ASTM A 153/A 153M.

B. Nails, Brads, and Staples: ASTM F 1667.

2.5 METAL FRAMING ANCHORS AND ACCESSORIES

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

B. Allowable Design Loads: Provide products with allowable design loads, as published by manufacturer, that meet or exceed those indicated. Manufacturer's published values shall be determined from empirical data or by rational engineering analysis and demonstrated by comprehensive testing performed by a qualified independent testing agency.

C. Galvanized-Steel Sheet: Hot-dip, zinc-coated steel sheet complying with ASTM A 653/A 653M, G60oating designation.

1. Use for interior locations unless otherwise indicated.

D. Truss Tie-Downs: See Structural Notes.

E. Roof Truss Clips: Angle clips for bracing bottom chord of roof trusses at non-load-bearing walls, 1-1/4 inches wide by 0.050 inch thick. Clip is fastened to truss through slotted holes to allow for truss deflection.

F. Roof Truss Bracing/Spacers: U-shaped channels, 1-1/2 inches wide by 1 inch deep by 0.040 inch thick, made to fit between two adjacent trusses and accurately space them apart, and with tabs having metal teeth for fastening to trusses.

2.6 MISCELLANEOUS MATERIALS

A. Galvanizing Repair Paint: SSPC-Paint 20, with dry film containing a minimum of 94 percent zinc dust by weight.

2.7 FABRICATION

A. Cut truss members to accurate lengths, angles, and sizes to produce close-fitting joints.

B. Fabricate metal connector plates to sizes, configurations, thicknesses, and anchorage details required to withstand design loads for types of joint designs indicated.

C. Assemble truss members in design configuration indicated; use jigs or other means to ensure uniformity and accuracy of assembly with joints closely fitted to comply with tolerances in TPI 1. Position members to produce design camber indicated.

1. Fabricate wood trusses within manufacturing tolerances in TPI 1.

D. Connect truss members by metal connector plates located and securely embedded simultaneously in both sides of wood members by air or hydraulic press.

2.8 SOURCE QUALITY CONTROL

A. Special Inspections: Owner will engage a qualified special inspector to perform special inspections.

1. Provide special inspector with access to fabricator's documentation of detailed fabrication and quality-control procedures that provide a basis for inspection control of the workmanship and the fabricator's ability to conform to approved construction documents and referenced standards.
2. Provide special inspector with access to places where wood trusses are being fabricated to perform inspections.

B. Correct deficiencies in Work that special inspections indicate does not comply with the Contract Documents.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install wood trusses only after supporting construction is in place and is braced and secured.

B. If trusses are delivered to Project site in more than one piece, assemble trusses before installing.

C. Hoist trusses in place by lifting equipment suited to sizes and types of trusses required, exercising care not to damage truss members or joints by out-of-plane bending or other causes.

D. Install and brace trusses according to TPI recommendations and as indicated.

E. Install trusses plumb, square, and true to line and securely fasten to supporting construction.

F. Space trusses as indicated; adjust and align trusses in location before permanently fastening.

G. Anchor trusses securely at bearing points; use metal truss tie-downs or floor truss hangers as applicable. Install fasteners through each fastener hole in metal framing anchors according to manufacturer's fastening schedules and written instructions.

H. Securely connect each truss ply required for forming built-up girder trusses.

1. Anchor trusses to girder trusses as indicated.

I. Install and fasten permanent bracing during truss erection and before construction loads are applied. Anchor ends of permanent bracing where terminating at walls or beams.

1. Install bracing to comply with Section 06 1000 "Rough Carpentry."

J. Install wood trusses within installation tolerances in TPI 1.

K. Do not alter trusses in field. Do not cut, drill, notch, or remove truss members.

L. Replace wood trusses that are damaged or do not meet requirements.

1. Damaged trusses may be repaired according to truss repair details signed and sealed by the qualified professional engineer responsible for truss design, when approved by Architect.

3.2 REPAIRS AND PROTECTION

A. Protect wood trusses from weather. If, despite protection, wood trusses become wet, apply EPA-registered borate treatment. Apply borate solution by spraying to comply with EPA-registered label.

B. Repair damaged galvanized coatings on exposed surfaces with galvanized repair paint according to ASTM A 780 and manufacturer's written instructions.

END OF SECTION 06 1753

SECTION 06 2023 - INTERIOR FINISH CARPENTRY

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Interior trim.
2. Installation of countertops.

B. Related Requirements:

1. Section 06 1000 "Rough Carpentry" for furring, blocking, and other carpentry work not exposed to view.
2. Section 06 4116 for Architectural Cabinetry.

1.3 DEFINITIONS

A. MDF: Medium-density fiberboard.

B. MDO: Plywood with a medium-density overlay on the face.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of process and factory-fabricated product. Indicate component materials, dimensions, profiles, textures, and colors and include construction and application details.

1. For products receiving a waterborne treatment, include statement that moisture content of treated materials was reduced before shipment to Project site to levels specified.
2. Include copies of warranties from chemical-treatment manufacturers for each type of treatment.

B. Samples for Initial Selection: For each type of product involving selection of colors, profiles, or textures.

C. Samples for Verification:

1. For each species and cut of lumber and panel products with non-factory-applied finish, with 1/2 of exposed surface finished, 50 sq. in. for lumber and 8 by 10 inches for panels.
2. For each finish system and color of lumber and panel products with factory-applied finish, 50 sq. in. for lumber and 8 by 10 inches for panels.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Stack lumber, plywood, and other panels flat with spacers between each bundle to provide air circulation. Protect materials from weather by covering with waterproof sheeting, securely anchored. Provide for air circulation around stacks and under coverings.

B. Deliver interior finish carpentry materials only when environmental conditions meet requirements specified for installation areas. If interior finish carpentry materials must be stored in other than installation areas, store only where environmental conditions meet requirements specified for installation areas.

1.6 FIELD CONDITIONS

A. Environmental Limitations: Do not deliver or install interior finish carpentry materials until building is enclosed and weatherproof, wet work in space is completed and nominally dry, and HVAC system is operating and maintaining temperature and relative humidity at occupancy levels during the remainder of the construction period.

B. Do not install finish carpentry materials that are wet, moisture damaged, or mold damaged.

1. Indications that materials are wet or moisture damaged include, but are not limited to, discoloration, sagging, or irregular shape.
2. Indications that materials are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration.

PART 2 - PRODUCTS

2.1 FABRICATOR/INSTALLER

A. Approved Millwork Fabricator and Installer:

1. The Wood Benders, Layton, Utah.

a. Contact Dustin Kay (801)771-1546.

2.2 MATERIALS, GENERAL

A. Lumber: DOC PS 20 and the following grading rules:

1. NHLA: National Hardwood Lumber Association, "Rules for the Measurement and Inspection of Hardwood & Cypress."
2. NLGA: National Lumber Grades Authority, "Standard Grading Rules for Canadian Lumber."
3. SPIB: The Southern Pine Inspection Bureau, "Standard Grading Rules for Southern Pine Lumber."
4. WCLIB: West Coast Lumber Inspection Bureau, Standard No. 17, "Grading Rules for West Coast Lumber."
5. WWPA: Western Wood Products Association, "Western Lumber Grading Rules."

B. Factory mark each piece of lumber with grade stamp of inspection agency indicating grade, species, moisture content at time of surfacing, and mill.

1. For exposed lumber, mark grade stamp on end or back of each piece, or omit grade stamp and provide certificates of grade compliance issued by inspection agency.

2.3 INTERIOR TRIM

A. Hardwood Lumber Trim for Transparent Finish (Stain or Clear Finish):

1. Species and Grade: White Maple, Clear, NHLA.
2. Maximum Moisture Content: 13 percent.
3. Finger Jointing: Not allowed.
4. Gluing for Width: Use for lumber trim wider than 6 inches.
5. Veneered Material: Not allowed.
6. Face Surface: Surfaced (smooth).
7. Matching: Selected for compatible grain and color.

2.4 MISCELLANEOUS MATERIALS

A. Fasteners for Interior Finish Carpentry: Nails, screws, and other anchoring devices of type, size, material, and finish required for application indicated to provide secure attachment, concealed where possible.

B. Multipurpose Construction Adhesive: Formulation complying with ASTM D 3498 that is recommended for indicated use by adhesive manufacturer.

2.5 FABRICATION

A. Back out or kerf backs of the following members except those with ends exposed in finished work:

1. Interior standing and running trim.

B. Ease edges of lumber less than 1 inch in nominal thickness to 1/16-inch radius and edges of lumber 1 inch or more in nominal thickness to 1/8-inch radius.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance.

B. Examine finish carpentry materials before installation. Reject materials that are wet, moisture damaged, and mold damaged.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Clean substrates of projections and substances detrimental to application.

B. Before installing interior finish carpentry, condition materials to average prevailing humidity in installation areas for a minimum of 24 hours.

3.3 INSTALLATION, GENERAL

A. Do not use materials that are unsound, warped, improperly treated or finished, inadequately seasoned, too small to fabricate with proper jointing arrangements, or with defective surfaces, sizes, or patterns.

B. Install interior finish carpentry level, plumb, true, and aligned with adjacent materials. Use concealed shims where necessary for alignment.

1. Scribe and cut interior finish carpentry to fit adjoining work. Refinish and seal cuts as recommended by manufacturer.
2. Where face fastening is unavoidable, countersink fasteners, fill surface flush, and sand unless otherwise indicated.
3. Install to tolerance of 1/8 inch in 96 inches or level and plumb. Install adjoining interior finish carpentry with 1/32-inchaximum offset for flush installation and 1/16-inchaximum offset for reveal installation.
4. Coordinate interior finish carpentry with materials and systems in or adjacent to it. Provide cutouts for mechanical and electrical items that penetrate interior finish carpentry.

3.4 STANDING AND RUNNING TRIM INSTALLATION

A. Install with minimum number of joints practical, using full-length pieces from maximum lengths of lumber available. Do not use pieces less than 24 inches long, except where necessary. Stagger joints in adjacent and related standing and running trim. Miter at returns, miter at outside corners, and cope at inside corners to produce tight-fitting joints with full-surface contact throughout length of joint. Use scarf joints for end-to-end joints. Plane backs of casings to provide uniform thickness across joints where necessary for alignment.

1. Match color and grain pattern of trim for transparent finish (stain or clear finish) across joints.

2. Install trim after gypsum-board joint finishing operations are completed.
3. Install without splitting; drill pilot holes before fastening where necessary to prevent splitting. Fasten to prevent movement or warping. Countersink fastener heads on exposed carpentry work and fill holes.

3.5 ADJUSTING

A. Replace interior finish carpentry that is damaged or does not comply with requirements. Interior finish carpentry may be repaired or refinished if work complies with requirements and shows no evidence of repair or refinishing. Adjust joinery for uniform appearance.

3.6 CLEANING

A. Clean interior finish carpentry on exposed and semi-exposed surfaces. Restore damaged or soiled areas and touch up factory-applied finishes, if any.

3.7 PROTECTION

A. Protect installed products from damage from weather and other causes during construction.

B. Remove and replace finish carpentry materials that are wet, moisture damaged, and mold damaged.

1. Indications that materials are wet or moisture damaged include, but are not limited to, discoloration, sagging, or irregular shape.
2. Indications that materials are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration.

END OF SECTION 06 2023

SECTION 06 4116 - PLASTIC-LAMINATE-FACED ARCHITECTURAL CABINETS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Plastic-laminate-faced architectural cabinets.

B. Related Requirements:

1. Section 06 1000 "Rough Carpentry" for wood furring, blocking, shims, and hanging strips required for installing cabinets and concealed within other construction before cabinet installation.
2. Section 06 4005 “Plastic Laminate".
3. Section 06 6001 “Miscellaneous Plastic Fabrications”.

1.3 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product, including, panel products, high-pressure decorative laminate, adhesive for bonding plastic laminate,, and cabinet hardware and accessories.

B. Shop Drawings: Show location of each item, dimensioned plans and elevations, large-scale details, attachment devices, and other components.

1. Show locations and sizes of furring, blocking, and hanging strips, including concealed blocking and reinforcement specified in other Sections.
2. Show locations and sizes of cutouts and holes for electrical switches and outlets and other items installed in architectural plastic-laminate cabinets.

C. Samples for Initial Selection:

1. Plastic laminates.
2. PVC edge material.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Do not deliver cabinets until painting and similar operations that could damage woodwork have been completed in installation areas. If cabinets must be stored in other than installation areas, store only in areas where environmental conditions comply with requirements specified in "Field Conditions" Article.

1.6 FIELD CONDITIONS

A. Environmental Limitations: Do not deliver or install cabinets until building is enclosed, wet work is complete, and HVAC system is operating and maintaining temperature and relative humidity at occupancy levels during the remainder of the construction period.

B. Field Measurements: Where cabinets are indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication, and indicate measurements on Shop Drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work.

1. Locate concealed framing, blocking, and reinforcements that support cabinets by field measurements before being enclosed, and indicate measurements on Shop Drawings.

C. Established Dimensions: Where cabinets are indicated to fit to other construction, establish dimensions for areas where cabinets are to fit. Provide allowance for trimming at site, and coordinate construction to ensure that actual dimensions correspond to established dimensions.

1.7 COORDINATION

A. Coordinate sizes and locations of framing, blocking, furring, reinforcements, and other related units of Work specified in other Sections to ensure that cabinets can be supported and installed as indicated.

PART 2 - PRODUCTS

2.1 FABRICATOR/INSTALLER

A. Approved Millwork Fabricator and Installer:

1. The Wood Benders, Layton, Utah.

a. Contact Dustin Kay (801)771-1546.

2.2 PLASTIC-LAMINATE-FACED ARCHITECTURAL CABINETS

A. Quality Standard: Unless otherwise indicated, comply with the "Architectural Woodwork Standards" for grades of architectural plastic-laminate cabinets indicated for construction, finishes, installation, and other requirements.

1. Provide labels from certification program indicating that woodwork, including installation, complies with requirements of grades specified.
2. The Contract Documents contain selections chosen from options in the quality standard and additional requirements beyond those of the quality standard. Comply with those selections and requirements in addition to the quality standard.

B. Grade: Custom.

C. Type of Construction: Frameless.

D. Cabinet, Door, and Drawer Front Interface Style: Flush overlay.

E. High-Pressure Decorative Laminate: NEMA LD 3, grades as indicated or if not indicated, as required by woodwork quality standard.

1. Manufacturers ct to compliance with requirements, provide products by one of the following:

a. Arborite.
b. Nevamar.
c. Lamin-art.
d. Equal as approved by Architect.

F. Laminate Cladding for Exposed Surfaces:

1. Horizontal Surfaces: Grade HGS.

2. Vertical Surfaces: Grade HGS.
3. Pattern Direction: Vertically for drawer fronts, doors, and fixed panels.

G. Materials for Semiexposed Surfaces:

1. Surfaces Other Than Drawer Bodies: Thermoset decorative panels.

a. Edges of Thermoset Decorative Panel Shelves: PVC or polyester edge banding.

2. Drawer Sides and Backs: Thermoset decorative panels with PVC or polyester edge banding.
3. Drawer Bottoms: Thermoset decorative panels.

H. Drawer Construction: Fabricate with exposed fronts fastened to subfront with mounting screws from interior of body.

1. Join subfronts, backs, and sides with glued rabbeted joints supplemented by mechanical fasteners.

I. Colors, Patterns, and Finishes: Provide materials and products that result in colors and textures of exposed laminate surfaces complying with the following requirements:

1. As selected by Architect from laminate manufacturer's full range.

2.3 WOOD MATERIALS

A. Wood Products: Provide materials that comply with requirements of referenced quality standard for each type of woodwork and quality grade specified unless otherwise indicated.

1. Wood Moisture Content: 5 to 10 percent.

B. Composite Wood and Agrifiber Products: Provide materials that comply with requirements of referenced quality standard for each type of woodwork and quality grade specified unless otherwise indicated.

1. Medium-Density Fiberboard: ANSI A208.2, Grade 130.
2. Thermoset Decorative Panels: Particleboard or medium-density fiberboard finished with thermally fused, melamine-impregnated decorative paper and complying with requirements of NEMA LD 3, Grade VGL, for test methods 3.3, 3.4, 3.6, 3.8, and 3.10.

2.4 CABINET HARDWARE AND ACCESSORIES

A. General: Provide cabinet hardware and accessory materials associated with architectural cabinets except for items specified in Section 08 7111 "Door Hardware (Descriptive Specification)."

B. Frameless Concealed Hinges (European Type): BHMA A156.9, B01602, 170 degrees of opening.

C. Wire Pulls: Back-mounted, solid metal, 4 inches long, 5/16 inch diameter.

D. Shelf Rests: BHMA A156.9, B04013; metal, two-pin type with shelf hold-down clip.

E. Drawer Slides: BHMA A156.9.

1. Grade 1 and Grade 2: Side mounted; full-extension type; zinc-plated steel with polymer rollers.
2. Grade 1HD-100 and Grade 1HD-200: Side mounted; full-extension type; zinc-plated-steel ball-bearing slides.
3. For drawers more than **3 inches** high but not more than **6 inches** high and not more than **24 inches** wide, provide Grade 1.
4. For drawers more than **6 inches** high or more than **24 inches** wide, provide Grade 1HD-100.

F. Door and Drawer Silencers: BHMA A156.16, L03011.

G. Exposed Hardware Finishes: For exposed hardware, provide finish that complies with BHMA A156.18 for BHMA finish number indicated.

1. Satin Chromium Plated: BHMA 626 for brass or bronze base; BHMA 652 for steel base.

H. For concealed hardware, provide manufacturer's standard finish that complies with product class requirements in BHMA A156.9.

2.5 MISCELLANEOUS MATERIALS

A. Adhesive for Bonding Plastic Laminate: Unpigmented contact or cement Contact cement.

1. Adhesive for Bonding Edges: Hot-melt adhesive or adhesive specified above for faces.

2.6 FABRICATION

A. Fabricate cabinets to dimensions, profiles, and details indicated.

B. Complete fabrication, including assembly and hardware application, to maximum extent possible before shipment to Project site. Disassemble components only as necessary for shipment and installation. Where necessary for fitting at site, provide ample allowance for scribing, trimming, and fitting.

1. Notify Architect seven days in advance of the dates and times woodwork fabrication will be complete.
2. Trial fit assemblies at fabrication shop that cannot be shipped completely assembled. Install dowels, screws, bolted connectors, and other fastening devices that can be removed after trial fitting. Verify that various parts fit as intended and check measurements of assemblies against field measurements before disassembling for shipment.

C. Shop-cut openings to maximum extent possible to receive hardware, appliances, electrical work, and similar items. Locate openings accurately and use templates or roughing-in diagrams to produce accurately sized and shaped openings. Sand edges of cutouts to remove splinters and burrs.

PART 3 - EXECUTION

3.1 PREPARATION

A. Before installation, condition cabinets to average prevailing humidity conditions in installation areas.

B. Before installing cabinets, examine shop-fabricated work for completion and complete work as required.

3.2 INSTALLATION

A. Grade: Install cabinets to comply with same grade as item to be installed.

B. Assemble cabinets and complete fabrication at Project site to the extent that it was not completed in the shop.

C. Install cabinets level, plumb, true, and straight. Shim as required with concealed shims. Install level and plumb to a tolerance of 1/8 inch in 96 inches.

D. Scribe and cut cabinets to fit adjoining work, refinish cut surfaces, and repair damaged finish at cuts.

E. Anchor cabinets to anchors or blocking built in or directly attached to substrates. Secure with countersunk, concealed fasteners and blind nailing. Use fine finishing nails or finishing screws for exposed fastening, countersunk and filled flush with woodwork.

1. Use filler matching finish of items being installed.

F. Cabinets: Install without distortion so doors and drawers fit openings properly and are accurately aligned. Adjust hardware to center doors and drawers in openings and to provide unencumbered operation. Complete installation of hardware and accessory items as indicated.

1. Install cabinets with no more than **1/8 inch in 96-inch** sag, bow, or other variation from a straight line.
2. Fasten wall cabinets through back, near top and bottom, and at ends not more than **16 inches** o.c. with No. 10 wafer-head sheet screws sized for not less than 1-1/2 inch penetration into wood blocking or framing.

3.3 ADJUSTING AND CLEANING

A. Repair damaged and defective cabinets, where possible, to eliminate functional and visual defects; where not possible to repair, replace woodwork. Adjust joinery for uniform appearance.

B. Clean, lubricate, and adjust hardware.

C. Clean cabinets on exposed and semi-exposed surfaces.

END OF SECTION

SECTION 06 4216 - FLUSH WOOD PANELING

PART 1 - GENERAL

1.1 SUMMARY

A. Includes But Not Limited To:

1. Quality requirements for AWS premium grade hardwood veneer paneling.

B. Related Requirements:

1. Section 06 4001: Common Architectural Woodwork Requirements.

1.2 REFERENCES

A. Association Publications:

1. Architectural Woodwork Institute, 46179 Westlake Drive, Suite 120, Potomac Falls, VA www.awinet.org.

a. Architectural Woodwork Standards (AWS), 2nd Edition, 2014.

B. Definitions:

1. Face Veneer: The outermost exposed wood veneer surface of a veneered wood door, panel, or other component exposed to view when the project is completed.
2. Grade: Unless otherwise noted, this term means Grade rules for Economy, Custom, and/or Premium Grade:
3. Plain-Sawn: A hardwood figure developed by sawing a log lengthwise at a tangent to the annual growth rings. It appears as U-shaped or straight markings in the board's face.

PART 2 - PRODUCTS

2.1 MATERIALS

A. AWS Premium Grade Hardwood Panels:

1. Panel Product 3/4 inch thick.
2. For Transparent Finishes:

a. Face Veneer: Plain sliced Maple meeting requirements of AWS Grade A, 1/50 inch thick minimum immediately before finishing.
b. Balancing Backer Veneer: Any compatible veneer.
c. Matching of veneer leaves: Slip match.
d. Veneer matching within panel face: Center and balanced matched.
e. Veneer matching from panel to panel: Slip match.

2.2 HANGER SYSTEM

A. Manufacturers and Systems:

1. Monarch Metals Aluminum Z Clip System MF375.

2. Equal from other manufacturers as approved by Architect.

PART 3 - EXECUTION: Not Used

END OF SECTION

SECTION 06 6001 - MISCELLANEOUS PLASTIC FABRICATIONS

PART 1 - GENERAL

1.1 SUMMARY

A. Products Furnished But not Installed Under This Section:

1. Furnish countertops and wall-hung counters as described in Contract Documents.

B. Related Requirements:

1. Section 06 2023: 'Interior Finish Carpentry':

a. Installation.

1.2 REFERENCES

A. Definitions:

1. Solid Surface: Solid surface materials are manufactured from polymeric materials. Granules may also be added to enhance the color effects. Solid surface materials are non-porous and homogeneous, with the same composition throughout the thickness of the solid surface material. They are capable of being repaired, renewed to the original finish and fabricated into continuous surfaces with inconspicuous seams.

B. Reference Standards:

1. American National Standards Institute/International Cast Polymer Alliance:

a. ANSI/ICPA SS-1-2001, 'Performance Standard for Solid Surface Materials'.

1.3 SUBMITTALS

A. Action Submittals:

1. Product Data:

a. Manufacturer's literature.

b. Color selections.

PART 2 - PRODUCTS

2.1 FABRICATOR/INSTALLER

A. Approved Millwork Fabricator and Installer:

1. The Wood Benders, Layton, Utah.

a. Contact Dustin Kay (801)771-1546.

2.2 ASSEMBLIES

A. Materials:

1. Acrylic Solid Surface:

    a. Design Criteria:

        1) Meet requirements of ANSI/ICPS SS-1.

    b. General:

        1) 1/2 inch thick 100 percent acrylic polymer.

    c. Manufacturer:

        1) Formica.

        2) Equal as approved by Architect.

    d. Colors: As selected by Architect.

PART 3 - EXECUTION: Not Used

END OF SECTION

DIVISION 7 - THERMAL AND MOISTURE PROTECTION:

07 1113	Bituminous Dampproofing
07 2100	Thermal Insulation
07 2419	Water Drainage Exterior Insulation and Finish System (EIFS)
07 2726	Fluid-Applied Membrane Air Barriers
07 4113	Standing-Seam Metal Roof Panels
07 4616	Aluminum Cladding
07 4213	Metal Soffit Panels
07 6200	Sheet Metal Flashing and Trim
07 6322	Steel Fascia
07 7123	Manufactured Gutters and Downspouts
07 9200	Joint Sealants

SECTION 07 1113 - BITUMINOUS DAMPPROOFING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Cold-applied, emulsified-asphalt dampproofing.

B. Related Requirements:

1. Section 03 3000 "Cast-in-Place Concrete" for bituminous vapor retarders.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

1.4 FIELD CONDITIONS

A. Weather Limitations: Proceed with application only when existing and forecasted weather conditions permit dampproofing to be performed according to manufacturers' written instructions.

PART 2 - PRODUCTS

2.1 MATERIALS, GENERAL

A. VOC Content: Products shall comply with VOC content limits of authorities having jurisdiction unless otherwise required.

2.2 COLD-APPLIED, EMULSIFIED-ASPHALT DAMPPROOFING

Retain "Manufacturers" Paragraph and list of manufacturers below to require products from manufacturers listed or a comparable product from other manufacturers.

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. APOC, Inc; a division of Gardner Industries.
2. BASF Corporation; Construction Systems.
3. Brewer Company (The).
4. ChemMasters, Inc.
5. Euclid Chemical Company (The); an RPM company.
6. Gardner-Gibson, Inc.

7. Henry Company.
8. ITW Polymers Sealants North America (formerly Pacific Polymers, Inc.).
9. Karnak Corporation.
10. Koppers Inc.
11. Malarkey Roofing Company.

B. Brush and Spray Coats: ASTM D 1227, Type III, Class 1.

2.3 AUXILIARY MATERIALS

A. General: Furnish auxiliary materials recommended in writing by dampproofing manufacturer for intended use and compatible with bituminous dampproofing.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions with Applicator present, for compliance with requirements for surface smoothness, surface moisture, and other conditions affecting performance of bituminous dampproofing work.

B. Proceed with application only after substrate construction and penetrating work have been completed and unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Mask or otherwise protect adjoining exposed surfaces from being stained, spotted, or coated with dampproofing. Prevent dampproofing materials from entering and clogging weep holes and drains.

B. Clean substrates of projections and substances detrimental to the dampproofing work; fill voids, seal joints, and remove bond breakers if any, as recommended in writing by prime material manufacturer.

3.3 APPLICATION, GENERAL

A. Comply with manufacturer's written instructions for dampproofing application, cure time between coats, and drying time before backfilling unless more stringent requirements are indicated.

1. Apply dampproofing to provide continuous plane of protection.
2. Apply additional coats if recommended in writing by manufacturer or to achieve a smooth surface and uninterrupted coverage.

B. Where dampproofing footings and foundation walls, apply from finished-grade line to top of footing; extend over top of footing and down a minimum of 6 inches over outside face of footing.

1. Extend dampproofing 12 inches onto intersecting walls and footings, but do not extend onto surfaces exposed to view when Project is completed.

3.4 COLD-APPLIED, EMULSIFIED-ASPHALT DAMPPROOFING

A. Concrete Foundations: Apply two brush or spray coats at not less than 1.5 gal./100 sq. ft. for first coat and 1 gal./100 sq. ft. for second coat.

3.5 CLEANING

A. Clean spillage and soiling from adjacent construction using cleaning agents and procedures recommended in writing by manufacturer of affected construction.

END OF SECTION 07 1113

SECTION 07 2100 - THERMAL INSULATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Foam-plastic board insulation.
2. Glass-fiber blanket insulation, including acoustical batts.

B. Related Sections:

1. Section 07 2726 "Fluid-Applied Membrane Air Barriers".
2. Section 07 2419 "Water-Drainage Exterior Insulation and Finish System" for insulation specified as part of these systems.

1.3 QUALITY ASSURANCE

A. Surface-Burning Characteristics: As determined by testing identical products according to ASTM E 84 by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

1.4 DELIVERY, STORAGE, AND HANDLING

A. Protect insulation materials from physical damage and from deterioration due to moisture, soiling, and other sources. Store inside and in a dry location. Comply with manufacturer's written instructions for handling, storing, and protecting during installation.

B. Protect foam-plastic board insulation as follows:

1. Do not expose to sunlight except to necessary extent for period of installation and concealment.
2. Protect against ignition at all times. Do not deliver foam-plastic board materials to Project site before installation time.
3. Quickly complete installation and concealment of foam-plastic board insulation in each area of construction.

PART 2 - PRODUCTS

2.1 FOAM-PLASTIC BOARD INSULATION

A. Extruded-Polystyrene Board Insulation: ASTM C 578, of type and minimum compressive strength indicated below, with maximum flame-spread and smoke-developed indexes of 75 and 450, respectively, per ASTM E 84.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Amoco Foam Products Company.
b. DiversiFoam Products.
c. Dow Chemical Company (The).
d. Owens-Corning Company.

2. Type IV, 25 psi.

B. Adhesive for Bonding Insulation: Product with demonstrated capability to bond insulation securely to substrates without damaging insulation and substrates.

2.2 GLASS-FIBER BLANKET INSULATION

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. CertainTeed Corporation.
2. Fibertek.
3. Johns Manville; a Berkshire Hathaway company.
4. Owens Corning Fiberglass Company.

B. Unfaced, Glass-Fiber Blanket Insulation: ASTM C 665, Type I; with maximum flame-spread and smoke-developed indexes of 25 and 50, respectively, per ASTM E 84; passing ASTM E 136 for combustion characteristics.

C. Kraft-Faced, Glass-Fiber Blanket Insulation: ASTM C 665, Type II (non-reflective faced), Class C (faced surface not rated for flame propagation); Category 1 (membrane is a vapor barrier).

D. Foil-Faced, Glass-Fiber Blanket Insulation: ASTM C 665, Type III (reflective faced), Class A with maximum flame-spread and smoke-developed indexes of 25 and 50, respectively, per ASTM E 84 (faced surface with a flame-propagation resistance of 0.12 W/sq. cm); Category 1 (membrane is a vapor barrier, faced with foil scrim, foil-scrim kraft, or foil-scrim polyethylene).

E. "R" Values:

1. Acoustically Insulated Walls:

   a. Fill walls with appropriate thickness to match wall framing width.
   b. Use unfaced insulation.

2. Thermally insulated Attic:

   a. R38 minimum.
   b. Use foil-faced insulation.

3. Thermally Insulated Walls:

   a. R19 minimum (in addition to continuous insulation).
   b. Use Kraft or foil-faced insulation.

2.3 INSULATION ATTACHMENT

A. Wire or other suitable material capable of supporting weight of insulation.

PART 3 - EXECUTION

3.1 PREPARATION

A. Clean substrates of substances that are harmful to insulation or that interfere with insulation attachment.

3.2 INSTALLATION, GENERAL

A. Comply with insulation manufacturer's written instructions applicable to products and applications indicated.

B. Install insulation that is undamaged, dry, and unsoiled and that has not been left exposed to ice, rain, or snow at any time.

C. Extend insulation to envelop entire area to be insulated. Cut and fit tightly around obstructions and fill voids with insulation. Remove projections that interfere with placement.

D. Provide sizes to fit applications indicated and selected from manufacturer's standard thicknesses, widths, and lengths. Apply single layer of insulation units to produce thickness indicated unless multiple layers are otherwise shown or required to make up total thickness.

3.3 INSTALLATION OF INSULATION FOR FRAMED CONSTRUCTION

A. Apply insulation units to substrates by method indicated, complying with manufacturer's written instructions. If no specific method is indicated, bond units to substrate with adhesive or use mechanical anchorage to provide permanent placement and support of units.

B. Foam-Plastic Board Insulation: Seal joints between units by applying adhesive, mastic, or sealant to edges of each unit to form a tight seal as units are shoved into place. Fill voids in completed installation with adhesive, mastic, or sealant as recommended by insulation manufacturer.

C. Glass-Fiber or Mineral-Wool Blanket Insulation: Install in cavities formed by framing members according to the following requirements:

1. Use insulation widths and lengths that fill the cavities formed by framing members. If more than one length is required to fill the cavities, provide lengths that will produce a snug fit between ends.
2. Place insulation in cavities formed by framing members to produce a friction fit between edges of insulation and adjoining framing members.
3. Maintain 3-inch clearance of insulation around recessed lighting fixtures not rated for or protected from contact with insulation.
4. For metal-framed wall cavities where cavity heights exceed 96 inches, support unfaced blankets mechanically and support faced blankets by taping flanges of insulation to flanges of metal studs.

D. Miscellaneous Voids: Install insulation in miscellaneous voids and cavity spaces where required to prevent gaps in insulation using the following materials:

1. Spray Polyurethane Insulation: Apply according to manufacturer's written instructions.

3.4 PROTECTION

A. Protect installed insulation from damage due to harmful weather exposures, physical abuse, and other causes. Provide temporary coverings or enclosures where insulation is subject to abuse and cannot be concealed and protected by permanent construction immediately after installation.

END OF SECTION 07 2100

SECTION 07 2419 - WATER-DRAINAGE EXTERIOR INSULATION AND FINISH SYSTEM (EIFS)

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. EIFS-clad drainage-wall assemblies that are field applied over substrate.

B. Related Requirements:

1. Section 07 9200 "Joint Sealants" for sealing joints in EIFS with elastomeric joint sealants and for perimeter joints between system and other materials.

1.3 DEFINITIONS

A. Definitions in ASTM E 2110 apply to Work of this Section.

B. EIFS: Exterior insulation and finish system(s).

C. IBC: International Building Code.

1.4 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1.5 ACTION SUBMITTALS

A. Product Data: For each EIFS component, trim, and accessory.

B. Samples: For each exposed product and for each color and texture specified, 8 inches square in size.

1.6 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Installer.

B. Manufacturer Certificates: Signed by EIFS manufacturer certifying the following:

1. EIFS complies with requirements.
2. Substrates to which EIFS is indicated to be attached are acceptable to EIFS manufacturer.

3. Accessory products installed with EIFS, including joint sealants and flashing, whether or not furnished by EIFS manufacturer and whether or not specified in this Section, are acceptable to EIFS manufacturer.

C. Product Test Reports: For each EIFS assembly and component, for tests performed by a qualified testing agency.

1.7 CLOSEOUT SUBMITTALS

A. Maintenance Data: For EIFS to include in maintenance manuals.

1.8 QUALITY ASSURANCE

A. Installer Qualifications: An installer who is certified in writing by EIFS manufacturer as qualified to install manufacturer's system using trained workers.

1.9 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials in original, unopened packages with manufacturers' labels intact and clearly identifying products.

B. Store materials inside and under cover; keep them dry and protected from weather, direct sunlight, surface contamination, aging, corrosion, damaging temperatures, construction traffic, and other causes.

1. Stack insulation board flat and off the ground.
2. Protect plastic insulation against ignition at all times. Do not deliver plastic insulating materials to Project site before installation time.
3. Complete installation and concealment of plastic materials as rapidly as possible in each area of construction.

1.10 FIELD CONDITIONS

A. Weather Limitations: Maintain ambient temperatures above 40 deg For a minimum of 24 hours before, during, and after adhesives or coatings are applied. Do not apply EIFS adhesives or coatings during rainfall. Proceed with installation only when existing and forecasted weather conditions and ambient outdoor air, humidity, and substrate temperatures permit EIFS to be applied, dried, and cured according to manufacturers' written instructions and warranty requirements.

1.11 WARRANTY

A. Manufacturer's Special Warranty: Manufacturer agrees to repair or replace components of EIFS-clad drainage-wall assemblies that fail in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to, the following:

    a. Bond integrity and weathertightness.
    b. Deterioration of EIFS finishes and other EIFS materials beyond normal weathering.

2. Warranty coverage includes the following components of EIFS-clad drainage-wall assemblies:

    a. EIFS finish, including base coats, finish coats, and reinforcing mesh.
    b. Insulation installed as part of EIFS including foam build-outs.
    c. Insulation adhesive and mechanical fasteners.
    d. EIFS accessories, including trim components and flashing.
    e. EIFS drainage components.

3. Warranty Period: Five years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

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

B. Source Limitations: Obtain EIFS from single source from single EIFS manufacturer and from sources approved by EIFS manufacturer as compatible with EIFS components.

2.2 PERFORMANCE REQUIREMENTS

A. EIFS Performance: Comply with ASTM E 2568 and ICC-ES AC219 and with the following:

1. Weathertightness: Resistant to uncontrolled water penetration from exterior, with a means to drain water entering EIFS to the exterior.
2. Structural Performance: EIFS assembly and components shall comply with ICC-ES AC219 when tested according to ASTM E 2568.
3. Impact Performance: ASTM E 2568, Standard impact resistance.

2.3 EIFS MATERIALS

A. Insulation Adhesive: EIFS manufacturer's standard formulation designed for indicated use; specifically formulated to be applied to back side of insulation in a manner that creates open vertical channels designed to serve as an integral part of the water-drainage system of the EIFS-clad drainage-wall assembly; compatible with substrate one of the following:

1. Job-mixed formulation of portland cement complying with ASTM C 150/C 150M, Type I, and polymer-based adhesive specified for base coat.
2. Factory-blended dry formulation of portland cement, dry polymer admixture, and fillers specified for base coat.
3. Factory-mixed noncementitious formulation designed for adhesive attachment of insulation to substrates of type indicated, as recommended by EIFS manufacturer.

B. Molded, Rigid Cellular Polystyrene Board Insulation: Comply with ASTM C 578, Type I; and EIFS manufacturer's requirements for most stringent requirements for material performance and qualities of insulation, including dimensions and permissible variations, and the following:

1. Aging: Before cutting and shipping, age insulation in block form by air drying for not less than six weeks.
2. Flame-Spread and Smoke-Developed Indexes: 25 and 450 or less, respectively, according to ASTM E 84.
3. Dimensions: Provide insulation boards of not more than 24 by 48 inches thick or in other thickness indicated, but not more than 4 inches thick or less than the thickness allowed by ASTM C 1397.
4. Foam Build-Outs: Provide with profiles and dimensions indicated on Drawings.

C. Reinforcing Mesh: Balanced, alkali-resistant, open-weave, glass-fiber mesh treated for compatibility with other EIFS materials, made from continuous multi-end strands with retained mesh tensile strength of not less than 120 lbf/in. according to ASTM E 2098 and the following:

1. Reinforcing Mesh for EIFS, General: Not less than weight required to meet impact-performance level specified in "Performance Requirements" Article.
2. Detail Reinforcing Mesh: Not less than as recommended by EIFS manufacturer.
3. Corner Reinforcing Mesh: Not less than as recommended by EIFS manufacturer.

D. Base-Coat Materials: EIFS manufacturer's standard mixture complying with the following:

1. Job-mixed formulation of portland cement complying with ASTM C 150/ C 150M, Type I, white or natural color; and manufacturer's standard polymer-emulsion adhesive designed for use with portland cement.

E. Mechanical Fasteners: EIFS manufacturer's standard corrosion-resistant fasteners consisting of thermal cap, standard washer and shaft attachments, and fastener indicated below; designed to resist Project's design loads; capable of pulling fastener head below surface of insulation board; and complying with the following:

1. For attachment to wood substrate, provide manufacturer's standard fasteners suitable for substrate.

F. Finish-Coat Materials: EIFS manufacturer's standard acrylic-based coating complying with the following:

1. Factory-mixed formulation of polymer-emulsion binder, colorfast mineral pigments, sound stone particles, and fillers.

2. Colors: As selected by Architect from manufacturer's full range.
3. Textures: As selected by Architect from manufacturer's full range.

G. Water: Potable.

2.4 MIXING

A. Comply with EIFS manufacturer's requirements for combining and mixing materials. Do not introduce admixtures, water, or other materials except as recommended by EIFS manufacturer. Mix materials in clean containers. Use materials within time period specified by EIFS manufacturer or discard.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

B. Examine roof edges, wall framing, flashings, openings, substrates, and junctures at other construction for suitable conditions where EIFS will be installed.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

1. Begin coating application only after surfaces are dry.
2. Application of coating indicates acceptance of surfaces and conditions.

3.2 PREPARATION

A. Protect contiguous work from moisture deterioration and soiling caused by application of EIFS. Provide temporary covering and other protection needed to prevent spattering of exterior finish coats on other work.

B. Protect EIFS, substrates, and wall construction behind them from inclement weather during installation. Prevent penetration of moisture behind drainage plane of EIFS and deterioration of substrates.

C. Prepare and clean substrates to comply with EIFS manufacturer's written instructions to obtain optimum bond between substrate and adhesive for insulation.

3.3 EIFS INSTALLATION, GENERAL

A. Comply with ASTM C 1397, ASTM E 2511, and EIFS manufacturer's written instructions for installation of EIFS as applicable to each type of substrate indicated.

3.4 INSULATION INSTALLATION

A. Board Insulation: Mechanically attach insulation to substrate in compliance with ASTM C 1397 and the following:

1. Apply insulation over substrates in courses with long edges of boards oriented horizontally.
2. Begin first course of insulation from screed/track and work upward. Work from perimeter casing beads toward interior of panels if possible.
3. Stagger vertical joints of insulation boards in successive courses to produce running bond pattern. Locate joints so no piece of insulation is less than 12 inches wide or 6 inches high. Offset joints not less than 6 inches from corners of window and door openings.

    a. Mechanical Attachment: Offset joints of insulation from horizontal joints in sheathing.

4. Interlock ends at internal and external corners.

5. Abut insulation tightly at joints within and between each course to produce flush, continuously even surfaces without gaps or raised edges between boards. If gaps greater than 1/16 inch occur, fill with insulation cut to fit gaps exactly; insert insulation without using adhesive or other material.
6. Cut insulation to fit openings, corners, and projections precisely and to produce edges and shapes complying with details indicated.
7. Rasp or sand flush entire surface of insulation to remove irregularities projecting more than 1/16 inch from surface of insulation and to remove yellowed areas due to sun exposure; do not create depressions deeper than 1/16 inch Prevent airborne dispersal and immediately collect insulation raspings or sandings.
8. Cut aesthetic reveals in outside face of insulation with high-speed router and bit configured to produce grooves, rabbets, and other features that comply with profiles and locations indicated. Do not reduce insulation thickness at aesthetic reveals to less than 3/4 inch
9. Install foam build-outs and attach to structure.
10. Interrupt insulation for expansion joints where indicated.
11. Form joints for sealant application by leaving gaps between adjoining insulation edges and between insulation edges and dissimilar adjoining surfaces. Make gaps wide enough to produce joint widths indicated after encapsulating joint substrates with base coat and reinforcing mesh.
12. After installing insulation and before applying field-applied reinforcing mesh, fully wrap board edges. Cover edges of board and extend encapsulating mesh not less than 2-1/2 inches over front and back face unless otherwise indicated on Drawings.
13. Treat exposed edges of insulation as follows:

    a. Except for edges forming substrates of sealant joints, encapsulate with base coat, reinforcing mesh, and finish coat.
    b. Encapsulate edges forming substrates of sealant joints within EIFS or between EIFS and other work with base coat and reinforcing mesh.

14. Coordinate installation of flashing and insulation to produce wall assembly that does not allow water to penetrate behind flashing and water-resistive barrier.

3.5 BASE-COAT INSTALLATION

A. Base Coat: Apply to exposed surfaces of insulation and foam build-outs in minimum thickness recommended in writing by EIFS manufacturer, but not less than 1/16-inch dry-coat thickness.

B. Reinforcing Mesh: Embed reinforcing mesh in wet base coat to produce wrinkle-free installation with mesh continuous at corners, overlapped not less than 2-1/2 inches or otherwise treated at joints to comply with ASTM C 1397 and EIFS manufacturer's written instructions. Do not lap reinforcing mesh within 8 inches of corners. Completely embed mesh, applying additional base-coat material if necessary, so reinforcing-mesh color and pattern are invisible.

C. Foam Build-Outs: Fully embed reinforcing mesh in base coat.

3.6 FINISH-COAT INSTALLATION

A. Finish Coat: Apply over dry base coat, maintaining a wet edge at all times for uniform appearance, in thickness required by EIFS manufacturer to produce a uniform finish of color and texture matching approved sample and free of cold joints, shadow lines, and texture variations.

3.7 CLEANING AND PROTECTION

A. Remove temporary covering and protection of other work. Promptly remove coating materials from window and door frames and other surfaces outside areas indicated to receive EIFS coatings.

END OF SECTION 07 2419

SECTION 07 2726 - FLUID-APPLIED MEMBRANE AIR BARRIERS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section includes fluid-applied, vapor-retarding membrane air barriers.

B. Related Requirements:

1. Section 06 1600 "Sheathing" for wall sheathings and wall sheathing joint-and-penetration treatments.

1.3 DEFINITIONS

A. Air-Barrier Material: A primary element that provides a continuous barrier to the movement of air.

B. Air-Barrier Accessory: A transitional component of the air barrier that provides continuity.

C. Air-Barrier Assembly: The collection of air-barrier materials and accessory materials applied to an opaque wall, including joints and junctions to abutting construction, to control air movement through the wall.

1.4 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1. Review air-barrier requirements and installation, special details, mockups, air-leakage and bond testing, air-barrier protection, and work scheduling that covers air barriers.

1.5 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include manufacturer's written instructions for evaluating, preparing, and treating substrate; technical data; and tested physical and performance properties of products.

1.6 QUALITY ASSURANCE

A. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by manufacturer.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Remove and replace liquid materials that cannot be applied within their stated shelf life.

B. Protect stored materials from direct sunlight.

1.8 FIELD CONDITIONS

A. Environmental Limitations: Apply air barrier within the range of ambient and substrate temperatures recommended by air-barrier manufacturer.

1. Protect substrates from environmental conditions that affect air-barrier performance.
2. Do not apply air barrier to a damp or wet substrate or during snow, rain, fog, or mist.

PART 2 - PRODUCTS

2.1 MATERIALS, GENERAL

A. Source Limitations: Obtain primary air-barrier materials and air-barrier accessories from single source from single manufacturer.

2.2 PERFORMANCE REQUIREMENTS

A. General: Air barrier shall be capable of performing as a continuous vapor-retarding air barrier and as a liquid-water drainage plane flashed to discharge to the exterior incidental condensation or water penetration. Air-barrier assemblies shall be capable of accommodating substrate movement and of sealing substrate expansion and control joints, construction material changes, penetrations, tie-ins to installed waterproofing, and transitions at perimeter conditions without deterioration and air leakage exceeding specified limits.

B. Air-Barrier Assembly Air Leakage: Maximum **0.04 cfm/sq. ft. of surface area at 1.57 lbf/sq. ft.**, when tested according to ASTM E 283.

2.3 VAPOR-RETARDING MEMBRANE AIR AND MOISTURE BARRIER

A. Fluid-Applied, Vapor-Retarding Membrane Air Barrier: synthetic polymer membrane.

1. Physical and Performance Properties:

   a. Air Permeance: Maximum **0.004 cfm/sq. ft. of surface area at 1.57-lbf/sq. ft.** pressure difference; ASTM E 2178.
   b. Vapor Permeance: Maximum **0.1 perm**; ASTM E 96/E 96M.
   c. Ultimate Elongation: Minimum 500 percent; ASTM D 412, Die C.

2.4 ACCESSORY MATERIALS

A. General: Accessory materials recommended by air-barrier manufacturer to produce a complete air-barrier assembly and compatible with primary air-barrier material.

B. Primer: Liquid waterborne primer recommended for substrate by air-barrier material manufacturer.

C. Modified Bituminous Strip: Vapor retarding, **40 mils** thick, smooth surfaced, self-adhering; consisting of **36 mils** of rubberized asphalt laminated to a **4-mil**-thick polyethylene film with release liner backing.

D. Joint Reinforcing Strip: Air-barrier manufacturer's glass-fiber-mesh tape.

E. Adhesive and Tape: Air-barrier manufacturer's standard adhesive and pressure-sensitive adhesive tape.

F. Sprayed Polyurethane Foam Sealant: One- or two-component, foamed-in-place, polyurethane foam sealant, **1.5- to 2.0-lb/cu. Ft** density; flame-spread index of 25 or less according to ASTM E 162; with primer and noncorrosive substrate cleaner recommended by foam sealant manufacturer.

G. Modified Bituminous Transition Strip: Vapor retarding, **40 mils** thick, smooth surfaced, self-adhering; consisting of **36 mils** of rubberized asphalt laminated to a **4-mil**-thick polyethylene film with release liner backing.

H. Joint Sealant: ASTM C 920, single-component, neutral-curing silicone; Class 100/50 (low modulus), Grade NS, Use NT related to exposure, and, as applicable to joint substrates indicated, Use O. Comply with Section 07 9200 "Joint Sealants."

I. Termination Mastic: Air-barrier manufacturer's standard cold fluid-applied elastomeric liquid; trowel grade.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements and other conditions affecting performance of the Work.

1. Verify that substrates are sound and free of oil, grease, dirt, excess mortar, or other contaminants.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 SURFACE PREPARATION

A. Clean, prepare, treat, and seal substrate according to manufacturer's written instructions. Provide clean, dust-free, and dry substrate for air-barrier application.

B. Mask off adjoining surfaces not covered by air barrier to prevent spillage and overspray affecting other construction.

C. At changes in substrate plane, apply sealant or termination mastic beads at sharp corners and edges to form a smooth transition from one plane to another.

D. Cover gaps in substrate plane and form a smooth transition from one substrate plane to another with stainless-steel sheet mechanically fastened to structural framing to provide continuous support for air barrier.

3.3 JOINT TREATMENT

A. Sheathing: Fill joints greater than 1/4 inch with sealant according to ASTM C 1193 and air-barrier manufacturer's written instructions. Apply first layer of fluid air-barrier material at joints. Tape joints with joint reinforcing strip after first layer is dry. Apply a second layer of fluid air-barrier material over joint reinforcing strip.

3.4 TRANSITION STRIP INSTALLATION

A. General: Install strips, transition strips, and accessory materials according to air-barrier manufacturer's written instructions to form a seal with adjacent construction and maintain a continuous air barrier.

1. Coordinate the installation of air barrier with installation of roofing membrane and base flashing to ensure continuity of air barrier with roofing membrane.
2. Install modified bituminous strip on roofing membrane or base flashing so that a minimum of 3 inches of coverage is achieved over each substrate.

B. Apply primer to substrates at required rate and allow it to dry. Limit priming to areas that will be covered by fluid air-barrier material on same day. Reprime areas exposed for more than 24 hours.

1. Prime glass-fiber-surfaced gypsum sheathing with number of prime coats needed to achieve required bond, with adequate drying time between coats.

C. Connect and seal exterior wall air-barrier material continuously to roofing-membrane air barrier, concrete below-grade structures, floor-to-floor construction, exterior glazing and window systems, glazed curtain-wall systems, storefront systems, exterior louvers, exterior door framing, and other construction used in exterior wall openings, using accessory materials.

D. At end of each working day, seal top edge of strips and transition strips to substrate with termination mastic.

E. Apply joint sealants forming part of air-barrier assembly within manufacturer's recommended application temperature ranges. Consult manufacturer when sealant cannot be applied within these temperature ranges.

F. Wall Openings: Prime concealed, perimeter frame surfaces of windows, curtain walls, storefronts, and doors. Apply modified bituminous transition strip so that a minimum of **3 inches** of coverage is achieved over each substrate. Maintain **3 inches** of full contact over firm bearing to perimeter frames with not less than **1 inch** of full contact.

1. Modified Bituminous Transition Strip: Roll firmly to enhance adhesion.

G. Fill gaps in perimeter frame surfaces of windows, curtain walls, storefronts, and doors, and miscellaneous penetrations of air-barrier material with foam sealant.

H. Seal strips and transition strips around masonry reinforcing or ties and penetrations with termination mastic.

I. Seal top of through-wall flashings to air barrier with an additional **6-inch**-wide, modified bituminous strip.

J. Seal exposed edges of strips at seams, cuts, penetrations, and terminations not concealed by metal counterflashings or ending in reglets with termination mastic.

K. Repair punctures, voids, and deficient lapped seams in strips and transition strips. Slit and flatten fishmouths and blisters. Patch with transition strips extending **6 inches** beyond repaired areas in strip direction.

3.5 FLUID AIR-BARRIER MEMBRANE INSTALLATION

A. General: Apply fluid air-barrier material to form a seal with strips and transition strips and to achieve a continuous air barrier according to air-barrier manufacturer's written instructions. Apply fluid air-barrier material within manufacturer's recommended application temperature ranges.

1. Limit priming to areas that will be covered by fluid air-barrier material on same day. Reprime areas exposed for more than 24 hours.
2. Prime glass-fiber-surfaced gypsum sheathing with number of prime coats needed to achieve required bond, with adequate drying time between coats.

B. Membrane Air Barriers: Apply a continuous unbroken air-barrier membrane to substrates according to the following thickness. Apply air-barrier membrane in full contact around protrusions such as masonry ties.

1. Vapor-Retarding Membrane Air Barrier: Total dry film thickness as recommended in writing by manufacturer to meet performance requirements, but not less than **40-mil** dry film thickness, applied in.

C. Apply strip and transition strip a minimum of **1 inch** onto cured air-barrier material according to air-barrier manufacturer's written instructions.

D. Do not cover air barrier until it has been tested and inspected by Owner's testing agency.

E. Correct deficiencies in or remove air barrier that does not comply with requirements; repair substrates and reapply air-barrier components.

3.6 CLEANING AND PROTECTION

A. Protect air-barrier system from damage during application and remainder of construction period, according to manufacturer's written instructions.

1. Protect air barrier from exposure to UV light and harmful weather exposure as required by manufacturer. If exposed to these conditions for more than 30 days, remove and replace air barrier or install additional, full-thickness, air-barrier application after repairing and preparing the overexposed membrane according to air-barrier manufacturer's written instructions.
2. Protect air barrier from contact with incompatible materials and sealants not approved by air-barrier manufacturer.

B. Clean spills, stains, and soiling from construction that would be exposed in the completed work using cleaning agents and procedures recommended by manufacturer of affected construction.

C. Remove masking materials after installation.

END OF SECTION 07 2726

SECTION 07 4113 - STANDING-SEAM METAL ROOF PANELS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section includes standing-seam metal roof system.

B. Related Sections:

1. Section 07 4213 "Metal Soffit Panels" for metal panels used in horizontal soffit applications.
2. Section 07 6322 "Steel Fascia".
3. Section 07 7123 "Gutters and Downspouts".

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for each type of panel and accessory.

B. Shop Drawings:

1. Include fabrication and installation layouts of metal panels; details of edge conditions, joints, panel profiles, corners, anchorages, attachment system, trim, flashings, closures, and accessories; and special details.

C. Samples for Verification: For each type of exposed finish required in manufacturer's standard color (minimum 25 colors).

1.4 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Installer.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: An entity that employs installers and supervisors with at least 3 years experience on similar work.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Deliver components, metal panels, and other manufactured items so as not to be damaged or deformed. Package metal panels for protection during transportation and handling.

B. Unload, store, and erect metal panels in a manner to prevent bending, warping, twisting, and surface damage.

C. Stack metal panels horizontally on platforms or pallets, covered with suitable weathertight and ventilated covering. Store metal panels to ensure dryness, with positive slope for drainage of water. Do not store metal panels in contact with other materials that might cause staining, denting, or other surface damage.

D. Retain strippable protective covering on metal panels during installation.

1.7 FIELD CONDITIONS

A. Weather Limitations: Proceed with installation only when existing and forecasted weather conditions permit assembly of metal panels to be performed according to manufacturers' written instructions and warranty requirements.

1.8 COORDINATION

A. Coordinate sizes and locations of equipment supports and roof penetrations with actual equipment provided.

B. Coordinate metal panel installation with rain drainage work, flashing, trim, construction of soffits, and other adjoining work to provide a leakproof, secure, and noncorrosive installation.

1.9 WARRANTY

A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of metal panel systems that fail in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to, the following:

a. Structural failures including rupturing, cracking, or puncturing.
b. Deterioration of metals and other materials beyond normal weathering.

2. Warranty Period: Two years from date of Substantial Completion.

B. Special Warranty on Panel Finishes: Manufacturer's standard form in which manufacturer agrees to repair finish or replace metal panels that show evidence of deterioration of factory-applied finishes within specified warranty period.

1. Exposed Panel Finish: Deterioration includes, but is not limited to, the following:

a. Color fading more than 5 Hunter units when tested according to ASTM D 2244.
b. Chalking in excess of a No. 8 rating when tested according to ASTM D 4214.
c. Cracking, checking, peeling, or failure of paint to adhere to bare metal.

2. Finish Warranty Period: 20 years from date of Substantial Completion.

C. Special Weathertightness Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace standing-seam metal roof panel assemblies that fail to remain weathertight, including leaks, within specified warranty period.

1. Warranty Period: 20 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 STANDING-SEAM METAL ROOF PANELS

A. General: Provide factory-formed metal roof panels designed to be installed by lapping and interconnecting raised side edges of adjacent panels with joint type indicated and mechanically attaching panels to supports using concealed clips in side laps. Include clips, cleats, pressure plates, and accessories required for weathertight installation.

1. Steel Panel Systems: Unless more stringent requirements are indicated, comply with ASTM E 1514.

B. Vertical-Rib, Snap-Joint, Standing-Seam Metal Roof Panels: Formed with vertical ribs at panel edges and a flat pan between ribs; designed for sequential installation by mechanically attaching panels to supports using concealed clips located under one side of panels, engaging opposite edge of adjacent panels, and snapping panels together.

1. Acceptable Products and Manufacturers: Subject to compliance with requirements, provide products by one of the following:

    a. Design Span HP System, as manufactured by AEP Span, Inc.
    b. LokSeam, as manufactured by MBCI Metal Roof and Wall Systems.
    c. Medallion Lok, as manufactured by McElroy Metal, Inc.
    d. Vertical Seam, as manufactured by Metal Sales Manufacturing Corporation.
    e. Equal as approved by Architect prior to bidding.

2. Metallic-Coated Steel Sheet: Zinc-coated (galvanized) steel sheet complying with ASTM A 653/A 653M, G90oating designation, or aluminum-zinc alloy-coated steel sheet complying with ASTM A 792/A 792M, Class AZ50 coating designation; structural quality. Prepainted by the coil-coating process to comply with ASTM A 755/A 755M.

    a. Nominal Thickness: 24 gauge minimum.
    b. Exterior Finish: Two-coat fluoropolymer.
    c. Color: As selected by Architect from manufacturer's full range.

3. Clips: One-piece fixed to accommodate thermal movement.

    a. Material: 0.028-inch nominal thickness, zinc-coated (galvanized) or aluminum-zinc alloy-coated steel sheet.

4. Panel Coverage 16 inches.
5. Panel Height: 1.75 inches.

2.2 UNDERLAYMENT MATERIALS

A. Self-Adhering, High-Temperature Underlayment: Provide self-adhering, cold-applied sheet underlayment, a minimum of 30 mils thick, consisting of slip-resistant, polyethylene-film top surface laminated to a layer of butyl or SBS-modified asphalt adhesive, with release-paper backing. Provide primer when recommended by underlayment manufacturer.

    1. Thermal Stability: Stable after testing at 240 deg F: ASTM D 1970.
    2. Low-Temperature Flexibility: Passes after testing at minus 20 deg F: ASTM D 1970.

B. Felt Underlayment: ASTM D 226/D22M, Type II (No. 30), asphalt-saturated organic felts.

C. Synthetic Underlayment:

    1. Diamond Deck by Certainteed.
    2. Tiger Paw by GAF.
    3. Deck Defense High Performance by Owners Corning.
    4. Equal as approved by Architect prior to installation.

2.3 MISCELLANEOUS MATERIALS

A. Panel Accessories: Provide components required for a complete, weathertight panel system including trim, copings, fasciae, mullions, sills, corner units, clips, flashings, sealants, gaskets, fillers, closure strips, and similar items. Match material and finish of metal panels unless otherwise indicated.

B. Flashing and Trim: Provide flashing and trim formed from same material as metal panels as required to seal against weather and to provide finished appearance. Locations include, but are not limited to, eaves, rakes, corners, bases, framed openings, ridges, fasciae, and fillers. Finish flashing and trim with same finish system as adjacent metal panels.

    1. Hip Caps: Manufacturer's Standard units.

2. Ridge and Hip Caps: Manufacturer's Standard ventilated units.

C. Panel Fasteners: Self-tapping screws designed to withstand design loads.

D. Panel Sealants: Provide sealant type recommended by manufacturer that are compatible with panel materials, are nonstaining, and do not damage panel finish.

1. Sealant Tape: Pressure-sensitive, 100 percent solids, gray polyisobutylene compound sealant tape with release-paper backing. Provide permanently elastic, nonsag, nontoxic, nonstaining tape 1/2 inch wide and 1/8 inch thick.
2. Joint Sealant: ASTM C 920; elastomeric polyurethane or silicone sealant; of type, grade, class, and use classifications required to seal joints in metal panels and remain weathertight; and as recommended in writing by metal panel manufacturer.

E. Snow Bars: Manufacturer's standard continuous snow bar system designed to attach at each standing seam.

1. Color: Match roofing color.

2.4 FABRICATION

A. General: Fabricate and finish metal panels and accessories at the factory, by manufacturer's standard procedures and processes, as necessary to fulfill indicated performance requirements demonstrated by laboratory testing. Comply with indicated profiles and with dimensional and structural requirements.

B. Provide panel profile for full length of panel.

C. Sheet Metal Flashing and Trim: Fabricate flashing and trim to comply with manufacturer's recommendations and recommendations in SMACNA's "Architectural Sheet Metal Manual" that apply to design, dimensions, metal, and other characteristics of item indicated.

1. Form exposed sheet metal accessories that are without excessive oil canning, buckling, and tool marks and that are true to line and levels indicated, with exposed edges folded back to form hems.
2. Seams: Fabricate nonmoving seams in accessories with flat-lock seams. Tin edges to be seamed, form seams, and solder.
3. Sealed Joints: Form nonexpansion, but movable, joints in metal to accommodate sealant and to comply with SMACNA standards.
4. Conceal fasteners and expansion provisions where possible. Exposed fasteners are not allowed on faces of accessories exposed to view.
5. Fabricate cleats and attachment devices from same material as accessory being anchored or from compatible, noncorrosive metal recommended in writing by metal panel manufacturer.

a. Size: As recommended by SMACNA's "Architectural Sheet Metal Manual" or metal panel manufacturer for application, but not less than thickness of metal being secured.

2.5 FINISHES

A. Protect mechanical and painted finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

B. Appearance of Finished Work: Variations in appearance of abutting or adjacent pieces are acceptable if they are within one-half of the range of approved Samples. Noticeable variations in same piece are unacceptable. Variations in appearance of other components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

C. Steel Panels and Accessories:

1. Two-Coat Fluoropolymer: AAMA 621. Fluoropolymer finish containing not less than 70 percent PVDF resin by weight in color coat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
2. Concealed Finish: Apply pretreatment and manufacturer's standard white or light-colored acrylic or polyester backer finish consisting of prime coat and wash coat with a minimum total dry film thickness of 0.5 mil.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances, metal panel supports, and other conditions affecting performance of the Work.

1. Examine solid roof sheathing to verify that sheathing joints are supported by framing or blocking and that installation is within flatness tolerances required by metal roof panel manufacturer.

B. Examine roughing-in for components and systems penetrating metal panels to verify actual locations of penetrations relative to seam locations of metal panels before installation.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Miscellaneous Supports: Install subframing, furring, and other miscellaneous panel support members and anchorages according to ASTM C 754 and metal panel manufacturer's written recommendations.

3.3 UNDERLAYMENT INSTALLATION

A. Self-Adhering Sheet Underlayment: Apply over roof perimeter for a distance up from eaves 36 inches beyond interior wall line, and at rakes to 36 inches inside interior wall line. Apply three 36 inch sheet continuous at each valley, overlapping 6 inches.

B. Felt or Synthetic Underlayment: Apply over the entire roof surface.

C. Apply slip sheet over underlayment prior to installing metal roof panels.

D. Flashings: Install flashings to cover underlayment to comply with requirements specified in Section 07 6200 "Sheet Metal Flashing and Trim."

3.4 METAL PANEL INSTALLATION

A. General: Install metal panels according to manufacturer's written instructions in orientation, sizes, and locations indicated. Install panels perpendicular to supports unless otherwise indicated. Anchor metal panels and other components of the Work securely in place, with provisions for thermal and structural movement.

1. Shim or otherwise plumb substrates receiving metal panels.
2. Flash and seal metal panels at perimeter of all openings. Fasten with self-tapping screws. Do not begin installation until air- or water-resistive barriers and flashings that will be concealed by metal panels are installed.
3. Install screw fasteners in predrilled holes.
4. Locate and space fastenings in uniform vertical and horizontal alignment.
5. Install flashing and trim as metal panel work proceeds.
6. Locate panel splices over, but not attached to, structural supports. Stagger panel splices and end laps to avoid a four-panel lap splice condition.
7. Align bottoms of metal panels and fasten with blind rivets, bolts, or self-tapping screws. Fasten flashings and trim around openings and similar elements with self-tapping screws.
8. Provide weathertight escutcheons for pipe- and conduit-penetrating panels.

B. Fasteners:

1. Steel Panels: Use stainless-steel fasteners for surfaces exposed to the exterior; use galvanized-steel fasteners for surfaces exposed to the interior.

C. Anchor Clips: Anchor metal roof panels and other components of the Work securely in place, using manufacturer's approved fasteners according to manufacturers' written instructions.

D. Metal Protection: Where dissimilar metals contact each other or corrosive substrates, protect against galvanic action as recommended in writing by metal panel manufacturer.

E. Standing-Seam Metal Roof Panel Installation: Fasten metal roof panels to supports with concealed clips at each standing-seam joint at location, spacing, and with fasteners recommended in writing by manufacturer.

1. Install clips to supports with self-tapping fasteners.
2. Install pressure plates at locations indicated in manufacturer's written installation instructions.
3. Snap Joint: Nest standing seams and fasten together by interlocking and completely engaging factory-applied sealant.
4. Watertight Installation:

a. Apply a continuous ribbon of sealant or tape to seal joints of metal panels, using sealant or tape as recommend in writing by manufacturer as needed to make panels watertight.
b. Provide sealant or tape between panels and protruding equipment, vents, and accessories.
c. At panel splices, nest panels with minimum 6-inch lap, sealed with sealant and fastened together by interlocking clamping plates.
d. Seal ends of ribs with urethane sealant.

F. Accessory Installation: Install accessories with positive anchorage to building and weathertight mounting, and provide for thermal expansion. Coordinate installation with flashings and other components.

1. Snow bars shall attach at each standing seam.
2. Install components required for a complete metal panel system including trim, copings, corners, seam covers, flashings, sealants, gaskets, fillers, closure strips, and similar items. Provide types indicated by metal roof panel manufacturers; or, if not indicated, types recommended by metal roof panel manufacturer.

G. Flashing and Trim: Comply with performance requirements, manufacturer's written installation instructions, and SMACNA's "Architectural Sheet Metal Manual." Provide concealed fasteners where possible, and set units true to line and level as indicated. Install work with laps, joints, and seams that will be permanently watertight and weather resistant.

1. Install exposed flashing and trim that is without buckling and tool marks, and that is true to line and levels indicated, with exposed edges folded back to form hems. Install sheet metal flashing and trim to fit substrates and achieve waterproof and weather-resistant performance.
2. Expansion Provisions: Provide for thermal expansion of exposed flashing and trim. Space movement joints at a maximum of 10 feet with no joints allowed within 24 inches of corner or intersection. Where lapped expansion provisions cannot be used or would not be sufficiently weather resistant and waterproof, form expansion joints of intermeshing hooked flanges, not less than 1 inch deep, filled with mastic sealant (concealed within joints).

H. Pipe Flashing: Form flashing around pipe penetration and metal roof panels. Fasten and seal to metal roof panels as recommended by manufacturer.

3.5 CLEANING AND PROTECTION

A. Remove temporary protective coverings and strippable films, if any, as metal panels are installed, unless otherwise indicated in manufacturer's written installation instructions. On completion of metal panel installation, clean finished surfaces as recommended by metal panel manufacturer. Maintain in a clean condition during construction.

B. Replace metal panels that have been damaged or have deteriorated beyond successful repair by finish touchup or similar minor repair procedures.

END OF SECTION 07 4113

SECTION 07 4213 - METAL SOFFIT PANELS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section includes metal soffit panel system and continuous soffit vent system.

B. Related Sections:

1. Section 07 4113 "Standing-Seam Metal Roof Panels" for metal roof system.

1.3 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for each type of panel and accessory.

B. Shop Drawings:

1. Include fabrication and installation layouts of metal panels; details of edge conditions, joints, panel profiles, corners, anchorages, attachment system, trim, flashings, closures, and accessories; and special details.

C. Samples for Initial Selection: For each type of metal panel indicated with factory-applied color finishes.

1. Include similar Samples of trim and accessories involving color selection.

D. Samples for Verification: For each type of exposed finish required, prepared on Samples of size indicated below:

1. Metal Panels: 12 inches long by actual panel width. Include fasteners, closures, and other metal panel accessories.

1.5 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Installer.

1.6 QUALITY ASSURANCE

A. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by manufacturer.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Deliver components, metal panels, and other manufactured items so as not to be damaged or deformed. Package metal panels for protection during transportation and handling.

B. Unload, store, and erect metal panels in a manner to prevent bending, warping, twisting, and surface damage.

C. Stack metal panels horizontally on platforms or pallets, covered with suitable weathertight and ventilated covering. Store metal panels to ensure dryness, with positive slope for drainage of water. Do not store metal panels in contact with other materials that might cause staining, denting, or other surface damage.

D. Retain strippable protective covering on metal panels during installation.

1.8 FIELD CONDITIONS

A. Weather Limitations: Proceed with installation only when existing and forecasted weather conditions permit assembly of metal panels to be performed according to manufacturers' written instructions and warranty requirements.

1.9 COORDINATION

A. Coordinate metal panel installation with rain drainage work, flashing, trim, construction of walls, and other adjoining work to provide a leakproof, secure, and noncorrosive installation.

1.10 WARRANTY

A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of metal panel systems that fail in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to, the following:

a. Structural failures including rupturing, cracking, or puncturing.
b. Deterioration of metals and other materials beyond normal weathering.

2. Warranty Period: Two years from date of Substantial Completion.

B. Special Warranty on Panel Finishes: Manufacturer's standard form in which manufacturer agrees to repair finish or replace metal panels that show evidence of deterioration of factory-applied finishes within specified warranty period.

1. Exposed Panel Finish: Deterioration includes, but is not limited to, the following:

a. Color fading more than 5 Hunter units when tested according to ASTM D 2244.
b. Chalking in excess of a No. 8 rating when tested according to ASTM D 4214.
c. Cracking, checking, peeling, or failure of paint to adhere to bare metal.

2. Finish Warranty Period: 20 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Structural Performance: Provide metal panel systems capable of withstanding the effects of the following loads, based on testing according to ASTM E 1592:

1. Deflection Limits: For wind loads, no greater than 1/180 of the span.

B. Air Infiltration: Air leakage of not more than 0.06 cfm/sq. ft. when tested according to ASTM E 283 at the following test-pressure difference:

C. Water Penetration under Static Pressure: No water penetration when tested according to ASTM E 331 at the following test-pressure difference:

D. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes by preventing buckling, opening of joints, overstressing of components, failure of joint sealants, failure of connections, and other

detrimental effects. Base calculations on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.

2.2 METAL SOFFIT PANELS

A. General: Provide metal soffit panels designed to be installed by lapping and interconnecting side edges of adjacent panels and mechanically attaching through panel to supports using concealed fasteners in side laps. Include accessories required for weathertight installation.

B. Flush-Profile Metal Soffit Panels: Solid panels formed with vertical panel edges and a flat pan between panel edges; with flush joint between panels.

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

    a. AEP / Span, Dallas, TX www.aep-span.com.
    b. ATAS Aluminum Products, Allentown, PA www.atas.com.
    c. Englert Inc, Perth Amboy, NJ www.englertinc.com.
    d. Fabral, Lancaster, PA www.fabral.com.
    e. Fashion Inc, Ottawa, KS www.fashioninc.com.
    f. Firestone Metal Products, Anoka, MN www.unaclad.com.
    g. MBCI, Houston, TX www.mbci.com.
    h. Petersen Aluminum Corp, Elk Grove, IL www.pac-clad.com.
    i. Ryerson, Chicago, IL www.ryerson.com.
    j. Equal as approved by Architect before bidding.

2. Metallic-Coated Steel Sheet: Zinc-coated (galvanized) steel sheet complying with ASTM A 653/A 653M, G90oating designation, or aluminum-zinc alloy-coated steel sheet complying with ASTM A 792/A 792M, Class AZ50oating designation; structural quality. Prepainted by the coil-coating process to comply with ASTM A 755/A 755M.

    a. Nominal Thickness: 24 gauge minimum.
    b. Exterior Finish: Two-coat fluoropolymer.
    c. Color: As selected by Architect from manufacturer's full range.

3. Panel Coverage: 12 inches.
4. Panel Height: 1.0 inch.

2.3 MISCELLANEOUS MATERIALS

A. Continuous Soffit Vent:

1. VAS70 Vent-A-Strip (Model 70) Mastic Home Exteriors, by Ply Gem, Chicago, IL, www.mastic.com.

    a. Width: 2 inches.

2. Equal as approved by Architect.
3. Finish to match soffit panels.

B. Panel Accessories: Provide components required for a complete, weathertight panel system including trim, clips, flashings, sealants, gaskets, fillers, closure strips, and similar items. Match material and finish of metal panels unless otherwise indicated.

C. Flashing and Trim: Provide flashing and trim formed from same material as metal panels as required to seal against weather and to provide finished appearance. Finish flashing and trim with same finish system as adjacent metal panels.

D. Panel Fasteners: Self-tapping screws designed to withstand design loads. Provide exposed fasteners with heads matching color of metal panels by means of plastic caps or factory-applied coating. Provide EPDM or PVC sealing washers for exposed fasteners.

E. Panel Sealants: Provide sealant types recommended by manufacturer that are compatible with panel materials, are nonstaining, and do not damage panel finish.

1. Joint Sealant: ASTM C 920; elastomeric polyurethane or silicone sealant; of type, grade, class, and use classifications required to seal joints in metal panels and remain weathertight; and as recommended in writing by metal panel manufacturer.

2.4 FABRICATION

A. General: Fabricate and finish metal panels and accessories at the factory, by manufacturer's standard procedures and processes, as necessary to fulfill indicated performance requirements demonstrated by laboratory testing. Comply with indicated profiles and with dimensional and structural requirements.

B. Provide panel profile, including major ribs and intermediate stiffening ribs, if any, for full length of panel.

C. Sheet Metal Flashing and Trim: Fabricate flashing and trim to comply with manufacturer's recommendations and recommendations in SMACNA's "Architectural Sheet Metal Manual" that apply to design, dimensions, metal, and other characteristics of item indicated.

1. Form exposed sheet metal accessories that are without excessive oil canning, buckling, and tool marks and that are true to line and levels indicated, with exposed edges folded back to form hems.
2. Seams: Fabricate nonmoving seams in accessories with flat-lock seams. Tin edges to be seamed, form seams, and solder.
3. Sealed Joints: Form nonexpansion, but movable, joints in metal to accommodate sealant and to comply with SMACNA standards.
4. Conceal fasteners and expansion provisions where possible. Exposed fasteners are not allowed on faces of accessories exposed to view.
5. Fabricate cleats and attachment devices from same material as accessory being anchored or from compatible, noncorrosive metal recommended in writing by metal panel manufacturer.

    a. Size: As recommended by SMACNA's "Architectural Sheet Metal Manual" or metal soffit panel manufacturer for application but not less than thickness of metal being secured.

2.5 FINISHES

A. Protect mechanical and painted finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

B. Appearance of Finished Work: Variations in appearance of abutting or adjacent pieces are acceptable if they are within one-half of the range of approved Samples. Noticeable variations in same piece are not acceptable. Variations in appearance of other components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

C. Steel Panels and Accessories:

1. Two-Coat Fluoropolymer: AAMA 621. Fluoropolymer finish containing not less than 70 percent PVDF resin by weight in color coat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
2. Concealed Finish: Apply pretreatment and manufacturer's standard white or light-colored acrylic or polyester backer finish consisting of prime coat and wash coat with a minimum total dry film thickness of 0.5 mil.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances, metal panel supports, and other conditions affecting performance of the Work.

1. Examine framing to verify that girts, angles, channels, studs, blocking, and other structural panel support members and anchorage have been installed within alignment tolerances required by metal panel manufacturer.

B. Examine roughing-in for components and systems penetrating metal panels to verify actual locations of penetrations relative to seam locations of metal panels before installation.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Miscellaneous Supports: Install subframing, blocking, and other miscellaneous panel support members and anchorages according to ASTM C 754 and metal panel manufacturer's written recommendations.

3.3 METAL PANEL INSTALLATION

A. General: Install metal panels according to manufacturer's written instructions in orientation, sizes, and locations indicated. Install panels perpendicular to supports unless otherwise indicated. Anchor metal panels and other components of the Work securely in place, with provisions for thermal and structural movement.

1. Shim or otherwise plumb substrates receiving metal panels.
2. Flash and seal metal panels at perimeter of all openings. Fasten with self-tapping screws. Do not begin installation until air- or water-resistive barriers and flashings that will be concealed by metal panels are installed.
3. Install screw fasteners in predrilled holes.
4. Locate and space fastenings in uniform vertical and horizontal alignment.
5. Install flashing and trim as metal panel work proceeds.
6. Locate panel splices over, but not attached to, structural supports. Stagger panel splices and end laps to avoid a four-panel lap splice condition.

B. Fasteners:

1. Steel Panels: Use stainless-steel fasteners for surfaces exposed to the exterior; use galvanized-steel fasteners for surfaces exposed to the interior.

C. Metal Protection: Where dissimilar metals contact each other or corrosive substrates, protect against galvanic action as recommended in writing by metal panel manufacturer.

D. Lap-Seam Metal Panels: Fasten metal panels to supports with fasteners at each lapped joint at location and spacing recommended by manufacturer.

1. Apply panels and associated items true to line for neat and weathertight enclosure.
2. Provide metal-backed washers under heads of exposed fasteners bearing on weather side of metal panels.
3. Locate and space exposed fasteners in uniform vertical and horizontal alignment. Use proper tools to obtain controlled uniform compression for positive seal without rupture of washer.
4. Install screw fasteners with power tools having controlled torque adjusted to compress washer tightly without damage to washer, screw threads, or panels. Install screws in predrilled holes.

E. Accessory Installation: Install accessories with positive anchorage to building and weathertight mounting, and provide for thermal expansion. Coordinate installation with flashings and other components.

1. Install components required for a complete metal panel system including trim, corners, seam covers, flashings, sealants, gaskets, fillers, closure strips, and similar items. Provide types indicated by metal panel manufacturer; or, if not indicated, provide types recommended by metal panel manufacturer.

F. Flashing and Trim: Comply with performance requirements, manufacturer's written installation instructions, and SMACNA's "Architectural Sheet Metal Manual." Provide concealed fasteners where possible, and set units true to line and level as indicated. Install work with laps, joints, and seams that are permanently watertight.

1. Install exposed flashing and trim that is without buckling, and tool marks, and that is true to line and levels indicated, with exposed edges folded back to form hems. Install sheet metal flashing and trim to fit substrates and to achieve waterproof performance.
2. Expansion Provisions: Provide for thermal expansion of exposed flashing and trim. Space movement joints at a maximum of 10 feet with no joints allowed within 24 inches of corner or intersection. Where lapped expansion provisions cannot be used or would not be waterproof, form expansion joints of intermeshing hooked flanges, not less than 1 inch deep, filled with mastic sealant (concealed within joints).

3.4 CLEANING AND PROTECTION

A. Remove temporary protective coverings and strippable films, if any, as metal panels are installed unless otherwise indicated in manufacturer's written installation instructions. On completion of metal panel installation, clean finished surfaces as recommended by metal panel manufacturer. Maintain in a clean condition during construction.

B. After metal panel installation, clear weep holes and drainage channels of obstructions, dirt, and sealant.

C. Replace metal panels that have been damaged or have deteriorated beyond successful repair by finish touchup or similar minor repair procedures.

END OF SECTION 07 4213

SECTION 07 4616 – ALUMINUM CLADDING

PART 1 - GENERAL

1.1 RELATED SECTIONS

A. Section 05 40 00 – Cold-Formed Metal framing: Metal framing for support of aluminum cladding

B. Section 01 74 21 – Construction/Demolition Waste Management and Disposal

C. Section 06 10 00 - Rough Carpentry

D. Section 07 62 00 – Sheet Metal Flashing and Trim

1.2 REFERENCES

A. American Society for Testing and Materials (ASTM)

1. ASTM E 84 Standard Test Method for Surface Burning Characteristics of Building Materials
2. ASTM E2768-11 – Standard Test Method for Extended Duration Surface Burning Characteristics for Building Materials (30 min Tunnel Test). Results: Zero Flame Spread, Smoke Developed Index of 5. Meets criteria for Class A fire rating
3. ASTM E136 - Standard Test Method for Behavior of Materials in a Vertical Tube Furnace at 750°C
4. ASTM E1477 - Standard Test Method for Luminous Reflectance Factor of Acoustical Materials by Use of Integrating-Sphere Reflectometers (LRV)

B. Canadian General Standards Board (CGSB)

1. CAN/CGSB-51.32, Sheathing, Membrane, Breather Type.
2. CAN/CGSB-93.2, Prefinished Aluminum Cladding, Soffits and Fascia, for Residential Use.
3. CAN/CGSB-93.3, Prefinished Galvanized and Aluminum-Zinc Alloy Steel Sheet for Residential Use.
4. CAN/CGSB-93.4, Galvanized and Aluminum-Zinc Alloy Coated Steel Cladding Soffits and Fascia, Prefinished, Residential.
5. CGSB 93.5, Installation of Metal Residential Cladding, Soffits and Fascia.

C. UL & Underwriters Laboratories of Canada (UL/ULC)

1. UL 723, Standard Method of Test for Surface Burning Characteristics of Building Materials.
2. CAN/ULC S102, Standard Method of Test for Surface Burning Characteristics of Building Materials and Assemblies.
3. CAN/ULC S114, Standard Test Method for determination of non-combustibility in building materials.

D. American Architectural Manufacturers Association (AAMA)

1. AAMA 2605 Voluntary Specification, Performance requirements and Test Procedures for Superior Performing Organic Coatings on Aluminum Extrusions and Panels.
2. AAMA 2604 - Voluntary Specification, Performance requirements and Test Procedures for High Performing Organic Coatings on Aluminum Extrusions and Panels.
3. AAMA 2603 - Voluntary Specification, Performance requirements and Test Procedures for Pigmented Organic Coatings on Aluminum Extrusions and Panels.

E. International Code Council Evaluation Service (ICC-ES)

1. ICC-ES Evaluation Report

1.3 SUBMITTALS

A. Product data: submit manufacturer's printed product literature, specifications and data sheet.

B. Submit duplicate 6 inch X 6 inch (152 X 152mm) samples of cladding material, of color and profile specified.

C. Shop drawings to indicate dimensions, profiles, attachment methods, schedule of wall elevations, trim and closure pieces, soffits, fascia, metal furring, and related work.

D. Certifications: Manufacturer's certifications that products comply with specified requirements, including laboratory reports showing compliance with specified tests and standards.

E. Submit manufacturer's installation instructions.

1.4 WARRANTY

A. Provide a written guarantee, signed and issued in the name of the owner, covering the metal cladding/cladding material for 15 (fifteen) years from the date of Substantial Completion.

B. The manufacturer's warranty is limited to replacement of defective material only, rather than installation of the same. Faulty installation shall be corrected by the installing contractor. The warranty required herein is the sole remedy against the manufacturer and there are no other implied warranties. In any event, the manufacturer shall not be liable for incidentals or consequential damages.

PART 2 - PRODUCTS

2.1 ALUMINUM CLADDING AND COMPONENTS

A. 6 inch (152 mm) V-Groove planks extruded aluminum 6063 T5

1. Finish coating: powder coated finish
2. Color: As specified on drawings.
3. Gloss: 30 ± 5.
4. Thickness: 1/16 inch (1.57mm) base metal thickness.
5. Profile: 6-inch (152mm) V-Groove X 24 ft (7315.2mm) plank.

2.2 ACCESSORIES

A. 3" STARTER STRIP, 5/8" STARTER J-TRACK, 5/8" J-TRACK, 5/8" TWO PIECE J-TRACK, 1-3/8" TWO PIECE J-TRACK, 3/4" INSIDE CORNER, 1" OUTSIDE CORNER, 2" CORNER SET, 3/16" OUTSIDE CORNER, 5/8" TERMINATION SET, 1-3/8" TERMINATION SET, 1-3/8" COMPRESSION JOINT, 1/2" FLAT REVEAL, 3/4" U-REVEAL SET, 1-1/2" U-REVEAL SET, 1-1/2" FLAT REVEAL SET, 3/4" T&G U-REVEAL, 1-1/2" T&G U-REVEAL, 1/2" T&G FLAT REVEAL, 2" OFFSET FLAT REVEAL, in same material and finishes as cladding.

B. Plank Clips: 316 Stainless steel Quick-Screen Clips that are shipped loose for field installation.

2.3 MANUFACTURERS

A. Longboard Architectural Products #120 - 1777 Clearbrook Rd.
Abbotsford, BC, Canada V2T 5X5
info@longboardproducts.com
1.800.604.0343

B. Equal as approved by architect prior to bidding.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install cladding and components in accordance with manufacturer's written instructions and shop drawings, including product technical bulletins, datasheets and install videos.

B. Install all cladding planks using Quick-Screen Clips in accordance with the manufacturer's written instructions, technical bulletins, datasheets and install videos to not restrict thermal movement at specified o.c. spacings. Install screws in pre-punched holes. Install one (1) hard-fastened screw per plank, directly through the plank flange to prevent plank migration. All fasteners should penetrate into solid, secure framing or blocking

C. Install components in accordance with the manufacturer's written instructions and shop drawings, including technical bulletins, datasheets and install videos with positive anchorage to building and provide for thermal movement

D. Install screw fasteners using power tools having controlled torque adjusted to compress Quick-Screen Clips tight without damage or deformation of the Quick-Screen Clips, screw heads, screw threads or cladding

E. Hard-fasten any and all butt-joints into solid secure framing or blocking, to maintain tight fitting hairline joints. Never exceed one (1) hard-fastener per plank, all other attachment points to use Quick-Screen Clips to not restrict thermal movement

F. Do not install damaged panels; repair or replace as required

3.2 CLEANING

A. Upon completion of installation, remove surplus materials, rubbish, tools and equipment barriers.

END OF SECTION

SECTION 07 6200 - SHEET METAL FLASHING AND TRIM

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Formed steep-slope roof sheet metal fabrications.
2. Formed wall flashing and trim.

B. Related Requirements:

1. Section 07 4113 For materials and installation of sheet metal flashings and trim integral with roofing.

1.3 COORDINATION

A. Coordinate sheet metal flashing and trim layout and seams with sizes and locations of penetrations to be flashed, and joints and seams in adjacent materials.

B. Coordinate sheet metal flashing and trim installation with adjoining roofing and wall materials, joints, and seams to provide leakproof, secure, and noncorrosive installation.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for each manufactured product and accessory.

B. Shop Drawings: For sheet metal flashing and trim.

1. Include plans, elevations, sections, and attachment details.
2. Detail fabrication and installation layouts, expansion-joint locations, and keyed details. Distinguish between shop- and field-assembled work.
3. Include identification of material, thickness, weight, and finish for each item and location in Project.
4. Include details for forming, including profiles, shapes, seams, and dimensions.
5. Include details for joining, supporting, and securing, including layout and spacing of fasteners, cleats, clips, and other attachments. Include pattern of seams.
6. Include details of termination points and assemblies.
7. Include details of roof-penetration flashing.
8. Include details of edge conditions, including eaves, ridges, valleys, rakes, crickets, and counterflashings as applicable.
9. Include details of special conditions.
10. Include details of connections to adjoining work.
11. Detail formed flashing and trim at scale of not less than 3 inches per 12 inches.

C. Samples for Initial Selection: For each type of sheet metal and accessory indicated with factory-applied finishes.

1.5 QUALITY ASSURANCE

A. Fabricator Qualifications: Employs skilled workers who custom fabricate sheet metal flashing and trim similar to that required for this Project and whose products have a record of successful in-service performance.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Do not store sheet metal flashing and trim materials in contact with other materials that might cause staining, denting, or other surface damage. Store sheet metal flashing and trim materials away from uncured concrete and masonry.

B. Protect strippable protective covering on sheet metal flashing and trim from exposure to sunlight and high humidity, except to extent necessary for period of sheet metal flashing and trim installation.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. General: Sheet metal flashing and trim assemblies shall withstand wind loads, structural movement, thermally induced movement, and exposure to weather without failure due to defective manufacture, fabrication, installation, or other defects in construction. Completed sheet metal flashing and trim shall not rattle, leak, or loosen, and shall remain watertight.

B. Sheet Metal Standard for Flashing and Trim: Comply with NRCA's "The NRCA Roofing Manual" and SMACNA's "Architectural Sheet Metal Manual" requirements for dimensions and profiles shown unless more stringent requirements are indicated.

C. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes to prevent buckling, opening of joints, overstressing of components, failure of joint sealants, failure of connections, and other detrimental effects. Base calculations on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.

1. Temperature Change: 120 deg F, ambient; 180 deg F, material surfaces.

2.2 SHEET METALS

A. General: Protect mechanical and other finishes on exposed surfaces from damage by applying strippable, temporary protective film before shipping.

B. Pre-painted Metallic-Coated Steel Sheet: Provide zinc-coated (galvanized) steel sheet according to ASTM A 653/A 653M, G90coating designation; prepainted by coil-coating process to comply with ASTM A 755/A 755M.

1. Surface: Smooth, flat.
2. Exposed Coil-Coated Finish:

    a. Two-Coat Fluoropolymer: AAMA 621. Fluoropolymer finish containing not less than 70 percent PVDF resin by weight in color coat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.

3. Color: As selected by Architect from manufacturer's full range.
4. Concealed Finish: Pretreat with manufacturer's standard white or light-colored acrylic or polyester backer finish, consisting of prime coat and wash coat with minimum total dry film thickness of 0.5 mil.

First option in "Zinc Sheet" Paragraph below is based on the IBC for zinc roof covering and cannot be met by ASTM B 69 alloys or by European standard EN 988. Second option is based on manufacturers' products and EN 988 with which all manufacturers comply and is similar to ASTM B 69, Alloy Z41121. Before retaining either option, verify acceptability and requirements with authorities having jurisdiction. See Evaluations.

Zinc sheet is available without manufacturer's protective back coating, but installation assembly and materials are more demanding. Revise if zinc sheet without manufacturer's protective back coating is required.

C. Zinc Sheet: Zinc, 99 percent pure, alloyed with 0.08 to 1.00 percent copper, 0.06 to 0.20 percent titanium, and up to 0.015 percent aluminum; with manufacturer's standard factory-applied, flexible, protective back coating.

1. Finish: Bright rolled.

2.3 MISCELLANEOUS MATERIALS

A. General: Provide materials and types of fasteners, solder, protective coatings, sealants, and other miscellaneous items as required for complete sheet metal flashing and trim installation and as recommended by manufacturer of primary sheet metal or manufactured item unless otherwise indicated.

B. Fasteners: Wood screws, annular threaded nails, self-tapping screws, self-locking rivets and bolts, and other suitable fasteners designed to withstand design loads and recommended by manufacturer of primary sheet metal or manufactured item.

1. General: Blind fasteners or self-drilling screws, gasketed, with hex-washer head.

a. Exposed Fasteners: Heads matching color of sheet metal using plastic caps or factory-applied coating. Provide metal-backed EPDM or PVC sealing washers under heads of exposed fasteners bearing on weather side of metal.
b. Blind Fasteners: High-strength aluminum or stainless-steel rivets suitable for metal being fastened.

2. Fasteners for Zinc-Coated (Galvanized) Steel Sheet: Series 300 stainless steel or hot-dip galvanized steel according to ASTM A 153/A 153M or ASTM F 2329.
3. Fasteners for Zinc Sheet: Series 300 stainless steel or hot-dip galvanized steel according to ASTM A 153/A 153M or ASTM F 2329.

C. Sealant Tape: Pressure-sensitive, 100 percent solids, polyisobutylene compound sealant tape with release-paper backing. Provide permanently elastic, nonsag, nontoxic, nonstaining tape 1/2 inch wide and 1/8 inch thick.

D. Elastomeric Sealant: ASTM C 920, elastomeric polymer sealant; of type, grade, class, and use classifications required to seal joints in sheet metal flashing and trim and remain watertight.

E. Butyl Sealant: ASTM C 1311, single-component, solvent-release butyl rubber sealant; polyisobutylene plasticized; heavy bodied for hooked-type expansion joints with limited movement.

F. Bituminous Coating: Cold-applied asphalt emulsion according to ASTM D 1187.

G. Asphalt Roofing Cement: ASTM D 4586, asbestos free, of consistency required for application.

2.4 FABRICATION, GENERAL

A. General: Custom fabricate sheet metal flashing and trim to comply with details shown and recommendations in cited sheet metal standard that apply to design, dimensions, geometry, metal thickness, and other characteristics of item required. Fabricate sheet metal flashing and trim in shop to greatest extent possible.

1. Fabricate sheet metal flashing and trim in thickness or weight needed to comply with performance requirements, but not less than that specified for each application and metal.
2. Obtain field measurements for accurate fit before shop fabrication.
3. Form sheet metal flashing and trim to fit substrates without excessive oil canning, buckling, and tool marks; true to line, levels, and slopes; and with exposed edges folded back to form hems.
4. Conceal fasteners and expansion provisions where possible. Do not use exposed fasteners on faces exposed to view.

B. Fabrication Tolerances: Fabricate sheet metal flashing and trim that is capable of installation to a tolerance of 1/4 inch in 20 feet on slope and location lines indicated on Drawings and within 1/8-inch offset of adjoining faces and of alignment of matching profiles.

C. Fabrication Tolerances: Fabricate sheet metal flashing and trim that is capable of installation to tolerances specified in MCA's "Guide Specification for Residential Metal Roofing."

D. Expansion Provisions: Form metal for thermal expansion of exposed flashing and trim.

1. Form expansion joints of intermeshing hooked flanges, not less than 1 inch deep, filled with butyl sealant concealed within joints.
2. Use lapped expansion joints only where indicated on Drawings.

E. Sealant Joints: Where movable, nonexpansion-type joints are required, form metal to provide for proper installation of elastomeric sealant according to cited sheet metal standard.

F. Fabricate cleats and attachment devices from same material as accessory being anchored or from compatible, noncorrosive metal.

G. Fabricate cleats and attachment devices of sizes as recommended by cited sheet metal standard for application, but not less than thickness of metal being secured.

H. Seams: Fabricate nonmoving seams with flat-lock seams. Form seams and seal with elastomeric sealant unless otherwise recommended by sealant manufacturer for intended use. Rivet joints where necessary for strength.

2.5 STEEP-SLOPE ROOF SHEET METAL FABRICATIONS

A. Base Flashing: Fabricate from the following materials:

1. Galvanized Steel: 22 gauge.

B. Counterflashing: Fabricate from the following materials:

1. Galvanized Steel: 24 gauge.

C. Flashing Receivers: Fabricate from the following materials:

1. Galvanized Steel: 24 gauge.

D. Roof-Penetration Flashing: Fabricate from the following materials:

1. Galvanized Steel: 22 gauge.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances, substrate, and other conditions affecting performance of the Work.

1. Verify compliance with requirements for installation tolerances of substrates.
2. Verify that substrate is sound, dry, smooth, clean, sloped for drainage, and securely anchored.
3. Verify that air- or water-resistant barriers have been installed over sheathing or backing substrate to prevent air infiltration or water penetration.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION, GENERAL

A. General: Anchor sheet metal flashing and trim and other components of the Work securely in place, with provisions for thermal and structural movement. Use fasteners, protective coatings, separators, sealants, and other miscellaneous items as required to complete sheet metal flashing and trim system.

1. Install sheet metal flashing and trim true to line, levels, and slopes. Provide uniform, neat seams with minimum exposure of solder, welds, and sealant.
2. Install sheet metal flashing and trim to fit substrates and to result in watertight performance. Verify shapes and dimensions of surfaces to be covered before fabricating sheet metal.
3. Space cleats not more than 12 inches apart. Attach each cleat with at least two fasteners. Bend tabs over fasteners.
4. Install exposed sheet metal flashing and trim with limited oil canning, and free of buckling and tool marks.
5. Torch cutting of sheet metal flashing and trim is not permitted.

B. Metal Protection: Where dissimilar metals contact each other, or where metal contacts pressure-treated wood or other corrosive substrates, protect against galvanic action or corrosion by painting contact surfaces with bituminous coating or by other permanent separation as recommended by sheet metal manufacturer or cited sheet metal standard.

1. Coat concealed side of uncoated-aluminum and stainless-steel sheet metal flashing and trim with bituminous coating where flashing and trim contact wood, ferrous metal, or cementitious construction.

C. Expansion Provisions: Provide for thermal expansion of exposed flashing and trim. Space movement joints at maximum of 10 feet with no joints within 24 inches of corner or intersection.

1. Form expansion joints of intermeshing hooked flanges, not less than 1 inch deep, filled with sealant concealed within joints.
2. Use lapped expansion joints only where indicated on Drawings.

D. Fasteners: Use fastener sizes that penetrate [wood blocking or sheathing not less than **1-1/4 inches** for nails and not less than **3/4 inch** for wood screws] substrate not less than recommended by fastener manufacturer to achieve maximum pull-out resistance.

E. Conceal fasteners and expansion provisions where possible in exposed work and locate to minimize possibility of leakage. Cover and seal fasteners and anchors as required for a tight installation.

F. Seal joints as required for watertight construction.

1. Use sealant-filled joints unless otherwise indicated. Embed hooked flanges of joint members not less than 1 inch into sealant. Form joints to completely conceal sealant. When ambient temperature at time of installation is between 40 and 70 deg F, set joint members for 50 percent movement each way. Adjust setting proportionately for installation at higher ambient temperatures. Do not install sealant-type joints at temperatures below 40 deg F.
2. Prepare joints and apply sealants to comply with requirements in Section 07 9200 "Joint Sealants."

3.3 ROOF FLASHING INSTALLATION

A. General: Install sheet metal flashing and trim to comply with performance requirements, sheet metal manufacturer's written installation instructions, and cited sheet metal standard. Provide concealed fasteners where possible, and set units true to line, levels, and slopes. Install work with laps, joints, and seams that are permanently watertight and weather resistant.

B. Pipe or Post Counterflashing: Install counterflashing umbrella with close-fitting collar with top edge flared for elastomeric sealant, extending minimum of 4 inches over base flashing. Install stainless-steel draw band and tighten.

C. Counterflashing: Coordinate installation of counterflashing with installation of base flashing. Insert counterflashing in reglets or receivers and fit tightly to base flashing. Extend counterflashing 4 inches over base flashing. Lap counterflashing

joints minimum of 4 inches. Secure in waterproof manner by means of interlocking folded seam or blind rivets and sealant unless otherwise indicated.

D. Roof-Penetration Flashing: Coordinate installation of roof-penetration flashing with installation of roofing and other items penetrating roof. Seal with elastomeric sealant and clamp flashing to pipes that penetrate roof.

3.4 ERECTION TOLERANCES

A. Installation Tolerances: Shim and align sheet metal flashing and trim within installed tolerance of 1/4 inch in 20 feet on slope and location lines indicated on Drawings and within 1/8-inch offset of adjoining faces and of alignment of matching profiles.

B. Installation Tolerances: Shim and align sheet metal flashing and trim within installed tolerances specified in MCA's "Guide Specification for Residential Metal Roofing."

3.5 CLEANING AND PROTECTION

A. Clean exposed metal surfaces of substances that interfere with uniform oxidation and weathering.

B. Clean off excess sealants.

C. Remove temporary protective coverings and strippable films as sheet metal flashing and trim are installed unless otherwise indicated in manufacturer's written installation instructions. On completion of sheet metal flashing and trim installation, remove unused materials and clean finished surfaces as recommended by sheet metal flashing and trim manufacturer. Maintain sheet metal flashing and trim in clean condition during construction.

D. Replace sheet metal flashing and trim that have been damaged or that have deteriorated beyond successful repair by finish touchup or similar minor repair procedures.

END OF SECTION 07 6200

SECTION 07 6322 - STEEL FASCIA

PART 1 - GENERAL

1.1 SUMMARY

A. Includes But Not Limited To:

1. Furnish and install metal fascia as described in Contract Documents.

1.2 REFERENCES

A. Reference Standards:

1. ASTM International:

a. ASTM A653/A653M-11, 'Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process'.
b. ASTM A792/A792M-10, 'Standard Specification for Steel Sheet, 55 % Aluminum-Zinc Alloy-Coated by the Hot-Dip Process'.

1.3 WARRANTY

A. Manufacturer Warranty:

1. Manufacturer's written 20-year or better guarantee for finish.

PART 2 - PRODUCTS

2.1 ASSEMBLIES

A. Manufacturers:

1. Type One Acceptable Manufacturers Of Metal:

a. AEP / Span, Dallas, TX www.aep-span.com.
b. ATAS Aluminum Products, Allentown, PA www.atas.com.
c. CMG – Coated Metals Group, Denver, CO www.cmgmetals.com.
d. Drexel Metals, LLC, Ivyland, PA www.drexmet.com.
e. Firestone Metal Products, Anoka, MN www.unaclad.com.
f. Fabral, Lancaster, PA www.fabral.com.
g. Hunter-Douglas Canada Ltd, Brampton, ON www.hunterdouglasgroup.com.
h. Ryerson, Chicago, IL www.ryerson.com.
i. Kaycan Ltd, Montreal, PQ (514) 334-7550 www.kaycan.com.
j. MBCI, Houston, TX www.mbci.com.
k. Metal Sales Manufacturing Corp, Sellersburg, IN www.mtlsales.com.
l. Petersen Aluminum Corp, Elk Grove, IL www.pac-clad.com
m. VicWest, Oakville, ON www.vicwest.ca
n. Equal as approved by Architect before bidding. See Section 01 6200.

B. Materials: Minimum 24 ga, hot-dipped galvanized to meet requirements of ASTM A653/A653M, 1.25 oz/sq ft or galvalume meeting requirements of ASTM A792/A792M AZ50, 50 ksi and complete with accessories recommended by Manufacturer for proper installation.

C. Fabrication: Fascia may either be shop-fabricated using metal from a specified manufacturer, or a factory-fabricated standard system from a specified manufacturer.

D. Finishes:

1. Face coating polyvinyledene Fluoride (PVF_2) Resin-base finish (Kynar 500 or Hylar 5000) for coil coating components containing 70 percent minimum PVF_2 in resin portion of formula. Thermo-cured two coat system consisting of corrosion inhibiting epoxy primer and top coat factory applied over properly pre-treated metal.
2. Reverse side coating thermo-cured system consisting of corrosion inhibiting epoxy primer applied over properly pre-treated metal.
3. Color as selected by Architect from Manufacturer's standard colors.

2.2 ACCESSORIES

A. Fastening Devices: Galvanized steel screws.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Conceal fasteners except where details might require a minimum number to be exposed. Paint heads of exposed fasteners to match background.

B. Install with slip joints at each end. Screw to substrate through pre-drilled, over-size holes.

C. Isolate from dissimilar metals not part of fascia system to prevent electrolytic action.

D. Repair buckling or bowing due to improper installation at no cost to Owner.

END OF SECTION

SECTION 07 7123 - MANUFACTURED GUTTERS AND DOWNSPOUTS

PART 1 - GENERAL

1.1 SUMMARY

A. Includes But Not Limited To:

1. Furnish and install gutters and downspouts as described in Contract Documents.

B. Related Requirements:

1. Section 07 9200: 'Joint Sealant', for quality of sealants for joints.

1.2 REFERENCES

A. Reference Standard:

1. Sheet Metal & Air Conditioning Contractors National Association Inc:

a. SMACNA Architectural Sheet Metal Manual, (7th edition 2012).

1.3 SUBMITTALS

A. Action Submittals:

1. Shop Drawings: Show gutter cross-section, mounting method, gauge of metal, expansion joint design and locations, and downspout locations minimum.

PART 2 - PRODUCTS

2.1 ASSEMBLIES

A. Manufacturers:

1. Type Two Acceptable Manufacturers of Metal:

a. ATAS Aluminum Products, Allentown, PA www.atas.com.
b. CMG – Coated Metals Group, Denver, CO www.cmgmetals.com.
c. Fabral, Jackson, GA www.fabral.com.
d. Firestone Metal Products, Anoka, MN www.unaclad.com.
e. MBCI, Houston, TX www.mbci.com.
f. Metal Sales Manufacturing Corp, Sellersburg, IN www.mtlsales.com.
g. Petersen Aluminum Corp, Elk Grove, IL www.pac-clad.com.
h. Reynolds Metals Company, Richmond, VA www.rmc.com.
i. Ryerson, Chicago, IL www.ryerson.com.
j. Equal as approved by Architect before installation. See Section 01 6200.

B. Materials

1. Steel:

a. Downspouts: Rectangular, 26 ga galvanized steel including necessary elbows.
b. Gutters: 24 ga galvanized steel.
c. Brackets: 22 ga 0.0336 inches galvanized steel or 26 ga 0.0217 inches double-hemmed minimum.

2. Screws, Bolts, Nails, And Accessory Fasteners: Non-corrosive and of strength and type consistent with function.
3. Downspouts, gutters, brackets, fasteners, and accessories shall be compatible material.

C. Fabrication:

1. Fabricate in accordance with SMACNA Architectural Manual recommendations, where applicable.
2. Cross-sectional configuration of gutter shall be Style A, (Page 1.13 6th Edition) of SMACNA Architectural Manual.
3. Form accurately to details.
4. Profiles, bends, and intersections shall be even and true to line.

D. Finishes:

1. Metal exposed to view shall have face coating of polyvinyledene Fluoride (PVF_2) Resin-base finish (Kynar 500 or Hylar 5000) containing seventy (70) percent minimum PVF_2 in resin portion of formula.

a. Thermo-cured two (2) coat system consisting of corrosion inhibiting epoxy primer and top coat factory applied over properly pre-treated metal.
b. Reverse side coating shall be thermo-cured system consisting of corrosion inhibiting epoxy primer applied over properly pre-treated metal.

2. Color as selected by Architect from Manufacturer's standard colors.

PART 3 - EXECUTION

3.1 PREPARATION

A. Protection Of In-Place Conditions:

1. Before starting work, verify governing dimensions at building. Inspect for conditions that would prevent installation of specified system. Do not install over improper conditions.
2. Insulate work from fascia as necessary to prevent electrolytic action.

3.2 INSTALLATION

A. Allow no more than 40 feet between downspouts. Lap joints in downspouts 1-1/2 inches minimum in direction of water flow.

B. Furnish and install outlet tubes and gutter ends where required. Furnish and install expansion joints in runs exceeding 50 feet and in runs that are restrained at both ends. Lap other joints in gutter one inch minimum, apply sealant in lap, and stainless steel rivet one inch on center maximum.

3.3 FIELD QUALITY CONTROL

A. Field Tests:

1. At completion of this work, block downspouts and flood gutters.
2. Repair leaks and adjust for proper drainage.

3.4 CLEANING

A. Leave metals clean and free of defects, stains, and damaged finish.

END OF SECTION 07 7123

SECTION 07 9200 - JOINT SEALANTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Silicone joint sealants.
2. Urethane joint sealants.
3. Latex joint sealants.

B. Related Sections:

1. Section 09 2900 "Gypsum Board" for sealing perimeter joints.
2. Section 09 3000 "Tiling" for sealing tile joints.
3. Section 09 5113 "Acoustical Panel Ceilings" for sealing edge moldings at perimeters with acoustical sealant.

1.3 ACTION SUBMITTALS

A. Product Data: For each joint-sealant product indicated.

1.4 QUALITY ASSURANCE

A. Installer Qualifications: Manufacturer's authorized representative who is trained and approved for installation of units required for this Project.

B. Source Limitations: Obtain each kind of joint sealant from single source from single manufacturer.

C. Product Testing: Test joint sealants using a qualified testing agency.

1. Testing Agency Qualifications: An independent testing agency qualified according to ASTM C 1021 to conduct the testing indicated.

1.5 PROJECT CONDITIONS

A. Do not proceed with installation of joint sealants under the following conditions:

1. When ambient and substrate temperature conditions are outside limits permitted by joint-sealant manufacturer or are below 40 deg F.
2. When joint substrates are wet.
3. Where joint widths are less than those allowed by joint-sealant manufacturer for applications indicated.
4. Where contaminants capable of interfering with adhesion have not yet been removed from joint substrates.

1.6 WARRANTY

A. Special warranties specified in this article exclude deterioration or failure of joint sealants from the following:

1. Movement of the structure caused by structural settlement or errors attributable to design or construction resulting in stresses on the sealant exceeding sealant manufacturer's written specifications for sealant elongation and compression.
2. Disintegration of joint substrates from natural causes exceeding design specifications.
3. Mechanical damage caused by individuals, tools, or other outside agents.
4. Changes in sealant appearance caused by accumulation of dirt or other atmospheric contaminants.

PART 2 - PRODUCTS

2.1 MATERIALS, GENERAL

A. Compatibility: Provide joint sealants, backings, and other related materials that are compatible with one another and with joint substrates under conditions of service and application, as demonstrated by joint-sealant manufacturer, based on testing and field experience.

B. Liquid-Applied Joint Sealants: Comply with ASTM C 920 and other requirements indicated for each liquid-applied joint sealant specified, including those referencing ASTM C 920 classifications for type, grade, class, and uses related to exposure and joint substrates.

C. Stain-Test-Response Characteristics: Where sealants are specified to be nonstaining to porous substrates, provide products that have undergone testing according to ASTM C 1248 and have not stained porous joint substrates indicated for Project.

D. Suitability for Contact with Food: Where sealants are indicated for joints that will come in repeated contact with food, provide products that comply with 21 CFR 177.2600.

E. Colors of Exposed Joint Sealants: As selected by Architect from manufacturer's full range.

2.2 SILICONE JOINT SEALANTS

A. Mildew-Resistant, Single-Component, Nonsag, Neutral-Curing Silicone Joint Sealant: ASTM C 920, Type S, Grade NS, Class 25, for Use NT.

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

    a. BASF Building Systems.
    b. Dow Corning Corporation.
    c. GE Advanced Materials – Silicones.
    d. May National Associates, Inc.
    e. Pecora Corporation.
    f. Polymeric Systems, Inc.
    g. Schnee-Moorehead, Inc.
    h. Sika Corporation; Construction Products Division.
    i. Tremco Incorporated.

2.3 URETHANE JOINT SEALANTS

A. Single-Component, Nonsag, Urethane Joint Sealant: ASTM C 920, Type S, Grade NS, Class 100/50, for Use NT.

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

    a. BASF Building Systems.
    b. Bostik, Inc.
    c. Lymtal, International, Inc.
    d. May National Associates, Inc.

e. Pacific Polymers International, Inc.
f. Pecora Corporation.
g. Polymeric Systems, Inc.
h. Schnee-Moorehead, Inc.
i. Sika Corporation; Construction Products Division.
j. Tremco Incorporated.

2.4 LATEX JOINT SEALANTS

A. Latex Joint Sealant: Acrylic latex or siliconized acrylic latex, ASTM C 834, Type OP, Grade NF.

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

a. BASF Building Systems.
b. Bostik, Inc.
c. May National Associates, Inc.
d. Pecora Corporation.
e. Schnee-Moorehead, Inc.
f. Tremco Incorporated.

2.5 JOINT SEALANT BACKING

A. General: Provide sealant backings of material that are nonstaining; are compatible with joint substrates, sealants, primers, and other joint fillers; and are approved for applications indicated by sealant manufacturer based on field experience and laboratory testing.

B. Cylindrical Sealant Backings: ASTM C 1330, Type C (closed-cell material with a surface skin), and of size and density to control sealant depth and otherwise contribute to producing optimum sealant performance.

C. Bond-Breaker Tape: Polyethylene tape or other plastic tape recommended by sealant manufacturer for preventing sealant from adhering to rigid, inflexible joint-filler materials or joint surfaces at back of joint. Provide self-adhesive tape where applicable.

2.6 MISCELLANEOUS MATERIALS

A. Primer: Material recommended by joint-sealant manufacturer where required for adhesion of sealant to joint substrates indicated, as determined from preconstruction joint-sealant-substrate tests and field tests.

B. Cleaners for Nonporous Surfaces: Chemical cleaners acceptable to manufacturers of sealants and sealant backing materials, free of oily residues or other substances capable of staining or harming joint substrates and adjacent nonporous surfaces in any way, and formulated to promote optimum adhesion of sealants to joint substrates.

C. Masking Tape: Nonstaining, nonabsorbent material compatible with joint sealants and surfaces adjacent to joints.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine joints indicated to receive joint sealants, with Installer present, for compliance with requirements for joint configuration, installation tolerances, and other conditions affecting joint-sealant performance.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Surface Cleaning of Joints: Clean out joints immediately before installing joint sealants to comply with joint-sealant manufacturer's written instructions and the following requirements:

1. Remove all foreign material from joint substrates that could interfere with adhesion of joint sealant, including dust, paints (except for permanent, protective coatings tested and approved for sealant adhesion and compatibility by sealant manufacturer), old joint sealants, oil, grease, waterproofing, water repellents, water, surface dirt, and frost.
2. Clean porous joint substrate surfaces by brushing, grinding, mechanical abrading, or a combination of these methods to produce a clean, sound substrate capable of developing optimum bond with joint sealants. Remove loose particles remaining after cleaning operations above by vacuuming or blowing out joints with oil-free compressed air. Porous joint substrates include the following:

    a. Concrete.
    b. Masonry.
    c. Unglazed surfaces of ceramic tile.
    d. Exterior insulation and finish systems.

3. Remove laitance and form-release agents from concrete.
4. Clean nonporous joint substrate surfaces with chemical cleaners or other means that do not stain, harm substrates, or leave residues capable of interfering with adhesion of joint sealants. Nonporous joint substrates include the following:

    a. Metal.
    b. Glass.
    c. Porcelain enamel.
    d. Glazed surfaces of ceramic tile.

B. Joint Priming: Prime joint substrates where recommended by joint-sealant manufacturer or as indicated by preconstruction joint-sealant-substrate tests or prior experience. Apply primer to comply with joint-sealant manufacturer's written instructions. Confine primers to areas of joint-sealant bond; do not allow spillage or migration onto adjoining surfaces.

C. Masking Tape: Use masking tape where required to prevent contact of sealant or primer with adjoining surfaces that otherwise would be permanently stained or damaged by such contact or by cleaning methods required to remove sealant smears. Remove tape immediately after tooling without disturbing joint seal.

3.3 INSTALLATION OF JOINT SEALANTS

A. General: Comply with joint-sealant manufacturer's written installation instructions for products and applications indicated, unless more stringent requirements apply.

B. Sealant Installation Standard: Comply with recommendations in ASTM C 1193 for use of joint sealants as applicable to materials, applications, and conditions indicated.

C. Install sealant backings of kind indicated to support sealants during application and at position required to produce cross-sectional shapes and depths of installed sealants relative to joint widths that allow optimum sealant movement capability.

1. Do not leave gaps between ends of sealant backings.
2. Do not stretch, twist, puncture, or tear sealant backings.
3. Remove absorbent sealant backings that have become wet before sealant application and replace them with dry materials.

D. Install bond-breaker tape behind sealants where sealant backings are not used between sealants and backs of joints.

E. Install sealants using proven techniques that comply with the following and at the same time backings are installed:

1. Place sealants so they directly contact and fully wet joint substrates.
2. Completely fill recesses in each joint configuration.
3. Produce uniform, cross-sectional shapes and depths relative to joint widths that allow optimum sealant movement capability.

F. Tooling of Nonsag Sealants: Immediately after sealant application and before skinning or curing begins, tool sealants according to requirements specified in subparagraphs below to form smooth, uniform beads of configuration indicated; to eliminate air pockets; and to ensure contact and adhesion of sealant with sides of joint.

1. Remove excess sealant from surfaces adjacent to joints.
2. Use tooling agents that are approved in writing by sealant manufacturer and that do not discolor sealants or adjacent surfaces.
3. Provide concave joint profile per Figure 8A in ASTM C 1193, unless otherwise indicated.

a. Use masking tape to protect surfaces adjacent to recessed tooled joints.

3.4 FIELD QUALITY CONTROL

A. Evaluation of Field-Adhesion Test Results: Sealants not evidencing adhesive failure from testing or noncompliance with other indicated requirements will be considered satisfactory. Remove sealants that fail to adhere to joint substrates during testing or to comply with other requirements. Retest failed applications until test results prove sealants comply with indicated requirements.

3.5 CLEANING

A. Clean off excess sealant or sealant smears adjacent to joints as the Work progresses by methods and with cleaning materials approved in writing by manufacturers of joint sealants and of products in which joints occur.

3.6 PROTECTION

A. Protect joint sealants during and after curing period from contact with contaminating substances and from damage resulting from construction operations or other causes so sealants are without deterioration or damage at time of Substantial Completion. If, despite such protection, damage or deterioration occurs, cut out and remove damaged or deteriorated joint sealants immediately so installations with repaired areas are indistinguishable from original work.

END OF SECTION 07 9200

DIVISION 8 - OPENINGS:

08 1113	Hollow Metal Doors and Frames
08 1416	Flush Wood Doors
08 3113	Access Doors and Frames
08 4113	Aluminum-Framed Entrances and Storefronts
08 4229	Swinging Automatic Entrances
08 7100	Door Hardware
08 8000	Glazing

SECTION 08 1113 - HOLLOW METAL DOORS AND FRAMES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section includes hollow-metal work.

B. Related Requirements:

1. Section 08 7100 "Door Hardware" for door hardware for hollow-metal doors.

1.3 DEFINITIONS

A. Minimum Thickness: Minimum thickness of base metal without coatings according to NAAMM-HMMA 803 or SDI A250.8.

1.4 COORDINATION

A. Coordinate anchorage installation for hollow-metal frames. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors. Deliver such items to Project site in time for installation.

1.5 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include construction details, material descriptions, core descriptions, fire-resistance ratings, and finishes.

B. Shop Drawings: Include the following:

1. Elevations of each door type.
2. Details of doors, including vertical- and horizontal-edge details and metal thicknesses.
3. Frame details for each frame type, including dimensioned profiles and metal thicknesses.
4. Locations of reinforcement and preparations for hardware.
5. Details of each different wall opening condition.
6. Details of anchorages, joints, field splices, and connections.
7. Details of accessories.

C. Schedule: Provide a schedule of hollow-metal work prepared by or under the supervision of supplier, using same reference numbers for details and openings as those on Drawings. Coordinate with final Door Hardware Schedule.

1.6 INFORMATIONAL SUBMITTALS

A. Product Test Reports: For each type of hollow-metal door and frame assembly, for tests performed by a qualified testing agency.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Deliver hollow-metal work palletized, packaged, or crated to provide protection during transit and Project-site storage. Do not use nonvented plastic.

1. Provide additional protection to prevent damage to factory-finished units.

B. Deliver welded frames with two removable spreader bars across bottom of frames, tack welded to jambs and mullions.

C. Store hollow-metal work vertically under cover at Project site with head up. Place on minimum 4-inch-high wood blocking. Provide minimum 1/4-inchspace between each stacked door to permit air circulation.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

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

1. Amweld International, LLC.
2. Ceco Door; ASSA ABLOY.
3. Curries Company; ASSA ABLOY.
4. Pioneer Industries, Inc.
5. Steel Craft.
6. Republic Books and Frames
7. Security Metal Products Corp.

B. Source Limitations: Obtain hollow-metal work from single source from single manufacturer.

2.2 INTERIOR DOORS AND FRAMES

A. Construct interior doors and frames to comply with the standards indicated for materials, fabrication, hardware locations, hardware reinforcement, tolerances, and clearances, and as specified.

1. Physical Performance: Level B according to SDI A250.4.
2. Frames:

    a. Materials: Uncoated steel sheet, minimum thickness of 0.053 inch.
    b. Construction: Face welded.

3. Exposed Finish: Prime.

2.3 EXTERIOR HOLLOW-METAL DOORS AND FRAMES

A. Construct exterior doors and frames to comply with the standards indicated for materials, fabrication, hardware locations, hardware reinforcement, tolerances, and clearances, and as specified.

B. Commercial Doors and Frames: NAAMM-HMMA 861..

1. Physical Performance: Level A according to SDI A250.4.
2. Doors:

    a. Type: As indicated in the Door and Frame Schedule.
    b. Thickness: 1-3/4 inches
    c. Face: Metallic-coated steel sheet, minimum thickness of 0.053 inch with minimum G60 A60 coating.
    d. Edge Construction: Continuously welded with no visible seam.
    e. Core: Steel stiffened.

        1) Thermal-Rated Doors: Provide doors fabricated with thermal-resistance value (R-value) of not less than 2.1 deg F x h x sq. ft./Btu when tested according to ASTM C 1363.

3. Frames:

   a. Materials: Metallic-coated steel sheet, minimum thickness of 0.067 inch with minimum G60 A60 coating.
   b. Construction: Full profile welded.

4. Finish: Galvanized and primed.

2.4 FRAME ANCHORS

A. Jamb Anchors:

1. Stud-Wall Type: Designed to engage stud, welded to back of frames; not less than 0.042 inch thick.

B. Floor Anchors: Formed from same material as frames, minimum thickness of 0.042 inch, and as follows:

1. Monolithic Concrete Slabs: Clip-type anchors, with two holes to receive fasteners.

2.5 MATERIALS

A. Cold-Rolled Steel Sheet: ASTM A 1008/A 1008M, Commercial Steel (CS), Type B; suitable for exposed applications.

B. Hot-Rolled Steel Sheet: ASTM A 1011/A 1011M, Commercial Steel (CS), Type B; free of scale, pitting, or surface defects; pickled and oiled.

C. Metallic-Coated Steel Sheet: ASTM A 653/A 653M, Commercial Steel (CS), Type B.

D. Frame Anchors: ASTM A 879/A 879M, Commercial Steel (CS), 04Zcoating designation; mill phosphatized.

1. For anchors built into exterior walls, steel sheet complying with ASTM A 1008/A 1008M or ASTM A 1011/A 1011M, hot-dip galvanized according to ASTM A 153/A 153M, Class B.

E. Inserts, Bolts, and Fasteners: Hot-dip galvanized according to ASTM A 153/A 153M.

F. Power-Actuated Fasteners in Concrete: Fastener system of type suitable for application indicated, fabricated from corrosion-resistant materials, with clips or other accessory devices for attaching hollow-metal frames of type indicated.

G. Mineral-Fiber Insulation: ASTM C 665, Type I (blankets without membrane facing); consisting of fibers manufactured from slag or rock wool; with maximum flame-spread and smoke-developed indexes of 25 and 50, respectively; passing ASTM E 136 for combustion characteristics.

2.6 FABRICATION

A. Fabricate hollow-metal work to be rigid and free of defects, warp, or buckle. Accurately form metal to required sizes and profiles, with minimum radius for metal thickness. Where practical, fit and assemble units in manufacturer's plant. To ensure proper assembly at Project site, clearly identify work that cannot be permanently factory assembled before shipment.

B. Hollow-Metal Doors:

1. Vertical Edges for Single-Acting Doors: Bevel edges 1/8 inch in 2 inches.
2. Top Edge Closures: Close top edges of doors with inverted closures of same material as face sheets.
3. Bottom Edge Closures: Close bottom edges of doors where required for attachment of weather stripping with end closures or channels of same material as face sheets.

C. Hollow-Metal Frames: Where frames are fabricated in sections due to shipping or handling limitations, provide alignment plates or angles at each joint, fabricated of same thickness metal as frames.

1. Provide countersunk, flat- or oval-head exposed screws and bolts for exposed fasteners unless otherwise indicated.
2. Floor Anchors: Weld anchors to bottoms of jambs with at least four spot welds per anchor; however, for slip-on drywall frames, provide anchor clips or countersunk holes at bottoms of jambs.
3. Jamb Anchors: Provide number and spacing of anchors as follows:

    a. Stud-Wall Type: Locate anchors not more than 18 inches from top and bottom of frame. Space anchors not more than 32 inches o.c. and as follows:

        1) Four anchors per jamb from 60 to 90 inches high.
        2) Five anchors per jamb from 90 to 96 inches high.

4. Door Silencers: Except on weather-stripped frames, drill stops to receive door silencers as follows. Keep holes clear during construction.

    a. Single-Door Frames: Drill stop in strike jamb to receive three door silencers.

D. Fabricate concealed stiffeners and edge channels from either cold- or hot-rolled steel sheet.

E. Hardware Preparation: Factory prepare hollow-metal work to receive templated mortised hardware; include cutouts, reinforcement, mortising, drilling, and tapping according to SDI A250.6, the Door Hardware Schedule, and templates.

1. Reinforce doors and frames to receive nontemplated, mortised, and surface-mounted door hardware.
2. Comply with applicable requirements in SDI A250.6 and BHMA A156.115 for preparation of hollow-metal work for hardware.

2.7 STEEL FINISHES

A. Interior:

1. Prime Finish: Clean, pretreat, and apply manufacturer's standard primer.

    a. Shop Primer: Manufacturer's standard, fast-curing, lead- and chromate-free primer complying with SDI A250.10; recommended by primer manufacturer for substrate; compatible with substrate and field-applied coatings despite prolonged exposure.

B. Exterior:

1. Galvanized and primed in accordance with ASTM A653/A653M.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

B. Examine roughing-in for embedded and built-in anchors to verify actual locations before frame installation.

C. Prepare written report, endorsed by Installer, listing conditions detrimental to performance of the Work.

D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Remove welded-in shipping spreaders installed at factory. Restore exposed finish by grinding, filling, and dressing, as required to make repaired area smooth, flush, and invisible on exposed faces.

B. Drill and tap doors and frames to receive nontemplated, mortised, and surface-mounted door hardware.

3.3 INSTALLATION

A. General: Install hollow-metal work plumb, rigid, properly aligned, and securely fastened in place. Comply with Drawings and manufacturer's written instructions.

B. Hollow-Metal Frames: Install hollow-metal frames of size and profile indicated. Comply with SDI A250.11 or NAAMM-HMMA 840 as required by standards specified.

1. Set frames accurately in position; plumbed, aligned, and braced securely until permanent anchors are set. After wall construction is complete, remove temporary braces, leaving surfaces smooth and undamaged.

    a. Where frames are fabricated in sections because of shipping or handling limitations, field splice at approved locations by welding face joint continuously; grind, fill, dress, and make splice smooth, flush, and invisible on exposed faces.
    b. Remove temporary braces necessary for installation only after frames have been properly set and secured.
    c. Check plumb, square, and twist of frames as walls are constructed. Shim as necessary to comply with installation tolerances.

2. Floor Anchors: Provide floor anchors for each jamb and mullion that extends to floor, and secure with post installed expansion anchors.

    a. Floor anchors may be set with power-actuated fasteners instead of post installed expansion anchors if so indicated and approved on Shop Drawings.

3. Metal-Stud Partitions: Solidly pack mineral-fiber insulation inside frames.
4. Installation Tolerances: Adjust hollow-metal door frames for squareness, alignment, twist, and plumb to the following tolerances:

    a. Squareness: Plus or minus 1/16 inch, measured at door rabbet on a line 90 degrees from jamb perpendicular to frame head.
    b. Alignment: Plus or minus 1/16 inch, measured at jambs on a horizontal line parallel to plane of wall.
    c. Twist: Plus or minus 1/16 inch, measured at opposite face corners of jambs on parallel lines, and perpendicular to plane of wall.
    d. Plumbness: Plus or minus 1/16 inch, measured at jambs at floor.

5. Fill space between frame and framing with tightly packed fiberglass insulation.

C. Hollow-Metal Doors: Fit hollow-metal doors accurately in frames, within clearances specified below. Shim as necessary.

1. Non-Fire-Rated Steel Doors:

    a. Between Door and Frame Jambs and Head: 1/8 inch plus or minus 1/32 inch.
    b. Between Edges of Pairs of Doors: 1/8 inch to 1/4 inch plus or minus 1/32 inch.
    c. At Bottom of Door: 3/4 inch plus or minus 1/32 inch.
    d. Between Door Face and Stop: 1/16 inch to 1/8 inch plus or minus 1/32 inch.

3.4 ADJUSTING AND CLEANING

A. Final Adjustments: Check and readjust operating hardware items immediately before final inspection. Leave work in complete and proper operating condition. Remove and replace defective work, including hollow-metal work that is warped, bowed, or otherwise unacceptable.

B. Remove grout and other bonding material from hollow-metal work immediately after installation.

C. Prime-Coat Touchup: Immediately after erection, sand smooth rusted or damaged areas of prime coat and apply touchup of compatible air-drying, rust-inhibitive primer.

END OF SECTION 08 1113

SECTION 08 1416 - FLUSH WOOD DOORS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Solid-core doors with wood-veneer faces.
2. Factory-finishing flush wood doors.
3. Factory-fitting flush wood doors to frames and factory machining for hardware.

B. Related Requirements:

1. Section 08 8000 "Glazing" for glass view panels in flush wood doors.
2. Section 23 3713 "Diffusers, Registers, and Grilles" for door grilles in flush wood doors.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of door. Include details of core and edge construction and trim for openings.

B. Shop Drawings: Indicate location, size, and hand of each door; elevation of each kind of door; construction details not covered in Product Data; and the following:

1. Dimensions and locations of blocking.
2. Dimensions and locations of mortises and holes for hardware.
3. Dimensions and locations of cutouts.
4. Undercuts.
5. Requirements for veneer matching.
6. Doors to be factory finished and finish requirements.

C. Samples for Initial Selection: For factory finished doors.

D. Samples for Verification:

1. Corner sections of doors, approximately 8 by 10 inches, with door faces and edges representing actual materials to be used.

    a. Provide Samples for each species of veneer and solid lumber required.
    b. Finish veneer-faced door Samples with same materials proposed for factory-finished doors.

1.4 QUALITY ASSURANCE

A. Manufacturer Qualifications: A qualified manufacturer that is a certified participant in AWI's Quality Certification Program.

B. Vendor Qualifications: A vendor that is certified for chain of custody by an FSC-accredited certification body.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Comply with requirements of referenced standard and manufacturer's written instructions.

B. Package doors individually in plastic bags or cardboard cartons.

C. Mark each door on bottom rail with opening number used on Shop Drawings.

1.6 FIELD CONDITIONS

A. Environmental Limitations: Do not deliver or install doors until spaces are enclosed and weathertight, wet work in spaces is complete and dry, and HVAC system is operating and maintaining ambient temperature and humidity conditions at occupancy levels during remainder of construction period.

1.7 WARRANTY

A. Special Warranty: Manufacturer agrees to repair or replace doors that fail in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to, the following:

   a. Warping (bow, cup, or twist) more than 1/4 inch in a 42-by-84-inch section.
   b. Telegraphing of core construction in face veneers exceeding 0.01 inch in a 3-inchspan.

2. Warranty shall also include installation and finishing that may be required due to repair or replacement of defective doors.
3. Warranty Period for Solid-Core Interior Doors: Life of installation.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

Retain "Manufacturers" Paragraph and list of manufacturers below to require products from manufacturers listed or a comparable product from other manufacturers.

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Algoma Hardwoods, Inc.
2. Eggers Industries.
3. Graham Wood Doors; ASSA ABLOY Group company.
4. Lynden Doors.
5. Marshfield Door Systems, Inc.
6. Oshkosh Door Company.
7. UT Industries.

2.2 FLUSH WOOD DOORS, GENERAL

A. Quality Standard: In addition to requirements specified, comply with AWI's, AWMAC's, and WI's "Architectural Woodwork Standards."

Provide AWI Quality Certification Labels indicating that doors comply with requirements of grades specified.

B. Particleboard-Core Doors:

1. Particleboard: ANSI A208.1, Grade LD-2.
2. Provide doors with glued-wood-stave or structural-composite-lumber cores instead of particleboard cores for doors indicated to receive exit devices.

C. Light Opening Frames:

1. Pre-finished wood to match door finish, 5/8 inch thick and set flush to face of door on each side.

2.3 FABRICATION

A. Factory fit doors to suit frame-opening sizes indicated. Comply with clearance requirements of referenced quality standard for fitting unless otherwise indicated.

B. Factory machine doors for hardware that is not surface applied. Locate hardware to comply with DHI-WDHS-3. Comply with final hardware schedules, door frame shop drawings, BHMA-156.115-W, and hardware templates.

1. Coordinate with hardware mortises in metal frames to verify dimensions and alignment before factory machining.

2.4 FACTORY FINISHING

A. General: Comply with referenced quality standard for factory finishing. Complete fabrication, including fitting doors for openings and machining for hardware that is not surface applied, before finishing.

1. Finish faces, all four edges, edges of cutouts, and mortises. Stains and fillers may be omitted on bottom edges, edges of cutouts, and mortises.

B. Factory finish doors.

C. Transparent Finish:

1. Grade: Premium.
2. Finish: AWI's, AWMAC's, and WI's "Architectural Woodwork Standards" System 5, conversion varnish.
3. Staining: As selected by Architect from manufacturer's full range.
4. Sheen: Satin.

2.5 VENEER-FACED DOORS FOR TRANSPARENT FINISH

A. Interior Solid-Core Doors:

1. Grade: Custom (Grade A faces).
2. Species: Select white maple.
3. Cut: Plain sliced (flat sliced).
4. Match between Veneer Leaves: Slip match.
5. Assembly of Veneer Leaves on Door Faces: Running match.
6. Exposed Vertical Edges: Same species as faces or a compatible species - edge Type A.
7. Core: Particleboard.
8. Construction: Five or seven plies. Stiles and rails are bonded to core, then entire unit is abrasive planed before veneering.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine doors and installed door frames, with Installer present, before hanging doors.

1. Verify that installed frames comply with indicated requirements for type, size, location, and swing characteristics and have been installed with level heads and plumb jambs.
2. Reject doors with defects.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Hardware: For installation, see Section 08 7100 "Door Hardware."

B. Installation Instructions: Install doors to comply with manufacturer's written instructions and referenced quality standard, and as indicated.

1. Install fire-rated doors according to NFPA 80.

C. Factory-Fitted Doors: Align in frames for uniform clearance at each edge.

D. Factory-Finished Doors: Restore finish before installation if fitting or machining is required at project site.

3.3 ADJUSTING

A. Operation: Rehang or replace doors that do not swing or operate freely.

B. Finished Doors: Replace doors that are damaged or that do not comply with requirements. Doors may be repaired or refinished if Work complies with requirements and shows no evidence of repair or refinishing.

END OF SECTION 08 1416

SECTION 08 3113 - ACCESS DOORS AND FRAMES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Access doors and frames for canopy soffit.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include construction details materials, individual components and profiles, and finishes.

B. Shop Drawings:

1. Include plans, elevations, sections, details, and attachments to other work.
2. Detail fabrication and installation of access doors and frames for each type of substrate.

PART 2 - PRODUCTS

2.1 ACCESS DOORS AND FRAMES

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

1. Access Panel Solutions.
2. Acudor Products, Inc.
3. Alfab, Inc.
4. Babcock-Davis.
5. Cendrex Inc.
6. Elmdor/Stoneman Manufacturing Co.; Div. of Acom Engineering Co.
7. Jensen Industries; Div. of Broan-Nutone, LLC.
8. J. L. Industries, Inc.; Div. of Activar Contruction Products Group.
9. Karp Associates, Inc.
10. Larsen's Manufacturing Company.
11. Maxam Metal Products Limited.

B. Source Limitations: Obtain each type of access door and frame from single source from single manufacturer.

C. Flush Access Doors with Exposed Flanges:

1. Assembly Description: Fabricate door to fit flush to frame. Provide manufacturer's standard-width exposed flange, proportional to door size.
2. Locations: Canopy soffit.
3. Door Size: As required.
4. Uncoated Steel Sheet for Door: Nominal 0.060 inch 16 gage.

a. Finish: Factory finish.

5. Frame Material: Same material, thickness, and finish as door.
6. Hinges: Manufacturer's standard.

D. Hardware:

1. Lock: Cylinder.

2.2 MATERIALS

A. Steel Plates, Shapes, and Bars: ASTM A 36/A 36M.

B. Steel Sheet: Uncoated or electrolytic zinc coated, ASTM A 879/A 879M, with cold-rolled steel sheet substrate complying with ASTM A 1008/A 1008M, Commercial Steel (CS), exposed.

C. Frame Anchors: Same type as door face.

D. Inserts, Bolts, and Anchor Fasteners: Hot-dip galvanized steel according to ASTM A 153/A 153M or ASTM F 2329.

2.3 FABRICATION

A. General: Provide access door and frame assemblies manufactured as integral units ready for installation.

B. Metal Surfaces: For metal surfaces exposed to view in the completed Work, provide materials with smooth, flat surfaces without blemishes. Do not use materials with exposed pitting, seam marks, roller marks, rolled trade names, or roughness.

C. Doors and Frames: Grind exposed welds smooth and flush with adjacent surfaces. Furnish attachment devices and fasteners of type required to secure access doors to types of supports indicated.

1. Provide mounting holes in frames for attachment of units to metal or wood framing.

D. Latching Mechanisms: Furnish number required to hold doors in flush, smooth plane when closed.

1. For cylinder locks, furnish two keys per lock and key all locks alike.

2.4 FINISHES

A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.

B. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

C. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

D. Steel and Metallic-Coated-Steel Finishes:

1. Factory Finish: Immediately after cleaning and pretreating, apply manufacturer's standard two-coat, baked-on finish consisting of prime coat and thermosetting topcoat, with a minimum dry-film thickness of 1 mil or topcoat.

a. Color: As selected by Architect to match metal soffit color.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Comply with manufacturer's written instructions for installing access doors and frames.

B. Install doors flush with adjacent finish surfaces or recessed to receive finish material.

3.3 ADJUSTING

A. Adjust doors and hardware, after installation, for proper operation.

B. Remove and replace doors and frames that are warped, bowed, or otherwise damaged.

END OF SECTION 08 3113

SECTION 08 4113 - ALUMINUM-FRAMED ENTRANCES AND STOREFRONTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Exterior and interior storefront framing.
2. Exterior and interior manual-swing entrance doors and door-frame units.

B. Related Sections:

1. Section 07 9200 "Joint Sealants" for sealing between storefront system and substrate.
2. Section 08 8000 "Glazing".
3. Section 08 7100 "Door Hardware".

1.3 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes.

B. Shop Drawings: For aluminum-framed entrances and storefronts. Include plans, elevations, sections, full-size details, and attachments to other work.

1. Include details of provisions for assembly expansion and contraction and for draining moisture occurring within the assembly to the exterior.
2. Include full-size isometric details of each vertical-to-horizontal intersection of aluminum-framed entrances and storefronts, showing the following:

a. Joinery, including concealed welds.
b. Anchorage.
c. Expansion provisions.
d. Glazing.
e. Flashing and drainage.

3. Show connection to and continuity with adjacent thermal, weather, air, and vapor barriers.

C. Samples for Initial Selection: For units with factory-applied color finishes.

1.5 INFORMATIONAL SUBMITTALS

A. Product Test Reports: For aluminum-framed entrances and storefronts, for tests performed by manufacturer and witnessed by a qualified testing agency.

1.6 QUALITY ASSURANCE

A. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by manufacturer.

B. Testing Agency Qualifications: Qualified according to ASTM E 699 for testing indicated and accredited by IAS or ILAC Mutual Recognition Arrangement as complying with ISO/IEC 17025.

C. Product Options: Information on Drawings and in Specifications establishes requirements for aesthetic effects and performance characteristics of assemblies. Aesthetic effects are indicated by dimensions, arrangements, alignment, and profiles of components and assemblies as they relate to sightlines, to one another, and to adjoining construction.

1. Do not change intended aesthetic effects, as judged solely by Architect, except with Architect's approval. If changes are proposed, submit comprehensive explanatory data to Architect for review.

1.7 WARRANTY

A. Special Warranty: Manufacturer agrees to repair or replace components of aluminum-framed entrances and storefronts that do not comply with requirements or that fail in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to, the following:

a. Structural failures including, but not limited to, excessive deflection.
b. Noise or vibration created by wind and thermal and structural movements.
c. Deterioration of metals and other materials beyond normal weathering.
d. Water penetration through fixed glazing and framing areas.
e. Failure of operating components.

2. Warranty Period: Five years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. General Performance: Comply with performance requirements specified, as determined by testing of aluminum-framed entrances and storefronts representing those indicated for this Project without failure due to defective manufacture, fabrication, installation, or other defects in construction.

1. Aluminum-framed entrances and storefronts shall withstand movements of supporting structure including, but not limited to, story drift, twist, column shortening, long-term creep, and deflection from uniformly distributed and concentrated live loads.
2. Failure also includes the following:

a. Thermal stresses transferring to building structure.
b. Glass breakage.
c. Noise or vibration created by wind and thermal and structural movements.
d. Loosening or weakening of fasteners, attachments, and other components.
e. Failure of operating units.

B. Deflection of Framing Members: At design wind pressure, as follows:

1. Deflection Normal to Wall Plane: Limited to edge of glass in a direction perpendicular to glass plane not exceeding 1/175 of the glass edge length for each individual glazing lite or an amount that restricts edge deflection of individual glazing lites to 3/4 inch, whichever is less.
2. Deflection Parallel to Glazing Plane: Limited to 1/360 of clear span or 1/8 inch, whichever is smaller.

a. Operable Units: Provide a minimum 1/16-inchclearance between framing members and operable units.

3. Cantilever Deflection: Where framing members overhang an anchor point, as follows:

    a. Perpendicular to Plane of Wall: No greater than 1/240 of clear span plus 1/4 inch for spans greater than 11 feet 8-1/4 inches or 1/175 times span, for spans less than 11 feet 8-1/4 inches.

C. Structural: Test according to ASTM E 330 as follows:

1. When tested at positive and negative wind-load design pressures, assemblies do not evidence deflection exceeding specified limits.
2. When tested at 150 percent of positive and negative wind-load design pressures, assemblies, including anchorage, do not evidence material failures, structural distress, or permanent deformation of main framing members exceeding 0.2 percent of span.
3. Test Durations: As required by design wind velocity, but not less than 10 seconds.

D. Air Infiltration: Test according to ASTM E 283 for infiltration as follows:

1. Fixed Framing and Glass Area:

    a. Maximum air leakage of 0.06 cfm/sq. ft. at a static-air-pressure differential of 1.57 lbf/sq. ft.

2. Entrance Doors:

    a. Pair of Doors: Maximum air leakage of 1.0 cfm/sq. ft. at a static-air-pressure differential of 1.57 lbf/sq. ft.
    b. Single Doors: Maximum air leakage of 0.5 cfm/sq. ft. at a static-air-pressure differential of 1.57 lbf/sq. ft.

E. Water Penetration under Static Pressure: Test according to ASTM E 331 as follows:

1. No evidence of water penetration through fixed glazing and framing areas when tested according to a minimum static-air-pressure differential of 20 percent of positive wind-load design pressure, but not less than 6.24 lbf/sq. ft.

F. Thermal Movements: Allow for thermal movements resulting from ambient and surface temperature changes:

1. Temperature Change: 120 deg F, ambient; 180 deg F, material surfaces.
2. Thermal Cycling: No buckling; stress on glass; sealant failure; excess stress on framing, anchors, and fasteners; or reduction of performance when tested according to AAMA 501.5.

    a. High Exterior Ambient-Air Temperature: That which produces an exterior metal-surface temperature of 180 deg F.
    b. Low Exterior Ambient-Air Temperature: 0 deg F.
    c. Interior Ambient-Air Temperature: 75 deg F.

2.2 MANUFACTURERS

A. Basis of Design: Contract Documents are based on products specified below to establish as standard of quality. Other available manufacturers with products having equivalent characteristics may be considered, provided deviations are minor and design concept as expressed in the Contract Documents is not changed, as judged by the Architect.

1. Manufacturer: Kawneer North America.
2. Storefront: 451T.

B. Available Manufacturers: Subject to compliance with requirements of Contract Documents, manufacturers offering entrance and storefront systems that may be incorporated in the work include the following:

1. Arcadia, Inc.
2. Kawneer North America: An Alcoa Company.
3. Tubelite, division of Indal, Inc.

4. C.R. Lawrence/US Aluminum.
5. EFCO Corporation, a Pella Company.
6. Oldcastle Building Envelope.

2.3 FRAMING

A. Framing Members: Manufacturer's extruded- or formed-aluminum framing members of thickness required and reinforced as required to support imposed loads.

1. Construction: Thermally broken.
2. Glazing System: Retained mechanically with gaskets on four sides.
3. Glazing Plane: Center.
4. Finish: Clear anodic finish.
5. Fabrication Method: Field-fabricated stick system.

B. Backer Plates: Manufacturer's standard, continuous backer plates for framing members, if not integral, where framing abuts adjacent construction.

C. Brackets and Reinforcements: Manufacturer's standard high-strength aluminum with nonstaining, nonferrous shims for aligning system components.

D. Materials:

1. Aluminum: Alloy and temper recommended by manufacturer for type of use and finish indicated.

a. Sheet and Plate: ASTM B 209.
b. Extruded Bars, Rods, Profiles, and Tubes: ASTM B 221.
c. Extruded Structural Pipe and Tubes: ASTM B 429/B 429M.
d. Structural Profiles: ASTM B 308/B 308M.

2.4 ENTRANCE DOOR SYSTEMS

A. Entrance Doors: Manufacturer's standard glazed entrance doors for manual-swing operation.

1. Door Construction: 1-3/4-inch overall thickness, with minimum 0.125-inch-thick, extruded-aluminum tubular rail and stile members. Mechanically fasten corners with reinforcing brackets that are deeply penetrated and fillet welded or that incorporate concealed tie rods.
2. Door Design: As indicated.
3. Glazing Stops and Gaskets: Beveled, snap-on, extruded-aluminum stops and preformed gaskets.

2.5 ENTRANCE DOOR HARDWARE

A. General: Provide entrance door hardware and entrance door hardware sets indicated in "Entrance Door Hardware Sets" Article for each entrance door to comply with requirements in this Section.

1. Entrance Door Hardware Sets: Provide quantity, item, size, finish or color indicated, and products complying with BHMA standard referenced.
2. Opening-Force Requirements:

a. Egress Doors: Not more than 15 lbf to release the latch and not more than 30 lbf to set the door in motion and not more than 15 lbf to open the door to its minimum required width.
b. Accessible Interior Doors: Not more than 5 lbf to fully open door.

B. Designations: Requirements for design, grade, function, finish, size, and other distinctive qualities of each type of entrance door hardware are indicated in "Entrance Door Hardware Sets" Article. Products are identified by using entrance door hardware designations as follows:

1. Named Manufacturers' Products: Manufacturer and product designation are listed for each door hardware type required for the purpose of establishing minimum requirements. Manufacturers' names are abbreviated in "Entrance Door Hardware Sets" Article.
2. References to BHMA Standards: Provide products complying with these standards and requirements for description, quality, and function.

C. Pivot Hinges: BHMA A156.4, Grade 1.

1. Offset-Pivot Hinges: Provide top, bottom, and intermediate offset pivots at each door leaf.

D. Manual Flush Bolts: BHMA A156.16, Grade 1.

E. Panic Exit Devices: BHMA A156.3, Grade 1, listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for panic protection, based on testing according to UL 305.

F. Cylinders: As specified in Section 08 7100 "Door Hardware."

G. Operating Trim: BHMA A156.6.

H. Closers: BHMA A156.4, Grade 1, with accessories required for a complete installation, sized as required by door size, exposure to weather, and anticipated frequency of use; adjustable to comply with field conditions and requirements for opening force.

I. Door Stops: BHMA A156.16, Grade 1, floor or wall mounted, as appropriate for door location indicated, with integral rubber bumper.

J. Weather Stripping: Manufacturer's standard replaceable components.

1. Compression Type: Made of ASTM D 2000, molded neoprene, or ASTM D 2287, molded PVC.
2. Sliding Type: AAMA 701/702, made of wool, polypropylene, or nylon woven pile with nylon-fabric or aluminum-strip backing.

K. Weather Sweeps: Manufacturer's standard exterior-door bottom sweep with concealed fasteners on mounting strip.

L. Silencers: BHMA A156.16, Grade 1.

M. Thresholds: BHMA A156.21, raised thresholds beveled with a slope of not more than 1:2, with maximum height of 1/2 inch

2.6 GLAZING

A. Glazing: Comply with Section 08 8000 "Glazing."

B. Glazing Gaskets: Manufacturer's standard sealed-corner pressure-glazing system of black, resilient elastomeric glazing gaskets, setting blocks, and shims or spacers.

C. Glazing Sealants: As recommended by manufacturer.

2.7 ACCESSORIES

A. Fasteners and Accessories: Manufacturer's standard corrosion-resistant, nonstaining, nonbleeding fasteners and accessories compatible with adjacent materials.

1. Use self-locking devices where fasteners are subject to loosening or turning out from thermal and structural movements, wind loads, or vibration.
2. Reinforce members as required to receive fastener threads.
3. Use exposed fasteners with countersunk Phillips screw heads, finished to match framing system.

B. Anchors: Three-way adjustable anchors with minimum adjustment of 1 inch that accommodate fabrication and installation tolerances in material and finish compatible with adjoining materials and recommended by manufacturer.

1. Concrete and Masonry Inserts: Hot-dip galvanized cast-iron, malleable-iron, or steel inserts complying with ASTM A 123/A 123M or ASTM A 153/A 153M requirements.

C. Concealed Flashing: Manufacturer's standard corrosion-resistant, nonstaining, nonbleeding flashing compatible with adjacent materials.

D. Bituminous Paint: Cold-applied asphalt-mastic paint complying with SSPC-Paint 12 requirements except containing no asbestos, formulated for 30-milthickness per coat.

E. Break Metal: Closure angles at storefront jambs where shown on drawings. Finish shall match storefront finish.

2.8 FABRICATION

A. Form or extrude aluminum shapes before finishing.

B. Weld in concealed locations to greatest extent possible to minimize distortion or discoloration of finish. Remove weld spatter and welding oxides from exposed surfaces by descaling or grinding.

C. Fabricate components that, when assembled, have the following characteristics:

1. Profiles that are sharp, straight, and free of defects or deformations.
2. Accurately fitted joints with ends coped or mitered.
3. Physical and thermal isolation of glazing from framing members.
4. Accommodations for thermal and mechanical movements of glazing and framing to maintain required glazing edge clearances.
5. Provisions for field replacement of glazing from exterior.
6. Fasteners, anchors, and connection devices that are concealed from view to greatest extent possible.

D. Mechanically Glazed Framing Members: Fabricate for flush glazing without projecting stops.

E. Structural-Sealant-Glazed Framing Members: Include accommodations for using temporary support device to retain glazing in place while structural sealant cures.

F. Entrance Door Frames: Reinforce as required to support loads imposed by door operation and for installing entrance door hardware.

G. Entrance Doors: Reinforce doors as required for installing entrance door hardware.

H. Entrance Door Hardware Installation: Factory install entrance door hardware to the greatest extent possible. Cut, drill, and tap for factory-installed entrance door hardware before applying finishes.

I. After fabrication, clearly mark components to identify their locations in Project according to Shop Drawings.

2.9 ALUMINUM FINISHES

A. Clear Anodic Finish: AAMA 611, AA-M12C22A41, Class I, 0.018 mm or thicker.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Prepare surfaces that are in contact with structural sealant according to sealant manufacturer's written instructions to ensure compatibility and adhesion. Preparation includes, but is not limited to, cleaning and priming surfaces.

3.3 INSTALLATION

A. General:

1. Comply with manufacturer's written instructions.
2. Do not install damaged components.
3. Fit joints to produce hairline joints free of burrs and distortion.
4. Rigidly secure nonmovement joints.
5. Install anchors with separators and isolators to prevent metal corrosion and electrolytic deterioration and to prevent impeding movement of moving joints.
6. Seal perimeter and other joints watertight unless otherwise indicated.

B. Metal Protection:

1. Where aluminum is in contact with dissimilar metals, protect against galvanic action by painting contact surfaces with materials recommended by manufacturer for this purpose or by installing nonconductive spacers.
2. Where aluminum is in contact with concrete or masonry, protect against corrosion by painting contact surfaces with bituminous paint.

C. Set continuous sill members and flashing in full sealant bed as specified in Section 07 9200 "Joint Sealants" to produce weathertight installation.

D. Install components plumb and true in alignment with established lines and grades.

E. Install glazing as specified in Section 08 8000 "Glazing."

F. Entrance Doors: Install doors to produce smooth operation and tight fit at contact points.

1. Exterior Doors: Install to produce weathertight enclosure and tight fit at weather stripping.
2. Field-Installed Entrance Door Hardware: Install surface-mounted entrance door hardware according to entrance door hardware manufacturers' written instructions using concealed fasteners to greatest extent possible.

3.4 ERECTION TOLERANCES

A. Erection Tolerances: Install aluminum-framed entrances and storefronts to comply with the following maximum tolerances:

1. Plumb: 1/8 inch in 10 feet; 1/4 inch in 40 feet.
2. Level: 1/8 inch in 20 feet; 1/4 inch in 40 feet.
3. Alignment:

    a. Where surfaces abut in line or are separated by reveal or protruding element up to 1/2 inch wide, limit offset from true alignment to 1/16 inch.
    b. Where surfaces are separated by reveal or protruding element from 1/2 to 1 inch wide, limit offset from true alignment to 1/8 inch.
    c. Where surfaces are separated by reveal or protruding element of 1 inch wide or more, limit offset from true alignment to 1/4 inch.

4. Location: Limit variation from plane to 1/8 inch in 12 feet; 1/2 inch over total length.

3.5 ENTRANCE DOOR HARDWARE SETS

A. Single Doors:

1. Group AL1:

a.	1 set:	Pivots.
b.	1 each:	Exit device (with dogging by Thumbturn).
c.	1 each:	Closer (with closer arm stop).
d.	1 each:	Pull (Kawneer Co-9 or equal, clear anodized).
e.	1 each:	Threshold.
f.	1 set:	Weatherstrip.
g.	1 each:	ASSA High security cylinder (key to Owner's master).

B. Double Doors:

1. Group AL2:

a. General

1)	1 each:	Threshold.
2)	1 set:	Weatherstrip.

b. Inactive Leaf:

1)	1 set:	Pivots.
2)	1 each:	Closer (with closer arm stop).
3)	1 each:	Push (Kawneer CP-11 or equal, clear anodized).
4)	1 each:	Pull (Kawneer CO-9 or equal, clear anodized).
5)	2 each:	Flush bolts (top and bottom, concealed).

c. Active Leaf:

1)	1 set:	Pivots.
2)	1 each:	Closer (with closer arm stop).
3)	1 each:	Push (Kawneer CP-11 or equal, clear anodized).
4)	1 each:	Pull (Kawneer CO-9 or equal, anodized finish).
5)	1 each:	ASSA High security cylinder (key to Owner's master).
6)	2 each:	ADA actuator; LCN 7910-918/7910-919 (Jambs).
7)	1 each:	ADA operator; LCN 4642 (Mount in vestibule)

2. Group AL3:

a. General

1)	1 each:	Threshold.
2)	1 set:	Weatherstrip.

b. Inactive Leaf:

1)	1 set:	Pivots.
2)	1 each:	Closer (with closer arm stop).
3)	1 each:	Push (Kawneer CP-11 or equal, clear anodized).
4)	1 each:	Pull (Kawneer CO-9 or equal, clear anodized).

c. Active Leaf:

1)	1 set:	Pivots.
2)	1 each:	Closer (with closer arm stop).
3)	1 each:	Push (Kawneer CP-11 or equal, clear anodized).
4)	1 each:	Pull (Kawneer CO-9 or equal, clear anodized).
5)	2 each:	ADA actuator; LCN 7910-918/7910-919 (Jambs).
6)	1 each:	ADA operator; LCN 4642 (Mount in vestibule)

END OF SECTION 08 4113

SECTION 08 4229 - SWINGING AUTOMATIC ENTRANCES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Exterior and interior, swinging, power-operated automatic entrances.

1.2 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings: For swinging automatic entrances.

1. Include plans, elevations, sections, hardware mounting heights, and attachment details.
2. Include diagrams for power, signal, and control wiring.
3. Indicate locations of activation and safety devices.
4. Include hardware schedule and indicate hardware types, functions, quantities, and locations.

C. Samples: For each type of exposed finish required.

D. Delegated-Design Submittal: For automatic entrances.

1.4 INFORMATIONAL SUBMITTALS

A. Product certificates.

B. Product test reports.

C. Sample warranties.

1.5 CLOSEOUT SUBMITTALS

A. Operation and maintenance data.

1.6 QUALITY ASSURANCE

A. Installer Qualifications: Manufacturer's authorized representative who is trained and approved for installation and maintenance of units required for this Project.

1.7 WARRANTY

A. Special Warranty: Manufacturer agrees to repair or replace components of automatic entrances that fail in materials or workmanship within specified warranty period.

1. Warranty Period: Two years from date of Substantial Completion.

B. Special Finish Warranty: Manufacturer agrees to repair or replace components on which finishes fail in materials or workmanship within specified warranty period.

1. Deterioration includes, but is not limited to, the following:

    a. Color fading more than 5 Hunter units when tested according to ASTM D2244.
    b. Chalking in excess of a No. 8 rating when tested according to ASTM D4214.
    c. Cracking, checking, peeling, or failure of paint to adhere to bare metal.

2. Warranty Period: 10 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 AUTOMATIC ENTRANCE ASSEMBLIES

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

B. Power-Operated Door Standard: BHMA A156.10.

2.2 PERFORMANCE REQUIREMENTS

A. Delegated Design: Engage a qualified professional engineer, as defined in Section 01 4000 "Quality Requirements," to design automatic entrances.

B. Structural Performance: Automatic entrances shall withstand the effects of gravity loads and the following loads and stresses within limits and under conditions indicated according to ASCE/SEI 7.

1. Seismic Loads: As indicated on drawings.

C. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes.

1. Temperature Change: 120 deg F , ambient; 180 deg F , material surfaces.

D. Air Infiltration: Maximum air leakage through fixed glazing and framing areas of 1.25 cfm/sq. ft. of fixed entrance-system area when tested according to ASTM E283 at a minimum static-air-pressure difference of 6.24 lbf/sq. ft..

2.3 SWINGING AUTOMATIC ENTRANCES

A. General: Provide manufacturer's standard automatic entrances, including doors, framing, headers, door operators, controls, and accessories required for a complete installation.

B. Swinging, Power-Operated Automatic Entrance:

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

    a. Besam Entrance Solutions; an ASSA ABLOY Group Company.
    b. DORMA USA, Inc.
    c. Horton Automatics; a division of Overhead Door Corporation.
    d. NABCO Entrances, Inc.
    e. Stanley Access Technologies.
    f. Tormax Technologies, Inc.

2. Configuration: Pair of swinging doors with transom.

    a. Traffic Pattern: Two way.
    b. Mounting: Surface.

3. Operator Features:

   a. Power opening and power-assist spring closing.
   b. Adjustable opening and closing speeds.
   c. Adjustable hold-open time between zero and 30 seconds.
   d. Adjustable backcheck and latching.
   e. Obstruction recycle.
   f. Automatic door re-open if stopped while closing.
   g. On-off/hold-open switch to control electric power to operator, key operated.

4. Controls: Activation and safety devices according to BHMA standards.

   a. Activation Device: Push-plate switch to activate door operator.
   b. Safety Device: Presence sensor mounted on door header to detect pedestrians in presence zone and to prevent door from closing.

5. Finish: Finish framing, door(s), and header with finish matching adjacent storefront.

   a. Clear anodic finish.

2.4 ENTRANCE COMPONENTS

A. Framing Members: Extruded aluminum, minimum 0.125 inch thick and reinforced as required to support imposed loads.

   1. Nominal Size: 2 by 4-1/2 inches.
   2. Extruded Glazing Stops and Applied Trim: Minimum 0.062-inch wall thickness.

B. Stile and Rail Doors: 1-3/4-inch-thick, glazed doors with minimum 0.125-inch-thick, extruded-aluminum tubular stile and rail members. Mechanically fasten corners with reinforcing brackets that are welded, or incorporate concealed tie-rods that span full length of top and bottom rails.

   1. Glazing Stops and Gaskets: Snap-on, extruded-aluminum stops and preformed gaskets.
   2. Stile Design: As indicated on Drawings.
   3. Rail Design: As indicated on Drawings.
   4. Muntin Bars: Horizontal tubular rail member for each door; match stile design and finish.

C. Sidelite(s) and Transom: 1-3/4-inch-deep sidelite(s) and transom with minimum 0.125-inch-thick, extruded-aluminum tubular stile and rail members matching door design.

   1. Glazing Stops and Gaskets: Same materials and design as for stile and rail door.
   2. Muntin Bars: Horizontal tubular rail members for each sidelite; match stile design.

D. Headers: Fabricated from minimum 0.125-inch-thick extruded aluminum and extending full width of automatic entrance units to conceal door operators and controls. Provide hinged or removable access panels for service and adjustment of door operators and controls. Secure panels to prevent unauthorized access.

   1. Mounting: Surface mounted.

E. Signage: As required by cited BHMA standard.

   1. Application Process: Silk-screened.

2.5 MATERIALS

A. Aluminum: Alloy and temper recommended by manufacturer for type of use and finish indicated.

1. Extrusions: ASTM B221.
2. Sheet: ASTM B209.

B. Steel Reinforcement: Reinforcement with corrosion-resistant primer complying with SSPC-PS Guide No. 12.00 applied immediately after surface preparation and pretreatment. Use surface preparation methods according to recommendations in SSPC-SP COM and prepare surfaces according to applicable SSPC standard.

C. Stainless-Steel Bars: ASTM A276/A276M or ASTM A666, type 304.

D. Stainless-Steel Tubing: ASTM A554, Grade MT 304.

E. Polycarbonate Sheet: ASTM C1349, Appendix X1, type II, coated, mar-resistant, UV-stabilized polycarbonate with coating on both surfaces.

F. Glazing: As specified in Section 08 8000 "Glazing."

G. Sealants and Joint Fillers: As specified in Section 07 9200 "Joint Sealants."

H. Bituminous Coating: Cold-applied asphalt emulsion complying with ASTM D1187/D1187M.

I. Fasteners and Accessories: Corrosion-resistant, nonstaining, nonbleeding fasteners and accessories compatible with adjacent materials.

2.6 DOOR OPERATORS AND CONTROLS

A. General: Provide operators and controls, which include activation and safety devices, according to BHMA standards, for condition of exposure, and for long-term, maintenance-free operation under normal traffic load for type of occupancy indicated.

B. Door Operators: Provide door operators of size recommended by manufacturer for door size, weight, and movement.

1. Door Operator Performance: Door operators shall open and close doors and maintain them in fully closed position when subjected to Project's design wind loads.
2. Electromechanical Operators: Concealed, self-contained, overhead units powered by fractional-horsepower, permanent-magnet dc motor; with closing speed controlled mechanically by gear train and dynamically by braking action of electric motor; with solid-state microprocessor controller; complying with UL 325; and with manual operation with power off.

C. Presence Sensors: Self-contained, active-infrared scanner units; adjustable to provide detection-field sizes and functions required by BHMA A156.10. Sensors shall remain active at all times.

D. Push-Plate Switch: Momentary-contact door-control switch with flat push-plate actuator, with contrasting-colored, engraved message.

1. Configuration: Square push plate with 4-by-4-inch junction box.

   a. Mounting: Surface mounted on wall.

2. Configuration: Rectangular push plate with 2-by-4-inch junction box.

   a. Mounting: Surface mounted on wall.

3. Push-Plate Material: Stainless steel, as selected by Architect from manufacturer's full range.

E. Electrical Interlocks: Unless units are equipped with self-protecting devices or circuits, provide electrical interlocks to prevent activation of operator when door is locked, latched, or bolted.

2.7 HARDWARE

A. General: Provide units in sizes and types recommended by automatic entrance and hardware manufacturers for entrances and uses indicated. Finish exposed parts to match door finish.

B. Breakaway Device for Power-Operated Doors: Device that allows door to swing out in direction of egress to full 90 degrees from any operating position. Interrupt powered operation of door operator while in breakaway mode.

C. Hinges:

1. Center-Pivot Sets: BHMA A156.4, Grade 1, with exposed parts of cast-aluminum alloy.
2. Offset Pivots: BHMA A156.4, Grade 1, with exposed parts of cast-aluminum alloy.
3. Butt Hinges: BHMA A156.1, Grade 1, five-knuckle, 4-1/2-by-4-inch ball-bearing butts.

    a. Provide nonremovable pins at hinges exposed on outside of door.
    b. Provide nonferrous hinges for doors exposed to weather.
    c. Provide three hinges at each leaf for doors up to 36 inches wide and 80 inches tall; provide four hinges at each leaf for wider or taller doors.

4. Continuous-Geared Hinges: BHMA A156.26, Grade 1.

D. Push Bars: As indicated on drawings.

E. Pull Handles: As indicated on drawings.

F. Thresholds: BHMA A156.21, extruded-aluminum raised thresholds; with beveled edges with a slope of not more than 1:2 and a maximum height of 1/2 inch. Provide cutouts as required for door operating hardware.

G. Weather Stripping: Replaceable components.

1. Sliding Type: AAMA 701/702, made of wool, polypropylene, or nylon woven pile with nylon-fabric or aluminum-strip backing.
2. Compression Type: Made of ASTM D2000 molded neoprene or ASTM D2287 molded PVC.
3. Weather Sweeps: Nylon brush sweep mounted to underside of door bottom.

H. Finger Guards: Collapsible neoprene or PVC gasket.

2.8 FABRICATION

A. General: Factory fabricate automatic entrance components to designs, sizes, and thicknesses indicated and to comply with indicated standards.

B. Framing: Provide automatic entrances as prefabricated assemblies. Complete fabrication, assembly, finishing, hardware application, and other work before shipment to Project site.

1. Provide components with concealed fasteners and anchor and connection devices.
2. Fabricate components with accurately fitted joints, with ends coped or mitered to produce hairline joints free of burrs and distortion.
3. Fabricate exterior components to drain water passing joints, condensation occurring within framing members, and moisture migrating within system to exterior.
4. Provide anchorage and alignment brackets for concealed support of assembly from building structure.
5. Allow for thermal expansion of exterior units.

C. Doors: Factory fabricated and assembled in profiles indicated. Reinforce as required to support imposed loads and for installing hardware.

D. Door Operators: Factory fabricated and installed in headers, including adjusting and testing.

E. Glazing: Fabricate framing with minimum glazing edge clearances for thickness and type of glazing indicated, according to GANA's "Glazing Manual."

F. Hardware: Factory install hardware to greatest extent possible; remove only as required for final finishing operation and for delivery to and installation at Project site. Cut, drill, and tap for factory-installed hardware before applying finishes.

1. Provide sliding-type weather stripping, mortised into door, at perimeter of doors.
2. Provide compression-type weather stripping at fixed stops of exterior doors. At locations without fixed stops, provide sliding-type weather stripping retained in adjustable strip mortised into door edge.
3. Provide weather sweeps mounted to underside of door bottoms of exterior doors.
4. Provide finger guards at each swinging-door leaf that has clearance at hinge side greater than 1/4 inch and less than 3/4 inch with door in any position. Anchor guards to hinge-jamb frame.

G. Controls:

1. General: Factory install activation and safety devices in doors and headers as required by BHMA A156.10 for type of door and direction of travel.
2. Install photoelectric beams in sides of guide rails, with dimension above finished floor not less than 24 inches.

2.9 ALUMINUM FINISHES

A. Color Anodic Finish: AAMA 611, AA-M12C22A41, Class I, 0.018 mm or thicker.

PART 3 - EXECUTION

3.1 INSTALLATION

A. General: Install automatic entrances according to manufacturer's written instructions and cited BHMA A156.10 for direction of pedestrian travel, including signage, controls, wiring, and connection to the building's power supply.

1. Do not install damaged components. Fit frame joints to produce hairline joints free of burrs and distortion. Rigidly secure nonmovement joints. Seal joints watertight.
2. Where aluminum will contact dissimilar metals, protect against galvanic action by painting contact surfaces with primer or by applying sealant or tape recommended by manufacturer for this purpose.
3. Where aluminum will contact concrete or masonry, protect against corrosion by painting contact surfaces with bituminous coating.

B. Entrances: Install automatic entrances plumb and true in alignment with established lines and grades without warp or rack of framing members and doors. Anchor securely in place.

1. Install surface-mounted hardware using concealed fasteners to greatest extent possible.
2. Set headers, operating brackets, and guides level and true to location with anchorage for permanent support.
3. Install components to drain water passing joints, condensation occurring within framing members, and moisture migrating within system to exterior.
4. Provide thresholds at exterior doors and where indicated.

C. Door Operators: Connect door operators to electrical power distribution system.

D. Access-Control Devices: Connect access-control devices to access-control system as specified in Section 28 1300 "Access Control Software and Database Management."

E. Controls: Install and adjust activation and safety devices according to manufacturer's written instructions and cited BHMA standard for direction of pedestrian travel. Connect control wiring according to Section 26 0519 "Low-Voltage Electrical Power Conductors and Cables."

F. Guide Rails: Install rails according to BHMA A156.10, including Appendix A, and manufacturer's written instructions unless otherwise indicated.

G. Glazing: Install glazing as specified in Section 08 8000 "Glazing." and Section 08 8853 "Security Glazing."

H. Sealants: Comply with requirements specified in Section 07 9200 "Joint Sealants" to provide weathertight installation.

1. Set thresholds, framing members, and flashings in full sealant bed.
2. Seal perimeter of framing members with sealant.

I. Signage: Apply signage on both sides of each door, as required by cited BHMA standard for direction of pedestrian travel.

J. Wiring within Automatic Entrance Enclosures: Bundle, lace, and train conductors to terminal points with no excess and without exceeding manufacturer's written limitations on bending radii. Provide and use lacing bars and distribution spools.

3.2 ADJUSTING

A. Adjust hardware, moving parts, door operators, and controls to function smoothly, and lubricate as recommended by manufacturer; comply with requirements of applicable BHMA standards.

B. Readjust door operators and controls after repeated operation of completed installation equivalent to three days' use by normal traffic (100 to 300 cycles).

3.3 DEMONSTRATION

A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain automatic entrances.

END OF SECTION

SECTION 08 7100 - DOOR HARDWARE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section includes:

1. Mechanical door hardware for the following:

a. Swinging doors.

2. Cylinders for door hardware specified in other sections.

B. Related Sections:

1. Section 08 1113 "Hollow Metal Doors and Frames" for door silencers provided as part of hollow-metal frames.
2. Section 08 1416 "Flush Wood Doors".
3. Section 08 4113 "Aluminum-Framed Entrances and Storefronts" for installation of entrance door hardware, including cylinders.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product indicated. Include construction and installation details, material descriptions, dimensions of individual components and profiles, and finishes.

1.4 INFORMATIONAL SUBMITTALS

A. Warranty: Special warranty specified in this Section.

1.5 CLOSEOUT SUBMITTALS

A. Maintenance Data: For each type of door hardware to include in maintenance manuals. Include final hardware schedule.

1.6 QUALITY ASSURANCE

A. Installer Qualifications: Supplier of products and an employer of workers trained and approved by product manufacturers and an Architectural Hardware Consultant who is available during the course of the Work to consult with Contractor, Architect, and Owner about door hardware and keying.

B. Source Limitations: Obtain each type of door hardware from a single manufacturer.

C. Means of Egress Doors: Latches do not require more than 15 lbf to release the latch. Locks do not require use of a key, tool, or special knowledge for operation.

D. Accessibility Requirements: For door hardware on doors in an accessible route, comply with the U.S. Architectural & Transportation Barriers Compliance Board's ADA-ABA Accessibility Guidelines, and ICC/ANSI A117.1.

1. Provide operating devices that do not require tight grasping, pinching, or twisting of the wrist and that operate with a force of not more than 5 lbf.

2. Comply with the following maximum opening-force requirements:

   a. Interior, Non-Fire-Rated Hinged Doors: 5 lbf applied perpendicular to door.

3. Bevel raised thresholds with a slope of not more than 1:2. Provide thresholds not more than 1/2 inch high.
4. Adjust door closer sweep periods so that, from an open position of 70 degrees, the door will take at least 3 seconds to move to a point 3 inches from the latch, measured to the leading edge of the door.

E. Preinstallation Conference: Conduct conference at Project site.

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.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Inventory door hardware on receipt and provide secure lock-up for door hardware delivered to Project site.

B. Tag each item or package separately with identification coordinated with the final door hardware schedule, and include installation instructions, templates, and necessary fasteners with each item or package.

C. Deliver keys and permanent cores to Owner by registered mail or overnight package service.

1.8 COORDINATION

A. Installation Templates: Distribute for doors, frames, and other work specified to be factory 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.

1.9 WARRANTY

A. Special 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. Failures include, but are not limited to, the following:

   a. Structural failures including excessive deflection, cracking, or breakage.
   b. Faulty operation of doors and door hardware.
   c. Deterioration of metals, metal finishes, and other materials beyond normal weathering and use.

2. Warranty Period: Three years from date of Substantial Completion, unless otherwise indicated.

   a. Exit Devices: Two years from date of Substantial Completion.
   b. Manual Closers: 10 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 SCHEDULED DOOR HARDWARE

A. Provide door hardware for each door as scheduled on Drawings to comply with requirements in this Section.

1. Door Hardware Sets: Provide quantity, item, size, finish or color indicated, and products equivalent in function and comparable in quality to named products.

B. Designations: Requirements for design, grade, function, finish, size, and other distinctive qualities of each type of door hardware are indicated in Part 3 "Door Hardware Schedule" Article. Products are identified by using door hardware designations, as follows:

1. Named Manufacturers' Products: Manufacturer and product designation are listed for each door hardware type required for the purpose of establishing minimum requirements. Manufacturers' names are abbreviated in Part 3 "Door Hardware Schedule" Article.
2. References to BHMA Designations: Provide products complying with these designations and requirements for description, quality, and function.

2.2 HINGES

A. Hinges: BHMA A156.1. Provide template-produced hinges for hinges installed on hollow-metal doors and hollow-metal frames.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Interior:

1) Hager Companies: BB 1279.
2) Ives: 5BBI.
3) McKinney Products Company; an ASSA ABLOY Group company TA 2714.
4) MacPro / McKinney: MPB79.
5) PBB, Inc BB81.
6) Stanley: FBB 179.

b. Exterior:

1) Hager Companies: BB 1191.
2) Ives: 5BBI.
3) McKinney; TA 2314.
4) PBB, Inc BB21.
5) Stanley: FBB 191.

2.3 MECHANICAL LOCKS AND LATCHES

A. Lock Functions: As indicated in door hardware schedule.

B. Lock Throw: Comply with testing requirements for length of bolts required and as follows:

1. Bored Locks: Minimum 1/2-inch latchbolt throw.

C. Lock Backset: 2-3/4 inches, unless otherwise indicated.

D. Lock Trim:

1. Levers:

a. Design Basis: Schlage 'Rhodes."

E. Strikes: Provide manufacturer's standard strike for each lock bolt or latchbolt complying with requirements indicated for applicable lock or latch and with strike box and curved lip extended to protect frame; finished to match lock or latch.

F. Bored Locks: BHMA A156.2; Grade 1; stamped steel case with steel or brass parts; Series 4000.

1. Manufacturers: Subject to compliance with requirements, including capability of accepting Owner-furnished ASSA cores, provide products by the following:

    a. Arrow USA; an ASSA ABLOY Group company.
    b. Schlage Commercial Lock Division; An Ingersoll-Rand Company.
    c. Yale Security Inc.; An ASSA Abloy Group Company.

G. Electronic Cylindrical Digital Locks:

1. Trilogy T2 (DL 2700 Series).
2. Equal as approved by Architect.

H. Deadbolts: Match manufacturer and style of lockset.

2.4 DOOR GASKETING

A. Door Gasketing: BHMA A156.22; air leakage not to exceed 0.50 cfm per foot of crack length for Gasketing other than for smoke control, as tested according to ASTM E 283; with resilient or flexible seal strips that are easily replaceable and readily available from stocks maintained by manufacturer.

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

    a. Hager Companies.
    b. M-D Building Products, Inc.
    c. National Guard Products.
    d. Pemco Manufacturing Co.; an ASSA Abloy Group Company.
    e. Reese Enterprises, Inc.
    f. Rixson Specialty Door Controls; an ASSA Abloy Group Company.
    g. Sealeze; a unit of Jason Incorporated.
    h. Zero International.

2.5 WEATHERSTRIPPING

A. Weatherstripping:

1. Finish: clear anodized aluminum.
2. Perimeter:

    a. 800S by Hager.
    b. A625A by NGP.
    c. 35041CP by Pemko.

3. Bottom:

    a. 750S CLR or 754S CLR by Hager.
    b. 198NA by NGP.
    c. 321CN by Pemko.

2.6 LOCK CYLINDERS

A. Lock Cylinders: Tumbler type, constructed from brass or bronze, stainless steel, or nickel silver.

1. Manufacturer: Same manufacturer as for locking devices.

2.7 KEYING

A. Exterior Storefront Doors: Owner will furnish and install permanent ASSA cores keyed to its Masterkey system.

B. Remaining Doors: Standard keying system acceptable to Owner.

2.8 SURFACE CLOSERS

A. Surface Closers: BHMA A156.4; rack-and-pinion hydraulic type with adjustable sweep and latch speeds controlled by key-operated valves and forged-steel main arm. Comply with manufacturer's written recommendations for size of door closers depending on size of door, exposure to weather, and anticipated frequency of use. Provide factory-sized closers, adjustable to meet field conditions and requirements for opening force.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

    a. LCN Closers.
    b. Norton Door Controls.
    c. Equal as approved by Architect.

2.9 MECHANICAL STOPS AND HOLDERS

A. Wall- and Floor-Mounted Stops: BHMA A156.16; polished cast brass, bronze, or aluminum base metal.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

    a. Architectural Builders hardware MFG, Inc.
    b. Baldwin Hardware Corporation.
    c. Burns Manufacturing Incorporated.
    d. Cal-Royal Products, Inc.
    e. Don-Jo Mfg., Inc.
    f. Door Controls International, Inc.
    g. Hager Companies.
    h. Hiawatha, Inc.
    i. IVES Hardware; an Ingersoll-Rand Company.
    j. Rockwood Manufacturing Company.
    k. Stanley Commercial hardware; Div. of The Stanley Works.
    l. Trimco.

B. Overhead Stop: Glynn Johnson GJ90S or Architect-Approved equal.

2.10 THRESHOLDS

A. Thresholds: BHMA A156.21; fabricated to full width of opening indicated.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

    a. Hager Companies.
    b. M-D Building Products, Inc.
    c. National Guard Products.
    d. Pemco Manufacturing Co.; an ASSA ABLOY Group Company.
    e. Reese Enterprises, Inc.
    f. Sealeze; a unit of Jason Incorporated.
    g. Zero International.

2.11 METAL PROTECTIVE TRIM UNITS

A. Metal Protective Trim Units: BHMA A156.6; fabricated from 0.050-inch-thick stainless steel; with manufacturer's standard machine or self-tapping screw fasteners.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Baldwin Hardware Corporation.
b. Hager Companies.
c. Rockwood Manufacturing Company.
d. Stanley Commercial hardware; Div. of The Stanley Works.
e. Trimco.

2.12 FABRICATION

A. Base Metals: Produce door hardware units of base metal indicated, fabricated by forming method indicated, using manufacturer's standard metal alloy, composition, temper, and hardness. Furnish metals of a quality equal to or greater than that of specified door hardware units and BHMA A156.18.

B. Fasteners: Provide door hardware manufactured to comply with published templates prepared for machine, wood, and sheet metal screws. Provide screws that comply with commercially recognized industry standards for application intended, except aluminum fasteners are not permitted. Provide Phillips flat-head screws with finished heads to match surface of door hardware, unless otherwise indicated.

1. Concealed Fasteners: For door hardware units that are exposed when door is closed, except for units already specified with concealed fasteners. Do not use through bolts for installation where bolt head or nut on opposite face is exposed unless it is the only means of securely attaching the door hardware. Where through bolts are used on hollow door and frame construction, provide sleeves for each through bolt.

2.13 FINISHES

A. US26D complying with BHMA A156.18.

B. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine doors and frames, with Installer present, for compliance with requirements for installation tolerances, wall and floor construction, and other conditions affecting performance.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

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: Comply with DHI WDHS.5 "Recommended Hardware Reinforcement Locations for Mineral Core Wood Flush Doors."

3.3 INSTALLATION

A. Mounting Heights: 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. Wood Doors: DHI WDHS.3, "Recommended Locations for Architectural Hardware for Wood Flush Doors."

B. Install each door hardware item to comply with manufacturer's written instructions. Where cutting and fitting are required to install door hardware onto or into surfaces that are later to be painted or finished in another way, coordinate removal, storage, and reinstallation of surface protective trim units with finishing. Do not install surface-mounted items until finishes have been completed on substrates involved.

1. Set units level, plumb, and true to line and location. Adjust and reinforce attachment substrates as necessary for proper installation and operation.
2. Drill and countersink units that are not factory prepared for anchorage fasteners. Space fasteners and anchors according to industry standards.

C. Hinges: Install types and in quantities indicated in door hardware schedule but not fewer than the number recommended by manufacturer for application indicated or one hinge for every 30 inches of door height, whichever is more stringent, unless other equivalent means of support for door, such as spring hinges or pivots, are provided.

D. Lock Cylinders: Install construction cores to secure building and areas during construction period.

1. Replace construction cores with permanent cores as directed by Owner.

E. Key Control System: Tag keys and place them on markers and hooks in key control system cabinet, as determined by final keying schedule.

F. Thresholds: Set thresholds for exterior doors and other doors indicated in full bed of sealant complying with requirements specified in Section 07 9200 "Joint Sealants."

G. Stops: Provide floor stops for doors where wall stops are not possible. Do not mount floor stops where they will impede traffic.

H. Perimeter Gasketing: Apply to head and jamb, forming seal between door and frame.

3.4 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 months after date of Substantial Completion, Installer's Architectural Hardware Consultant shall examine and readjust each item of door hardware, including adjusting operating forces, as necessary to ensure function of doors, door hardware, and electrified door hardware.

3.5 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 that door hardware is without damage or deterioration at time of Substantial Completion.

3.6 HARDWARE GROUPS

A. Interior Door Hardware Groups:

1. Single Doors:

a. Group 2: Door 105A.

1)	3 each:	Butt hinges.
2)	1 each:	Lockset, storeroom lock F-86.
3)	1 each:	Wall stop.
4)	1 each:	Kick plate.

b. Group 4: Doors 107A, 108A.

1)	3 each:	Butt hinges.
2)	1 each:	Lockset, privacy lock F-76.
3)	1 each:	Closer.
4)	1 each:	Wall stop.

c. Group 5: Door 109A.

1)	3 each:	Butt hinges.
2)	1 each:	Lockset, office lock F-81.
3)	1 each:	Wall stop.

d. Group 6: Doors 111A, 113A, 114A.

1)	4 each:	Butt hinges.
2)	1 set:	Smoke Gaskets.
3)	1 each:	Lockset, office lock F-81.
4)	1 each:	Wall stop (Floor Stop at 111A).

e. Group 8: Doors 103A, 104A.

1)	3 each:	Butt hinges.
2)	1 each:	Closer.
3)	1 each:	Electronic push button lock.
4)	1 each:	Wall stop.

f. Group 9: Door 110A.

1)	3 each:	Butt hinges.
2)	1 each:	Lockset, storeroom lock F-86.
3)	1 each:	Deadbolt, E2152.
4)	1 set:	Weatherstripping.
5)	1 each:	Threshold.
6)	1 each:	Overhead stop.

END OF SECTION 08 7100

SECTION 08 8000 - GLAZING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section includes:

1. Glass for doors and storefront framing.
2. Glazing sealants and accessories.
3. Ceramic coated spandrel insulating glass

B. Related Requirements:

1. Section 08 4100 "Aluminum Entrances and Storefronts."

1.3 DEFINITIONS

A. Glass Manufacturers: Firms that produce primary glass, fabricated glass, or both, as defined in referenced glazing publications.

B. Glass Thicknesses: Indicated by thickness designations in millimeters according to ASTM C 1036.

C. IBC: International Building Code.

D. Interspace: Space between lites of an insulating-glass unit.

1.4 COORDINATION

A. Coordinate glazing channel dimensions to provide necessary bite on glass, minimum edge and face clearances, and adequate sealant thicknesses, with reasonable tolerances.

1.5 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Glass Samples: For each type of the following products; 12 inches square.

1. Insulating glass.

C. Glazing Schedule: List glass types and thicknesses for each size opening and location. Use same designations indicated on Drawings.

1.6 INFORMATIONAL SUBMITTALS

A. Product Certificates: For glass.

B. Product Test Reports: For, coated glass, insulating glass, and glazing sealants, for tests performed by a qualified testing agency.

1. For glazing sealants, provide test reports based on testing current sealant formulations within previous 36-month period.

C. Preconstruction adhesion and compatibility test report.

1.7 QUALITY ASSURANCE

A. Manufacturer Qualifications for Insulating-Glass Units with Sputter-Coated, Low-E Coatings: A qualified insulating-glass manufacturer who is approved and certified by coated-glass manufacturer.

B. Installer Qualifications: A qualified installer who employs glass installers for this Project who are certified under the National Glass Association's Certified Glass Installer Program.

C. Glass Testing Agency Qualifications: A qualified independent testing agency accredited according to the NFRC CAP 1 Certification Agency Program.

D. Sealant Testing Agency Qualifications: An independent testing agency qualified according to ASTM C 1021 to conduct the testing indicated.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Protect glazing materials according to manufacturer's written instructions. Prevent damage to glass and glazing materials from condensation, temperature changes, direct exposure to sun, or other causes.

B. Comply with insulating-glass manufacturer's written instructions for venting and sealing units to avoid hermetic seal ruptures due to altitude change.

1.9 FIELD CONDITIONS

A. Environmental Limitations: Do not proceed with glazing when ambient and substrate temperature conditions are outside limits permitted by glazing material manufacturers and when glazing channel substrates are wet from rain, frost, condensation, or other causes.

1. Do not install glazing sealants when ambient and substrate temperature conditions are outside limits permitted by sealant manufacturer or are below 40 deg F.

1.10 WARRANTY

A. Manufacturer's Special Warranty for Coated-Glass Products: Manufacturer agrees to replace coated-glass units that deteriorate within specified warranty period. Deterioration of coated glass is defined as defects developed from normal use that are not attributed to glass breakage or to maintaining and cleaning coated glass contrary to manufacturer's written instructions. Defects include peeling, cracking, and other indications of deterioration in coating.

1. Warranty Period: 10 years from date of Substantial Completion.

B. Manufacturer's Special Warranty for Insulating Glass: Manufacturer agrees to replace insulating-glass units that deteriorate within specified warranty period. Deterioration of insulating glass is defined as failure of hermetic seal under normal use that is not attributed to glass breakage or to maintaining and cleaning insulating glass contrary to manufacturer's written instructions. Evidence of failure is the obstruction of vision by dust, moisture, or film on interior surfaces of glass.

1. Warranty Period: 10 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

Retain "Basis-of-Design Glass Product" Paragraph and list of manufacturers below to require a specific product or a comparable product from manufacturers listed.

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Guardian Industries Corp.; SunGuard.
2. Oldcastle BuildingEnvelope™.
3. Pilkington North America.
4. PPG Industries.

B. Source Limitations for Glass: Obtain from single source from single manufacturer for each glass type.

C. Source Limitations for Glazing Accessories: Obtain from single source from single manufacturer for each product and installation method.

2.2 PERFORMANCE REQUIREMENTS

A. General: Installed glazing systems shall withstand normal thermal movement and wind and impact loads (where applicable) without failure, including loss or glass breakage attributable to the following: defective manufacture, fabrication, or installation; failure of sealants or gaskets to remain watertight and airtight; deterioration of glazing materials; or other defects in construction.

B. Structural Performance: Glazing shall withstand the following design loads within limits and under conditions indicated determined according to the IBC and ASTM E 1300.

1. Design Wind Pressures: As indicated on Drawings.
2. Design Wind Pressures: Determine design wind pressures applicable to Project according to ASCE/SEI 7, based on heights above grade indicated on Drawings.

    a. Wind Design Data: As indicated on Drawings.

3. Differential Shading: Design glass to resist thermal stresses induced by differential shading within individual glass lites.

C. Safety Glazing: Where safety glazing is indicated, provide glazing that complies with 16 CFR 1201, Category II.

D. Thermal and Optical Performance Properties: Provide glass with performance properties specified, as indicated in manufacturer's published test data, based on procedures indicated below:

1. For monolithic-glass lites, properties are based on units with lites of thickness indicated.
2. For insulating-glass units, properties are based on units of thickness indicated for overall unit and for each lite.
3. U-Factors: Center-of-glazing values, according to NFRC 100 and based on LBL's WINDOW 5.2 computer program, expressed as Btu/sq. ft. x h x deg F.
4. Solar Heat-Gain Coefficient and Visible Transmittance: Center-of-glazing values, according to NFRC 200 and based on LBL's WINDOW 5.2 computer program.
5. Visible Reflectance: Center-of-glazing values, according to NFRC 300.

2.3 GLASS PRODUCTS, GENERAL

A. Glazing Publications: Comply with published recommendations of glass product manufacturers and organizations below unless more stringent requirements are indicated. See these publications for glazing terms not otherwise defined in this Section or in referenced standards.

1. IGMA Publication for Insulating Glass: SIGMA TM-3000, "North American Glazing Guidelines for Sealed Insulating Glass Units for Commercial and Residential Use."

B. Insulating-Glass Certification Program: Permanently marked either on spacers or on at least one component lite of units with appropriate certification label of IGCC.

C. Thickness: Where glass thickness is indicated, it is a minimum. Provide glass that complies with performance requirements and is not less than the thickness indicated.

1. Minimum Glass Thickness for Exterior Lites: 6 mm.

D. Strength: Where annealed float glass is indicated, provide annealed float glass, heat-strengthened float glass, or fully tempered float glass as needed to comply with "Performance Requirements" Article. Where heat-strengthened float glass is indicated, provide heat-strengthened float glass or fully tempered float glass as needed to comply with "Performance Requirements" Article. Where fully tempered float glass is indicated, provide fully tempered float glass.

2.4 GLASS PRODUCTS

A. Clear Annealed Float Glass: ASTM C 1036, Type I, Class 1 (clear), Quality-Q3.

B. Fully Tempered Float Glass: ASTM C 1048, Kind FT (fully tempered), Condition A (uncoated) unless otherwise indicated, Type I, Class 1 (clear) or Class 2 (tinted) as indicated, Quality-Q3.

1. Fabrication Process: By horizontal (roller-hearth) process with roll-wave distortion parallel to bottom edge of glass as installed unless otherwise indicated.

2.5 INSULATING GLASS

A. Insulating-Glass Units: Factory-assembled units consisting of sealed lites of glass separated by a dehydrated interspace, qualified according to ASTM E 2190.

1. Sealing System: Dual seal, with manufacturer's standard primary and secondary sealants.
2. Spacer: Manufacturer's standard spacer material and construction.
3. Desiccant: Molecular sieve or silica gel, or a blend of both.

2.6 GLAZING SEALANTS

A. General:

1. Compatibility: Compatible with one another and with other materials they contact, including glass products, seals of insulating-glass units, and glazing channel substrates, under conditions of service and application, as demonstrated by sealant manufacturer based on testing and field experience.
2. Suitability: Comply with sealant and glass manufacturers' written instructions for selecting glazing sealants suitable for applications indicated and for conditions existing at time of installation.
3. Colors of Exposed Glazing Sealants: As selected by Architect from manufacturer's full range.

B. Glazing Sealant: Neutral-curing silicone glazing sealant complying with ASTM C 920, Type S, Grade NS, Class 25, Use NT.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Bostik, Inc.
b. Dow Corning Corporation.
c. GE Construction Sealants; Momentive Performance Materials Inc.
d. May National Associates, Inc.; a subsidiary of Sika Corporation.
e. Polymeric Systems, Inc.
f. Schnee-Morehead, Inc., an ITW company.

g. Sika Corporation.

2.7 GLAZING TAPES

A. Back-Bedding Mastic Glazing Tapes: Preformed, butyl-based, 100 percent solids elastomeric tape; nonstaining and non-migrating in contact with nonporous surfaces; with or without spacer rod as recommended in writing by tape and glass manufacturers for application indicated; and complying with ASTM C 1281 and AAMA 800 for products indicated below:

1. AAMA 806.3 tape, for glazing applications in which tape is subject to continuous pressure.
2. AAMA 807.3 tape, for glazing applications in which tape is not subject to continuous pressure.

B. Expanded Cellular Glazing Tapes: Closed-cell, PVC foam tapes; factory coated with adhesive on both surfaces; and complying with AAMA 800 for the following types:

1. AAMA 810.1, Type 1, for glazing applications in which tape acts as the primary sealant.
2. AAMA 810.1, Type 2, for glazing applications in which tape is used in combination with a full bead of liquid sealant.

2.8 MISCELLANEOUS GLAZING MATERIALS

A. General: Provide products of material, size, and shape complying with referenced glazing standard, with requirements of manufacturers of glass and other glazing materials for application indicated, and with a proven record of compatibility with surfaces contacted in installation.

B. Cleaners, Primers, and Sealers: Types recommended by sealant or gasket manufacturer.

C. Setting Blocks: Elastomeric material with a Shore, Type A durometer hardness of 85, plus or minus 5.

D. Spacers: Elastomeric blocks or continuous extrusions of hardness required by glass manufacturer to maintain glass lites in place for installation indicated.

E. Edge Blocks: Elastomeric material of hardness needed to limit glass lateral movement (side walking).

F. Cylindrical Glazing Sealant Backing: ASTM C 1330, Type O (open-cell material), of size and density to control glazing sealant depth and otherwise produce optimum glazing sealant performance.

2.9 FABRICATION OF GLAZING UNITS

A. Fabricate glazing units in sizes required to fit openings indicated for Project, with edge and face clearances, edge and surface conditions, and bite complying with written instructions of product manufacturer and referenced glazing publications, to comply with system performance requirements.

1. Allow for thermal movements from ambient and surface temperature changes acting on glass framing members and glazing components.

    a. Temperature Change: 120 deg F, ambient; 180 deg F, material surfaces.

B. Clean-cut or flat-grind vertical edges of butt-glazed monolithic lites to produce square edges with slight chamfers at junctions of edges and faces.

C. Grind smooth and polish exposed glass edges and corners.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine framing, glazing channels, and stops, with Installer present, for compliance with the following:

1. Manufacturing and installation tolerances, including those for size, squareness, and offsets at corners.
2. Presence and functioning of weep systems.
3. Minimum required face and edge clearances.
4. Effective sealing between joints of glass-framing members.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Clean glazing channels and other framing members receiving glass immediately before glazing. Remove coatings not firmly bonded to substrates.

B. Examine glazing units to locate exterior and interior surfaces. Label or mark units as needed so that exterior and interior surfaces are readily identifiable. Do not use materials that leave visible marks in the completed Work.

3.3 GLAZING, GENERAL

A. Comply with combined written instructions of manufacturers of glass, sealants, gaskets, and other glazing materials, unless more stringent requirements are indicated, including those in referenced glazing publications.

B. Protect glass edges from damage during handling and installation. Remove damaged glass from Project site and legally dispose of off Project site. Damaged glass includes glass with edge damage or other imperfections that, when installed, could weaken glass, impair performance, or impair appearance.

C. Apply primers to joint surfaces where required for adhesion of sealants, as determined by preconstruction testing.

D. Install setting blocks in sill rabbets, sized and located to comply with referenced glazing publications, unless otherwise required by glass manufacturer. Set blocks in thin course of compatible sealant suitable for heel bead.

E. Do not exceed edge pressures stipulated by glass manufacturers for installing glass lites.

F. Provide spacers for glass lites where length plus width is larger than 50 inches.

1. Locate spacers directly opposite each other on both inside and outside faces of glass. Install correct size and spacing to preserve required face clearances, unless gaskets and glazing tapes are used that have demonstrated ability to maintain required face clearances and to comply with system performance requirements.
2. Provide 1/8-inchminimum bite of spacers on glass and use thickness equal to sealant width. With glazing tape, use thickness slightly less than final compressed thickness of tape.

G. Provide edge blocking where indicated or needed to prevent glass lites from moving sideways in glazing channel, as recommended in writing by glass manufacturer and according to requirements in referenced glazing publications.

H. Set glass lites in each series with uniform pattern, draw, bow, and similar characteristics.

I. Set glass lites with proper orientation so that coatings face exterior or interior as specified.

J. Where wedge-shaped gaskets are driven into one side of channel to pressurize sealant or gasket on opposite side, provide adequate anchorage so gasket cannot walk out when installation is subjected to movement.

K. Square cut wedge-shaped gaskets at corners and install gaskets in a manner recommended by gasket manufacturer to prevent corners from pulling away; seal corner joints and butt joints with sealant recommended by gasket manufacturer.

3.4 TAPE GLAZING

A. Position tapes on fixed stops so that, when compressed by glass, their exposed edges are flush with or protrude slightly above sightline of stops.

B. Install tapes continuously, but not necessarily in one continuous length. Do not stretch tapes to make them fit opening.

C. Cover vertical framing joints by applying tapes to heads and sills first, then to jambs. Cover horizontal framing joints by applying tapes to jambs, then to heads and sills.

D. Place joints in tapes at corners of opening with adjoining lengths butted together, not lapped. Seal joints in tapes with compatible sealant approved by tape manufacturer.

E. Do not remove release paper from tape until right before each glazing unit is installed.

F. Center glass lites in openings on setting blocks, and press firmly against tape by inserting dense compression gaskets formed and installed to lock in place against faces of removable stops. Start gasket applications at corners and work toward centers of openings.

3.5 GASKET GLAZING (DRY)

A. Cut compression gaskets to lengths recommended by gasket manufacturer to fit openings exactly, with allowance for stretch during installation.

B. Insert soft compression gasket between glass and frame or fixed stop so it is securely in place with joints miter cut and bonded together at corners.

C. Installation with Drive-in Wedge Gaskets: Center glass lites in openings on setting blocks, and press firmly against soft compression gasket by inserting dense compression gaskets formed and installed to lock in place against faces of removable stops. Start gasket applications at corners and work toward centers of openings. Compress gaskets to produce a weathertight seal without developing bending stresses in glass. Seal gasket joints with sealant recommended by gasket manufacturer.

D. Installation with Pressure-Glazing Stops: Center glass lites in openings on setting blocks, and press firmly against soft compression gasket. Install dense compression gaskets and pressure-glazing stops, applying pressure uniformly to compression gaskets. Compress gaskets to produce a weathertight seal without developing bending stresses in glass. Seal gasket joints with sealant recommended by gasket manufacturer.

E. Install gaskets so they protrude past face of glazing stops.

3.6 SEALANT GLAZING (WET)

A. Install continuous spacers, or spacers combined with cylindrical sealant backing, between glass lites and glazing stops to maintain glass face clearances and to prevent sealant from extruding into glass channel and blocking weep systems until sealants cure. Secure spacers or spacers and backings in place and in position to control depth of installed sealant relative to edge clearance for optimum sealant performance.

B. Force sealants into glazing channels to eliminate voids and to ensure complete wetting or bond of sealant to glass and channel surfaces.

C. Tool exposed surfaces of sealants to provide a substantial wash away from glass.

3.7 CLEANING AND PROTECTION

A. Immediately after installation remove nonpermanent labels and clean surfaces.

B. Protect glass from contact with contaminating substances resulting from construction operations. Examine glass surfaces adjacent to or below exterior concrete and other masonry surfaces at frequent intervals during construction, but not less than once a month, for buildup of dirt, scum, alkaline deposits, or stains.

1. If, despite such protection, contaminating substances do come into contact with glass, remove substances immediately as recommended in writing by glass manufacturer. Remove and replace glass that cannot be cleaned without damage to coatings.

C. Remove and replace glass that is damaged during construction period.

D. Wash glass on both exposed surfaces not more than four days before date scheduled for inspections that establish date of Substantial Completion. Wash glass as recommended in writing by glass manufacturer.

3.8 MONOLITHIC GLASS SCHEDULE

A. Glass Type 'C': Clear annealed float glass.

1. Minimum Thickness: 6 mm.

B. Glass Type 'D': Clear fully tempered float glass.

1. Minimum Thickness: 6mm.

C. Glass Type 'E': Clear fully tempered float glass, Matelux Acid Etched.

1. Basis of Design Product:

a. AGC Glass Company North America; Matelux.

3.9 INSULATING GLASS SCHEDULE

A. Glass Type 'A': Low-E-coated, clear insulating glass.

1. Basis-of-Design Product: PPG Industries; Solarban 70.
2. Overall Unit Thickness: 1 inch.
3. Minimum Thickness of Each Glass Lite: 6 mm.
4. Outdoor Lite: Solarban 60 float glass.
5. Interspace Content: Air.
6. Indoor Lite: Annealed float glass.
7. Low-E Coating: Sputtered on second surface.
8. Winter Nighttime U-Factor: .29 maximum.
9. Summer Daytime U-Factor: .27 maximum.
10. Visible Light Transmittance: 70 percent minimum.
11. Solar Heat Gain Coefficient: .38 maximum.

B. Glass Type 'B' Low-E-Coated, Tempered, Clear Insulating Glass:

1. Basis-of-Design Product: PPG Industries; Solarban 70.
2. Overall Unit Thickness: 1 inch.
3. Minimum Thickness of Each Glass Lite: 6 mm.
4. Outdoor Lite: Solarban 60; fully tempered.
5. Interspace Content: Air.
6. Indoor Lite: Fully tempered float glass.
7. Low-E Coating: Sputtered on second surface.
8. Winter Nighttime U-Factor: .29 maximum.
9. Summer Daytime U-Factor: .27 maximum.
10. Visible Light Transmittance: 70 percent minimum.
11. Solar Heat Gain Coefficient: .38 maximum.
12. Safety glass required.

END OF SECTION 08 8000

DIVISION 9 - FINISHES:

09 9001	Finish Schedule
09 2216	Non-Structural Metal Framing
09 2900	Gypsum Board
09 3013	Ceramic Tiling
09 5113	Acoustical Panel Ceilings
09 6513	Resilient Base and Accessories
09 6519	Resilient Tile Flooring
09 6813	Tile Carpeting
09 9113	Exterior Painting
09 9123	Interior Painting
09 9300	Staining and Transparent Finishing

SECTION 09 0001 – FINISH SCHEDULE

MARK	PRODUCT	MANUFACTURER	DESCRIPTION
FLOOR MATERIALS			
F01	Carpet tile.	Tarkett	Light Shift, White Out, 24"x24"
F02	Carpet tile (Accent).	Tarkett	Parallel Ray, White Out, 24"x24"
F03	Walk off carpet tile.	Tarkett	Assertive Action, Chromium, 24"x24"
F04	Restroom floor tile.	Crossville Studios	Feel, Grey, Mosaic Spina; Grout: Mapei, 104 Timberwolf
F05	Lobby floor tile.	Crossville Studios	Feel, Grey, 24"x24", Natural; Grout: Mapei, 104 Timberwolf
F06	Lobby floor tile (Accent).	Crossville Studios	Feel, Grey, 12"x24", Polished; Grout: Mapei, 104 Timberwolf
F07	LVT.	Tarkett	Contour, Artiface, Interlace 18"x18"
F08	Painted concrete.	PPG	PPG0996-4 Cloudy Slate
BASE MATERIALS			
B01	4" coved rubber base.	Johnsonite/Tarkett	4" Traditional Duracove Rubber, 199 Dockside WG
B02	No base.	-	Provide cove trim in lieu of base. Re: detail 07/A1.31.
WALL MATERIALS			
W01	Primed & painted wall surface.	PPG	PPG0996-1 Shining Scale; Satin
W02	Primed & painted wall surface (Accent).	PPG	PPG0996-4 Cloudy Slate; Satin
W03	Primed & painted wall surface (Accent).	PPG	PPG0996-6 Slate Mine; Satin
W04	Primed & painted wall surface (Epoxy).	PPG	PPG0996-1 Shining Scale
W05	Wall tile.	Crossville Studios	Feel, Grey, 12"x24"; Grout: Mapei,104 Timberwolf
W06	Wall tile (Accent).	Crossville Studios	Feel, Grey Stripes, 12"x24"; Grout: Mapei, 104 Timberwolf
W07	Hardwood veneer wall panels.	-	Stain: Match Door Finish – (Oshkosh Color: SWMAP, Finish: Clear Finish – 500)
W08	Wall tile.	Crossville	Swatches; Necessary Objects, Cotton, Satin; 6"x6"; NEC01.10606S; Grout: Mapei, 104 Timberwolf
CEILING MATERIALS			
C01	Suspended 2'x2' acoustical lay-in ceiling.	Armstrong	Cortega, White, 2'x2'
C02	Suspended 5/8" gypsum board ceiling system (1 layer). Smooth texture. Paint.	PPG	Smooth texture; Paint color: PPG0996-1 Shining Scale; Flat (epoxy paint in wet areas)
C03	5/8" gypsum board ceiling system (1 layer) installed over framing. Smooth texture. Paint.	-	Smooth texture; Paint color: PPG0996-1 Shining Scale; Flat
C04	Exposed structure.	-	-

C05	Suspended hardwood veneer ceiling panel system over 5/8" gypsum board.	-	Stain: Match Door Finish – (Oshkosh Color: SWMAP, Finish: Clear Finish – 500)

MILLWORK FINISHES			
M01	Solid surface.	Formica	742 Blanco Terrazzo
M02	Solid surface.	Formica	412 Dalmata Terrazzo Matrix
M03	Stainless steel base.	Alpolic	18 gauge, brushed finish
M04	Plastic laminate.	Formica	86992-58 Hard Rock Maple
M05	Plastic laminate.	Formica	6994-26 Ceruse Gray Walnut
M06	Rubber base.	Johnsonite/Tarkett	199 Dockside WG

SPECIALTIES			
S03	Hollow metal frame.	PPG	Paint frame; PPG0996-4 Cloudy Slate; Semi-Glass
S06	¾" plywood phone hoard – see floor plan	-	Paint to match walls
S10	Door Stain	Oshkosh Door Company	Color: SWMAP, Finish: Clear Finish - 500

END OF SECTION

SECTION 09 2216 - NON-STRUCTURAL METAL FRAMING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Non-load-bearing steel framing systems for interior gypsum board assemblies.
2. Suspension systems for interior gypsum ceilings, soffits, and grid systems.
3. Suspension systems for interior wood veneer ceilings and grid systems.

B. Related Requirements:

1. Section 06 1000 “Rough Carpentry”.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

PART 2 - PRODUCTS

2.1 FRAMING SYSTEMS

A. Framing Members, General: Comply with ASTM C 754 for conditions indicated.

1. Steel Sheet Components: Comply with ASTM C 645 requirements for metal unless otherwise indicated.
2. Protective Coating: ASTM A 653/A 653M, G40, hot-dip galvanized unless otherwise indicated.

B. Studs and Runners: ASTM C 645. Use either steel studs and runners or dimpled steel studs and runners.

1. Steel Studs and Runners:

a. Minimum Base-Metal Thickness: As indicated on Drawings, 20 gauge minimum.
b. Depth: As indicated on Drawings.

2. Dimpled Steel Studs and Runners:

a. Minimum Base-Metal Thickness: As indicated on Drawings.
b. Depth: As indicated on Drawings.

C. Slip-Type Head Joints: Where indicated, provide the following:

1. Deflection Track: Steel sheet top runner manufactured to prevent cracking of finishes applied to interior partition framing resulting from deflection of structure above; in thickness not less than indicated for studs and in width to accommodate depth of studs.

a. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1) Blazeframe Industries.

2) ClarkDietrich Building Systems.
3) Fire Trak Corp.
4) MBA Building Supplies.
5) Metal-Lite.
6) Steel Network, Inc. (The).

2.2 SUSPENSION SYSTEMS

A. Tie Wire: ASTM A 641/A 641M, Class 1 zinc coating, soft temper, 0.062-inch-diameter wire, or double strand of 0.048-inch-diameter wire.

B. Wire Hangers: ASTM A 641/A 641M, Class 1 zinc coating, soft temper, 0.16 inch in diameter.

C. Carrying Channels: Cold-rolled, commercial-steel sheet with a base-metal thickness of 0.053 inch and minimum 1/2-inch-wide flanges.

1. Depth: As indicated on Drawings.

D. Furring Channels (Furring Members):

1. Hat-Shaped, Rigid Furring Channels: ASTM C 645, 7/8 inch deep.

a. Minimum Base-Metal Thickness: As indicated on Drawings.

2. Resilient Furring Channels: 1/2-inch-deep members designed to reduce sound transmission.

a. Configuration: hat shaped.

E. Grid Suspension System for Gypsum Board Ceilings: ASTM C 645, direct-hung system composed of main beams and cross-furring members that interlock. Provide manufacturer's "heavy-duty" system.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Armstrong World Industries, Inc.
b. Chicago Metallic Corporation.

2.3 AUXILIARY MATERIALS

A. General: Provide auxiliary materials that comply with referenced installation standards.

1. Fasteners for Metal Framing: Of type, material, size, corrosion resistance, holding power, and other properties required to fasten steel members to substrates.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas and substrates, with Installer present, and including welded hollow-metal frames, cast-in anchors, and structural framing, for compliance with requirements and other conditions affecting performance of the Work.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Suspended Assemblies: Coordinate installation of suspension systems with installation of overhead structure to ensure that inserts and other provisions for anchorages to building structure have been installed to receive hangers at spacing required to support the Work and that hangers will develop their full strength.

3.3 INSTALLATION, GENERAL

A. Installation Standard: ASTM C 754.

B. Install supplementary framing, and blocking to support fixtures, equipment services, heavy trim, grab bars, toilet accessories, furnishings, or similar construction.

C. Install bracing at terminations in assemblies.

3.4 INSTALLING FRAMED ASSEMBLIES

A. Install framing system components according to spacings indicated, but not greater than spacings required by referenced installation standards for assembly types.

1. Single-Layer Application: 16 inches o.c. unless otherwise indicated.
2. Tile Backing Panels: 16 inches o.c. unless otherwise indicated.

B. Install studs so flanges within framing system point in same direction.

C. Install tracks (runners) at floors and overhead supports. Extend framing full height to structural supports or substrates above suspended ceilings except where partitions are indicated to terminate at suspended ceilings. Continue framing around ducts penetrating partitions above ceiling.

1. Slip-Type Head Joints: Where framing extends to overhead structural supports, install to produce joints at tops of framing systems that prevent axial loading of finished assemblies.
2. Door Openings: Screw vertical studs at jambs to jamb anchor clips on door frames; install runner track section (for cripple studs) at head and secure to jamb studs.

    a. Install two studs at each jamb unless otherwise indicated.
    b. Extend jamb studs through suspended ceilings and attach to underside of overhead structure.

3. Other Framed Openings: Frame openings other than door openings the same as required for door openings unless otherwise indicated. Install framing below sills of openings to match framing required above door heads.

D. Installation Tolerance: Install each framing member so fastening surfaces vary not more than 1/8 inch from the plane formed by faces of adjacent framing.

3.5 INSTALLING SUSPENSION SYSTEMS

A. Install suspension system components according to spacings indicated, but not greater than spacings required by referenced installation standards for assembly types.

1. Hangers: 48 inches o.c.
2. Carrying Channels (Main Runners): 48 inches o.c.
3. Furring Channels (Furring Members): 16 inches o.c.

B. Isolate suspension systems from building structure where they abut or are penetrated by building structure to prevent transfer of loading imposed by structural movement.

C. Suspend hangers from building structure as follows:

1. Install hangers plumb and free from contact with insulation or other objects within ceiling plenum that are not part of supporting structural or suspension system.

    a. Splay hangers only where required to miss obstructions and offset resulting horizontal forces by bracing, countersplaying, or other equally effective means.

2. Where width of ducts and other construction within ceiling plenum produces hanger spacings that interfere with locations of hangers required to support standard suspension system members, install supplemental suspension members and hangers in the form of trapezes or equivalent devices.

    a. Size supplemental suspension members and hangers to support ceiling loads within performance limits established by referenced installation standards.

3. Wire Hangers: Secure by looping and wire tying, either directly to structures or to inserts, eye screws, or other devices and fasteners that are secure and appropriate for substrate, and in a manner that will not cause hangers to deteriorate or otherwise fail.
4. Do not attach hangers to steel roof deck.
5. Do not attach hangers to permanent metal forms. Furnish cast-in-place hanger inserts that extend through forms.
6. Do not attach hangers to rolled-in hanger tabs of composite steel floor deck.
7. Do not connect or suspend steel framing from ducts, pipes, or conduit.

D. Grid Suspension Systems: Attach perimeter wall track or angle where grid suspension systems meet vertical surfaces. Mechanically join main beam and cross-furring members to each other and butt-cut to fit into wall track.

E. Installation Tolerances: Install suspension systems that are level to within 1/8 inch in 12 feet measured lengthwise on each member that will receive finishes and transversely between parallel members that will receive finishes.

END OF SECTION 09 2216

SECTION 09 2900 - GYPSUM BOARD

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Interior gypsum board.
2. Tile backing panels.

B. Related Requirements:

1. Section 09 2216 "Non-Structural Metal Framing" for non-structural framing and suspension systems that support gypsum board panels.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

1.4 QUALITY ASSURANCE

A. Mockups: Before beginning gypsum board installation, install mockups of at least 100 sq. ft.in surface area to demonstrate aesthetic effects and set quality standards for materials and execution.

1. Install mockups for the following:

    a. Each level of gypsum board finish indicated for use in exposed locations.

2. Apply or install final decoration indicated, including painting and wallcoverings, on exposed surfaces for review of mockups.
3. Simulate finished lighting conditions for review of mockups.
4. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.5 DELIVERY, STORAGE AND HANDLING

A. Store materials inside under cover and keep them dry and protected against weather, condensation, direct sunlight, construction traffic, and other potential causes of damage. Stack panels flat and supported on risers on a flat platform to prevent sagging.

1.6 FIELD CONDITIONS

A. Environmental Limitations: Comply with ASTM C 840 requirements or gypsum board manufacturer's written recommendations, whichever are more stringent.

B. Do not install paper-faced gypsum panels until installation areas are enclosed and conditioned.

C. Do not install panels that are wet, those that are moisture damaged, and those that are mold damaged.

1. Indications that panels are wet or moisture damaged include, but are not limited to, discoloration, sagging, or irregular shape.
2. Indications that panels are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration.

PART 2 - PRODUCTS

2.1 GYPSUM BOARD, GENERAL

A. Size: Provide maximum lengths and widths available that will minimize joints in each area and that correspond with support system indicated.

2.2 INTERIOR GYPSUM BOARD

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. American Gypsum.
2. CertainTeed Corporation.
3. Continental Building Products, LLC.
4. Georgia-Pacific Building Products.
5. National Gypsum Company.
6. PABCO Gypsum.
7. Temple-Inland Building Products by Georgia-Pacific.

B. Gypsum Board, Type X: ASTM C 1396/C 1396M.

1. Thickness: 5/8 inch.
2. Long Edges: Tapered.

C. Moisture- and Mold-Resistant Gypsum Board: ASTM C 1396/C 1396M. With moisture- and mold-resistant core and paper surfaces.

1. Core: 5/8 inch, Type X.
2. Long Edges: Tapered.
3. Mold Resistance: ASTM D 3273, score of 10 as rated according to ASTM D 3274.

2.3 TILE BACKING PANELS

A. Glass-Mat, Water-Resistant Backing Board: ASTM C 1178/C 1178M, with manufacturer's standard edges.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

    a. CertainTeed Corporation.
    b. Georgia-Pacific Building Products.
    c. National Gypsum Company.

2. Core: 5/8 inch, Type X.
3. Mold Resistance: ASTM D 3273, score of 10 as rated according to ASTM D 3274.

2.4 TRIM ACCESSORIES

A. Interior Trim: ASTM C 1047.

1. Material: Galvanized or aluminum-coated steel sheet, rolled zinc, plastic, or paper-faced galvanized steel sheet.
2. Shapes:

a. Cornerbead.
b. LC-Bead: J-shaped; exposed long flange receives joint compound.
c. L-Bead: L-shaped; exposed long flange receives joint compound.
d. U-Bead: J-shaped; exposed short flange does not receive joint compound.
e. Expansion (control) joint.

2.5 JOINT TREATMENT MATERIALS

A. General: Comply with ASTM C 475/C 475M.

B. Joint Tape:

1. Interior Gypsum Board: Paper.
2. Glass-Mat Gypsum Sheathing Board: 10-by-10 glass mesh.
3. Tile Backing Panels: As recommended by panel manufacturer.

C. Joint Compound for Interior Gypsum Board: For each coat use formulation that is compatible with other compounds applied on previous or for successive coats.

1. Prefilling: At open joints and damaged surface areas, use setting-type taping compound.
2. Embedding and First Coat: For embedding tape and first coat on joints, fasteners, and trim flanges, use setting-type taping compound.

a. Use setting-type compound for installing paper-faced metal trim accessories.

3. Fill Coat: For second coat, use drying type, all purpose compound.
4. Finish Coat: For third coat, use drying-type, all-purpose compound.
5. Skim Coat: For final coat of Level 5 finish, use drying-type, all-purpose compound.

2.6 AUXILIARY MATERIALS

A. General: Provide auxiliary materials that comply with referenced installation standards and manufacturer's written recommendations.

B. Steel Drill Screws: ASTM C 1002, unless otherwise indicated.

1. Use screws complying with ASTM C 954 for fastening panels to steel members from 0.033 to 0.112 inch thick.
2. For fastening cementitious backer units, use screws of type and size recommended by panel manufacturer.

C. Sound Attenuation Blankets: ASTM C 665, Type I (blankets without membrane facing) produced by combining thermosetting resins with mineral fibers manufactured from glass, slag wool, or rock wool.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas and substrates including welded hollow-metal frames and framing, with Installer present, for compliance with requirements and other conditions affecting performance.

B. Examine panels before installation. Reject panels that are wet, moisture damaged, and mold damaged.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 APPLYING AND FINISHING PANELS, GENERAL

A. Comply with ASTM C 840.

B. Install ceiling panels across framing to minimize the number of abutting end joints and to avoid abutting end joints in central area of each ceiling. Stagger abutting end joints of adjacent panels not less than one framing member.

C. Install panels with face side out. Butt panels together for a light contact at edges and ends with not more than 1/16 inch of open space between panels. Do not force into place.

D. Locate edge and end joints over supports, except in ceiling applications where intermediate supports or gypsum board back-blocking is provided behind end joints. Do not place tapered edges against cut edges or ends. Stagger vertical joints on opposite sides of partitions. Do not make joints other than control joints at corners of framed openings.

E. Form control and expansion joints with space between edges of adjoining gypsum panels.

F. Cover both faces of support framing with gypsum panels in concealed spaces (above ceilings, etc.), except in chases braced internally.

1. Unless concealed application is indicated or required for sound, fire, air, or smoke ratings, coverage may be accomplished with scraps of not less than 8 sq. ft.in area.
2. Fit gypsum panels around ducts, pipes, and conduits.
3. Where partitions intersect structural members projecting below underside of floor/roof slabs and decks, cut gypsum panels to fit profile formed by structural members; allow 1/4- to 3/8-inch-wide joints to install sealant.

G. Attachment to Steel Framing: Attach panels so leading edge or end of each panel is attached to open (unsupported) edges of stud flanges first.

H. Wood Framing: Install gypsum panels over wood framing, with floating internal corner construction. Do not attach gypsum panels across the flat grain of wide-dimension lumber, including floor joists and headers. Float gypsum panels over these members or provide control joints to counteract wood shrinkage.

I. Install sound attenuation blankets before installing gypsum panels unless blankets are readily installed after panels have been installed on one side.

3.3 APPLYING INTERIOR GYPSUM BOARD

A. Single-Layer Application:

1. On ceilings, apply gypsum panels before wall/partition board application to greatest extent possible and at right angles to framing unless otherwise indicated.
2. On partitions/walls, apply gypsum panels horizontally (perpendicular to framing) unless otherwise indicated or required by fire-resistance-rated assembly, and minimize end joints.

    a. Stagger abutting end joints not less than one framing member in alternate courses of panels.

3. Fastening Methods: Apply gypsum panels to supports with steel drill screws.

3.4 APPLYING TILE BACKING PANELS

A. Glass-Mat, Water-Resistant Backing Panels: Comply with manufacturer's written installation instructions and install at locations indicated to receive tile. Install with 1/4-inch gap where panels abut other construction or penetrations.

B. Where tile backing panels abut other types of panels in same plane, shim surfaces to produce a uniform plane across panel surfaces.

3.5 INSTALLING TRIM ACCESSORIES

A. General: For trim with back flanges intended for fasteners, attach to framing with same fasteners used for panels. Otherwise, attach trim according to manufacturer's written instructions.

B. Interior Trim: Install in the following locations:

1. Cornerbead: Use at outside corners unless otherwise indicated.
2. LC-Bead: Use at exposed panel edges.
3. L-Bead: Use where indicated.
4. U-Bead: Use at exposed panel edges.

3.6 FINISHING GYPSUM BOARD

A. General: Treat gypsum board joints, interior angles, edge trim, control joints, penetrations, fastener heads, surface defects, and elsewhere as required to prepare gypsum board surfaces for decoration. Promptly remove residual joint compound from adjacent surfaces.

B. Prefill open joints and damaged surface areas.

C. Apply joint tape over gypsum board joints, except for trim products specifically indicated as not intended to receive tape.

D. Gypsum Board Finish Levels: Finish panels to levels indicated below and according to ASTM C 840:

1. Level 1: Ceiling plenum areas, concealed areas, and where indicated.
2. Level 4: At panel surfaces that will be exposed to view unless otherwise indicated.

    a. Primer and its application to surfaces are specified in Section 09 9123 "Interior Painting."

3. Level 5: Where indicated on Drawings.

    a. Primer and its application to surfaces are specified in Section 09 9123 "Interior Painting."

3.7 PROTECTION

A. Protect adjacent surfaces from drywall compound and promptly remove from floors and other non-drywall surfaces. Repair surfaces stained, marred, or otherwise damaged during drywall application.

B. Protect installed products from damage from weather, condensation, direct sunlight, construction, and other causes during remainder of the construction period.

C. Remove and replace panels that are wet, moisture damaged, and mold damaged.

1. Indications that panels are wet or moisture damaged include, but are not limited to, discoloration, sagging, or irregular shape.
2. Indications that panels are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration.

END OF SECTION 09 2900

SECTION 09 3013 - CERAMIC TILING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Porcelain tile.
2. Glazed wall tile.
3. Stone thresholds.
4. Crack isolation membrane.
5. Metal edge strips.

B. Related Requirements:

1. Section 07 9200 "Joint Sealants" for sealing of expansion, contraction, control, and isolation joints in tile surfaces.
2. Section 09 2900 "Gypsum Board" for glass-mat, water-resistant backer board.

1.3 DEFINITIONS

A. General: Definitions in the ANSI A108 series of tile installation standards and in ANSI A137.1 apply to Work of this Section unless otherwise specified.

B. ANSI A108 Series: ANSI A108.01, ANSI A108.02, ANSI A108.1A, ANSI A108.1B, ANSI A108.1C, ANSI A108.4, ANSI A108.5, ANSI A108.6, ANSI A108.8, ANSI A108.9, ANSI A108.10, ANSI A108.11, ANSI A108.12, ANSI A108.13, ANSI A108.14, ANSI A108.15, ANSI A108.16, and ANSI A108.17, which are contained in its "Specifications for Installation of Ceramic Tile."

C. Module Size: Actual tile size plus joint width indicated.

D. Face Size: Actual tile size, excluding spacer lugs.

1.4 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1. Review requirements in ANSI A108.01 for substrates and for preparation by other trades.

1.5 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Samples for Initial Selection: For tile, grout, and accessories involving color selection.

1.6 INFORMATIONAL SUBMITTALS

A. Product Certificates: For each type of product.

1.7 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials that match and are from same production runs as products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Tile and Trim Units: Furnish quantity of full-size units equal to 3 percent of amount installed for each type, composition, color, pattern, and size indicated.

1.8 QUALITY ASSURANCE

A. Installer Qualifications:

1. Minimum three (3) years experience installing specified tile installation.
2. Minimum five (5) satisfactorily completed installations of comparable quality, scope, similar size, and complexity in past two (2) years before bidding.
3. Upon request, submit documentation.

1.9 DELIVERY, STORAGE, AND HANDLING

A. Deliver and store packaged materials in original containers with seals unbroken and labels intact until time of use. Comply with requirements in ANSI A137.1 for labeling tile packages.

B. Store tile and cementitious materials on elevated platforms, under cover, and in a dry location.

C. Store aggregates where grading and other required characteristics can be maintained and contamination can be avoided.

D. Store liquid materials in unopened containers and protected from freezing.

1.10 FIELD CONDITIONS

A. Environmental Limitations: Do not install tile until construction in spaces is complete and ambient temperature and humidity conditions are maintained at the levels indicated in referenced standards and manufacturer's written instructions.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Obtain tile of each type and color or finish from same production run and of consistent quality in appearance and physical properties for each contiguous area.

B. Source Limitations for Setting and Grouting Materials: Obtain ingredients of a uniform quality for each mortar, adhesive, and grout component from single manufacturer and each aggregate from single source or producer.

1. Obtain setting and grouting materials, except for unmodified Portland cement and aggregate, from single manufacturer.
2. Obtain crack isolation membrane, except for sheet products, from manufacturer of setting and grouting materials.

C. Source Limitations for Other Products: Obtain each of the following products specified in this Section from a single manufacturer:

1. Stone thresholds.
2. Waterproof membrane.
3. Crack isolation membrane.
4. Metal edge strips.

2.2 PRODUCTS, GENERAL

A. ANSI Ceramic Tile Standard: Provide tile that complies with ANSI A137.1 for types, compositions, and other characteristics indicated.

2.3 TILE PRODUCTS

A. Ceramic Tile Type 'W05': Glazed porcelain tile (restroom walls).

1. Manufacturers: Subject to compliance with requirements, provide products by Crossville Studios.
2. Certification: Tile certified by the Porcelain Tile Certification Agency.
3. Face Size: 12 by 24 inches.
4. Tile Series and Pattern: Feel.
5. Tile Color: See drawings.
6. Grout Color: See drawings.

B. Ceramic Tile Type 'W06': Glazed porcelain tile (restroom walls).

1. Manufacturers: Subject to compliance with requirements, provide products by Crossville Studios.
2. Certification: Tile certified by the Porcelain Tile Certification Agency.
3. Face Size: 12 by 24 inches.
4. Tile Series and Pattern: Feel, Stripes.
5. Tile Color: See drawings.
6. Grout Color: See drawings.

C. Ceramic Tile Type 'F04': Ceramic floor tile (restroom floors).

1. Manufacturers: Subject to compliance with requirements, provide products by Crossville Studios.
2. Certification: Tile certified by the Porcelain Tile Certification Agency.
3. Face Size: 1 by 2 ½ inches Mosaic in 12 by 12 inches sheet.
4. Tile Series and Pattern: Feel, Mosaic Spina.
5. Tile Color: See drawings.
6. Grout Color: See drawings.

D. Ceramic Tile Types 'F06': Ceramic floor tile.

1. Manufacturers: Subject to compliance with requirements, provide products by Crossville Studios.
2. Certification: Tile certified by the Porcelain Tile Certification Agency.
3. Face Size: 12 by 24 inches
4. Finishes: Natural.
5. Dynamic Coefficient of Friction: Not less than 0.42.
6. Tile Series: Feel.
7. Pattern: See drawings.
8. Tile Color: See drawings.
9. Grout Color: See drawings.

2.4 THRESHOLDS

A. General: Fabricate to sizes and profiles indicated or required to provide transition between adjacent floor finishes.

1. Bevel edges at 1:2 slope, with lower edge of bevel aligned with or up to 1/16 inch above adjacent floor surface. Finish bevel to match top surface of threshold. Limit height of threshold to 1/2 inch or less above adjacent floor surface.

B. Marble Thresholds: ASTM C 503/C 503M, with a minimum abrasion resistance of 10 according to ASTM C 1353 or ASTM C 241/C 241M and with honed finish.

1. Description: Provide the following:

    a. Grey Marble, one (1) piece, 7/8 inch thick by 2 1/2 inches by door opening width. Cross-section to meet handicap accessibility requirements.

2.5 METAL EDGE STRIP

A. Stainless steel or anodized aluminum edge for use at carpet/paver tile transition, at top edge of ceramic wall tile wainscot in restrooms, and as a coved transition between floor tile and wall tile in restrooms.

1. Carpet/Paver Tile Transition: Schluter-RENO-U.
2. Top of Tile Wainscot: Schluter-SCHIENE.
3. Coved Floor/Wall Transition: Schluter-DILEX-AHK.

2.6 CRACK ISOLATION MEMBRANE

A. General: Manufacturer's standard product that complies with ANSI A118.12 for high performance and is recommended by the manufacturer for the application indicated. Include reinforcement and accessories recommended by manufacturer.

B. Polyethylene Sheet: Polyethylene faced on both sides with fleece webbing; 0.008-inchnominal thickness.

Retain "Products" Subparagraph and list of manufacturers and products below to require specific products or a comparable product from other manufacturers.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

    a. Flexible, thin, load-bearing, fabric-reinforced:

        1) CUSTOM: Crack Buster Pro Crack Prevention Mat Underlayment, with Peel & Stick Primer.
        2) LATICRETE: Blue 92 Anti-Fracture Membrane.
        3) MAPEI, Mapeguard SM, and Primer SM.
        4) MERKRETE: Hydro-Guard SP-1.

    b. Liquid applied, latex based:

        1) CUSTOM: RedGard Waterproofing and Crack Prevention Membrane or FractureFree Crack Prevention Membrane.
        2) LATICRETE: Hydro Ban.
        3) MAPEI, Mapelastic AquaDefense.
        4) MERKRETE: Fracture Guard 5000.

2.7 SETTING MATERIALS

A. Portland Cement Mortar (Thickset) Installation Materials: ANSI A108.02.

1. Cleavage Membrane: Asphalt felt, ASTM D 226/D 226M, Type I (No. 15); or polyethylene sheeting, ASTM D 4397, 4.0 mils thick.
2. Latex Additive: Manufacturer's standard, water emulsion, serving as replacement for part or all of gaging water, of type specifically recommended by latex-additive manufacturer for use with field-mixed portland cement and aggregate mortar bed.

B. Latex-Portland Cement Mortar (Thinset): ANSI A118.4.

1. Manufacturers: Subject to compliance with requirements, provide products by the following:
2. Provide prepackaged, dry-mortar mix containing dry, redispersible, vinyl acetate or acrylic additive to which only water must be added at Project site.

3. Provide prepackaged, dry-mortar mix combined with acrylic resin liquid-latex additive at Project site.
4. For wall applications, provide mortar that complies with requirements for nonsagging mortar in addition to the other requirements in ANSI A118.4.

C. Water-Cleanable, Tile-Setting Epoxy: ANSI A118.3.

1. Manufacturers: Subject to compliance with requirements, provide products by the following:
2. Provide product capable of withstanding continuous and intermittent exposure to temperatures of up to 140 and 212 deg F, respectively, and certified by manufacturer for intended use.

2.8 GROUT MATERIALS

A. Sand-Portland Cement Grout: ANSI A108.10, consisting of white or gray cement and white or colored aggregate as required to produce color indicated.

2.9 MISCELLANEOUS MATERIALS

A. Trowelable Underlayments and Patching Compounds: Latex-modified, portland cement-based formulation provided or approved by manufacturer of tile-setting materials for installations indicated.

B. Vapor-Retarder Membrane: Polyethylene sheeting, ASTM D 4397, 4.0 mils thick.

C. Tile Cleaner: A neutral cleaner capable of removing soil and residue without harming tile and grout surfaces, specifically approved for materials and installations indicated by tile and grout manufacturers.

D. Grout Sealer: Manufacturer's standard product for sealing grout joints and that does not change color or appearance of grout.

2.10 MIXING MORTARS AND GROUT

A. Mix mortars and grouts to comply with referenced standards and mortar and grout manufacturers' written instructions.

B. Add materials, water, and additives in accurate proportions.

C. Obtain and use type of mixing equipment, mixer speeds, mixing containers, mixing time, and other procedures to produce mortars and grouts of uniform quality with optimum performance characteristics for installations indicated.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions where tile will be installed, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

1. Verify that substrates for setting tile are firm; dry; clean; free of coatings that are incompatible with tile-setting materials, including curing compounds and other substances that contain soap, wax, oil, or silicone; and comply with flatness tolerances required by ANSI A108.01 for installations indicated.
2. Verify that concrete substrates for tile floors installed with adhesives, bonded mortar bed, or thinset mortar comply with surface finish requirements in ANSI A108.01 for installations indicated.

    a. Verify that surfaces that received a steel trowel finish have been mechanically scarified.
    b. Verify that protrusions, bumps, and ridges have been removed by sanding or grinding.

3. Verify that installation of grounds, anchors, recessed frames, electrical and mechanical units of work, and similar items located in or behind tile has been completed.

4. Verify that joints and cracks in tile substrates are coordinated with tile joint locations; if not coordinated, adjust joint locations in consultation with Architect.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Fill cracks, holes, and depressions in concrete substrates for tile floors installed with adhesives or thinset mortar with trowelable leveling and patching compound specifically recommended by tile-setting material manufacturer.

B. Blending: For tile exhibiting color variations, verify that tile has been factory blended and packaged so tile units taken from one package show same range of colors as those taken from other packages and match approved Samples. If not factory blended, either return to manufacturer or blend tiles at Project site before installing.

3.3 CERAMIC TILE INSTALLATION

A. Comply with TCNA's "Handbook for Ceramic, Glass, and Stone Tile Installation" for TCNA installation methods specified in tile installation schedules. Comply with parts of the ANSI A108 series "Specifications for Installation of Ceramic Tile" that are referenced in TCNA installation methods, specified in tile installation schedules, and apply to types of setting and grouting materials used.

1. For the following installations, follow procedures in the ANSI A108 series of tile installation standards for providing 95 percent mortar coverage:

    a. Tile floors consisting of tiles 8 by 8 inches or larger.
    b. Tile floors consisting of rib-backed tiles.

B. Extend tile work into recesses and under or behind equipment and fixtures to form complete covering without interruptions unless otherwise indicated. Terminate work neatly at obstructions, edges, and corners without disrupting pattern or joint alignments.

C. Accurately form intersections and returns. Perform cutting and drilling of tile without marring visible surfaces. Carefully grind cut edges of tile abutting trim, finish, or built-in items for straight aligned joints. Fit tile closely to electrical outlets, piping, fixtures, and other penetrations so plates, collars, or covers overlap tile.

D. Provide manufacturer's standard trim shapes where necessary to eliminate exposed tile edges.

E. Jointing Pattern: Lay tile in grid pattern unless otherwise indicated. Lay out tile work and center tile fields in both directions in each space or on each wall area. Lay out tile work to minimize the use of pieces that are less than half of a tile. Provide uniform joint widths unless otherwise indicated.

1. Where adjoining tiles on floor, base, walls, or trim are specified or indicated to be same size, align joints.
2. Where tiles are specified or indicated to be whole integer multiples of adjoining tiles on floor, base, walls, or trim, align joints unless otherwise indicated.

F. Joint Widths: Unless otherwise indicated, install tile with the following joint widths:

1. Glazed Wall Tile: 1/16 inch.
2. Porcelain Tile: 1/8 inch.

G. Lay out tile wainscots to dimensions indicated.

H. Stone Thresholds: Install stone thresholds in same type of setting bed as adjacent floor unless otherwise indicated.

1. At locations where mortar bed (thickset) would otherwise be exposed above adjacent floor finishes, set thresholds in latex-portland cement mortar (thinset).

2. Do not extend crack isolation membrane under thresholds set in dry-set portland cement or latex-portland cement mortar. Fill joints between such thresholds and adjoining tile set on crack isolation membrane with elastomeric sealant.

I. Grout Sealer: Apply grout sealer to cementitious grout joints in tile floors according to grout-sealer manufacturer's written instructions. As soon as grout sealer has penetrated grout joints, remove excess sealer and sealer from tile faces by wiping with soft cloth.

3.4 TILE BACKING PANEL INSTALLATION

A. Install panels and treat joints according to ANSI A108.11 and manufacturer's written instructions for type of application indicated. Use latex-portland cement mortar for bonding material unless otherwise directed in manufacturer's written instructions.

3.5 CRACK ISOLATION MEMBRANE INSTALLATION

A. Install crack isolation membrane to comply with ANSI A108.17 and manufacturer's written instructions to produce membrane of uniform thickness that is bonded securely to substrate.

B. Allow crack isolation membrane to cure before installing tile or setting materials over it.

3.6 ADJUSTING AND CLEANING

A. Remove and replace tile that is damaged or that does not match adjoining tile. Provide new matching units, installed as specified and in a manner to eliminate evidence of replacement.

B. Cleaning: On completion of placement and grouting, clean all ceramic tile surfaces so they are free of foreign matter.

1. Remove grout residue from tile as soon as possible.
2. Clean grout smears and haze from tile according to tile and grout manufacturer's written instructions but no sooner than 10 days after installation. Use only cleaners recommended by tile and grout manufacturers and only after determining that cleaners are safe to use by testing on samples of tile and other surfaces to be cleaned. Protect metal surfaces and plumbing fixtures from effects of cleaning. Flush surfaces with clean water before and after cleaning.

3.7 PROTECTION

A. Protect installed tile work with kraft paper or other heavy covering during construction period to prevent staining, damage, and wear. If recommended by tile manufacturer, apply coat of neutral protective cleaner to completed tile walls and floors.

B. Prohibit foot and wheel traffic from tiled floors for at least seven days after grouting is completed.

C. Before final inspection, remove protective coverings and rinse neutral protective cleaner from tile surfaces.

END OF SECTION 09 3013

SECTION 09 5113 - ACOUSTICAL PANEL CEILINGS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section includes acoustical panels and exposed suspension systems for ceilings.

B. Products furnished, but not installed under this Section, include anchors, clips, and other ceiling attachment devices to be cast in concrete.

1.3 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Samples for Initial Selection: For components with factory-applied color finishes.

1.5 INFORMATIONAL SUBMITTALS

A. Evaluation Reports: For each acoustical panel ceiling suspension system and anchor and fastener type, from ICC-ES.

1.6 CLOSEOUT SUBMITTALS

A. Maintenance Data: For finishes to include in maintenance manuals.

1.7 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Acoustical Ceiling Panels: Full-size panels equal to 2 percent of quantity installed.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Deliver acoustical panels, suspension-system components, and accessories to Project site in original, unopened packages and store them in a fully enclosed, conditioned space where they will be protected against damage from moisture, humidity, temperature extremes, direct sunlight, surface contamination, and other causes.

B. Before installing acoustical panels, permit them to reach room temperature and a stabilized moisture content.

C. Handle acoustical panels carefully to avoid chipping edges or damaging units in any way.

1.9 FIELD CONDITIONS

A. Environmental Limitations: Do not install acoustical panel ceilings until spaces are enclosed and weatherproof, wet work in spaces is complete and dry, work above ceilings is complete, and ambient temperature and humidity conditions are maintained at the levels indicated for Project when occupied for its intended use.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Seismic Performance: Acoustical ceiling shall withstand the effects of earthquake motions determined according to ASCE/SEI 7.

B. Surface-Burning Characteristics: Comply with ASTM E 84; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
   1. Flame-Spread Index: 25 or less.

   2. Smoke-Developed Index: 50 or less.

2.2 ACOUSTICAL PANELS, GENERAL

A. Source Limitations:

   1. Acoustical Ceiling Panel: Obtain each type from single source from single manufacturer.
   2. Suspension System: Obtain each type from single source from single manufacturer.

B. Source Limitations: Obtain each type of acoustical ceiling panel and supporting suspension system from single source from single manufacturer.

C. Glass-Fiber-Based Panels: Made with binder containing no urea formaldehyde.

D. Acoustical Panel Standard: Provide manufacturer's standard panels of configuration indicated that comply with ASTM E 1264 classifications as designated by types, patterns, acoustical ratings, and light reflectances unless otherwise indicated.

   1. Mounting Method for Measuring NRC: Type E-400; plenum mounting in which face of test specimen is 15-3/4 inches away from test surface according to ASTM E 795.

2.3 ACOUSTICAL PANELS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

   1. Armstrong: 'Cortega' Lay-in, 704
   2. Type and Form: Type III, mineral base with painted finish; Form 2, water felted.

B. Color: White.

C. LR: Not less than 0.80.

D. NRC: Not less than 0.55.

E. CAC: Not less than 35.

F. Edge/Joint Detail: Angled Tegular Lay-in.

G. Thickness: 3/4 inch.

H. Modular Size: 24 by 24 inches as indicated in Ceiling Legend.

2.4 METAL SUSPENSION SYSTEMS, GENERAL

A. Metal Suspension-System Standard: Provide manufacturer's standard direct-hung metal suspension systems of types, structural classifications, and finishes indicated that comply with applicable requirements in ASTM C 635/C 635M.

1. High-Humidity Finish: Comply with ASTM C 635/C 635M requirements for "Coating Classification for Severe Environment Performance" where high-humidity finishes are indicated.

B. Attachment Devices: Size for five times the design load indicated in ASTM C 635/C 635M, Table 1, "Direct Hung," unless otherwise indicated. Comply with seismic design requirements.

C. Wire Hangers, Braces, and Ties: Provide wires complying with the following requirements:

1. Zinc-Coated, Carbon-Steel Wire: ASTM A 641/A 641M, Class 1 zinc coating, soft temper.
2. Stainless-Steel Wire: ASTM A 580/A 580M, Type 304, nonmagnetic.
3. Nickel-Copper-Alloy Wire: ASTM B 164, nickel-copper-alloy UNS No. N04400.
4. Size: Select wire diameter so its stress at three times hanger design load (ASTM C 635/C 635M, Table 1, "Direct Hung") will be less than yield stress of wire, but provide not less than 0.106-inch- diameter wire.

D. Seismic Struts: Manufacturer's standard compression struts designed to accommodate seismic forces.

2.5 METAL SUSPENSION SYSTEM

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

B. Wide-Face, Capped, Double-Web, Steel Suspension System: Main and cross runners roll formed from cold-rolled steel sheet; prepainted, electrolytically zinc coated, or hot-dip galvanized according to ASTM A 653/A 653M, not less than G30coating designation; with prefinished 15/16-inch-wide metal caps on flanges.

1. Structural Classification: Heavy-duty system.
2. End Condition of Cross Runners: butt-edge type.
3. Face Design: Flat, flush.
4. Cap Material: Steel or aluminum cold-rolled sheet.
5. Cap Finish: Painted white.

2.6 METAL EDGE MOLDINGS AND TRIM

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

B. Roll-Formed, Sheet-Metal Edge Moldings and Trim: Type and profile indicated or, if not indicated, manufacturer's standard moldings for edges and penetrations that comply with seismic design requirements; formed from sheet metal of same material, finish, and color as that used for exposed flanges of suspension-system runners.

1. Provide manufacturer's standard edge moldings that fit acoustical panel edge details and suspension systems indicated and that match width and configuration of exposed runners unless otherwise indicated.
2. For lay-in panels with reveal edge details, provide stepped edge molding that forms reveal of same depth and width as that formed between edge of panel and flange at exposed suspension member.
3. For circular penetrations of ceiling, provide edge moldings fabricated to diameter required to fit penetration exactly.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, including structural framing to which acoustical panel ceilings attach or abut, with Installer present, for compliance with requirements specified in this and other Sections that affect ceiling installation and anchorage and with requirements for installation tolerances and other conditions affecting performance of acoustical panel ceilings.

B. Examine acoustical panels before installation. Reject acoustical panels that are wet, moisture damaged, or mold damaged.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Measure each ceiling area and establish layout of acoustical panels to balance border widths at opposite edges of each ceiling. Avoid using less-than-half-width panels at borders, and comply with layout shown on reflected ceiling plans.

3.3 INSTALLATION

A. General: Install acoustical panel ceilings to comply with ASTM C 636/C 636M and seismic design requirements indicated, according to manufacturer's written instructions and CISCA's "Ceiling Systems Handbook."

B. Suspend ceiling hangers from building's structural members and as follows:

1. Install hangers plumb and free from contact with insulation or other objects within ceiling plenum that are not part of supporting structure or of ceiling suspension system.
2. Splay hangers only where required to miss obstructions; offset resulting horizontal forces by bracing, countersplaying, or other equally effective means.
3. Where width of ducts and other construction within ceiling plenum produces hanger spacings that interfere with location of hangers at spacings required to support standard suspension-system members, install supplemental suspension members and hangers in form of trapezes or equivalent devices.
4. Secure wire hangers to ceiling-suspension members and to supports above with a minimum of three tight turns. Connect hangers directly either to structures or to inserts, eye screws, or other devices that are secure and appropriate for substrate and that will not deteriorate or otherwise fail due to age, corrosion, or elevated temperatures.
5. When steel framing does not permit installation of hanger wires at spacing required, install carrying channels or other supplemental support for attachment of hanger wires.
6. Space hangers not more than 48 inches o.c. along each member supported directly from hangers unless otherwise indicated; provide hangers not more than 8 inches from ends of each member.
7. Size supplemental suspension members and hangers to support ceiling loads within performance limits established by referenced standards and publications.

C. Secure bracing wires to ceiling suspension members and to supports with a minimum of four tight turns. Suspend bracing from building's structural members as required for hangers, without attaching to permanent metal forms, steel deck, or steel deck tabs. Fasten bracing wires into concrete with cast-in-place or postinstalled anchors.

D. Install edge moldings and trim of type indicated at perimeter of acoustical ceiling area and where necessary to conceal edges of acoustical panels.

1. Screw attach moldings to substrate at intervals not more than 16 inches o.c. and not more than 3 inches from ends, leveling with ceiling suspension system to a tolerance of 1/8 inch in 12 feet. Miter corners accurately and connect securely.
2. Do not use exposed fasteners, including pop rivets, on moldings and trim.

E. Install suspension-system runners so they are square and securely interlocked with one another. Remove and replace dented, bent, or kinked members.

F. Install acoustical panels with undamaged edges and fit accurately into suspension-system runners and edge moldings. Scribe and cut panels at borders and penetrations to provide a neat, precise fit.

1. Arrange directionally patterned acoustical panels as follows:

a. Install panels with pattern running in one direction parallel to long axis of space.

2. For reveal-edged panels on suspension-system runners, install panels with bottom of reveal in firm contact with top surface of runner flanges.
3. For reveal-edged panels on suspension-system members with box-shaped flanges, install panels with reveal surfaces in firm contact with suspension-system surfaces and panel faces flush with bottom face of runners.
4. Paint cut edges of panel remaining exposed after installation; match color of exposed panel surfaces using coating recommended in writing for this purpose by acoustical panel manufacturer.

3.4 CLEANING

A. Clean exposed surfaces of acoustical panel ceilings, including trim, edge moldings, and suspension-system members. Comply with manufacturer's written instructions for cleaning and touchup of minor finish damage. Remove and replace ceiling components that cannot be successfully cleaned and repaired to permanently eliminate evidence of damage.

END OF SECTION 09 5113

SECTION 09 6513 - RESILIENT BASE AND ACCESSORIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Resilient base.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Samples for Initial Selection: For each type of product indicated.

1.4 DELIVERY, STORAGE, AND HANDLING

A. Store resilient products and installation materials in dry spaces protected from the weather, with ambient temperatures maintained within range recommended by manufacturer, but not less than 50 deg F or more than 90 deg F.

1.5 FIELD CONDITIONS

A. Maintain ambient temperatures within range recommended by manufacturer, but not less than 70 deg F or more than 95 deg F, in spaces to receive resilient products during the following time periods:

1. 48 hours before installation.
2. During installation.
3. 48 hours after installation.

B. After installation and until Substantial Completion, maintain ambient temperatures within range recommended by manufacturer, but not less than 55 deg F or more than 95 deg F.

C. Install resilient products after other finishing operations, including painting, have been completed.

PART 2 - PRODUCTS

2.1 THERMOSET-RUBBER BASE

A. Manufacturers: Subject to compliance with requirements, provide products by the following:

1. Johnsonite Inc. | Tarkett

B. Product Standard: ASTM F 1861, Type TS (rubber, vulcanized thermoset), Group I (solid, homogeneous).

1. Style and Location:

a. Traditional Duracove Rubber

C. Thickness: 0.125 inch.

D. Height: 4 inches.

E. Lengths: Coils in manufacturer's standard length.

F. Outside Corners: Pre-molded.

G. Inside Corners: Butt Joint.

H. Colors: As indicated on drawings.

2.2 INSTALLATION MATERIALS

A. Adhesives: Water-resistant type recommended by resilient-product manufacturer for resilient products and substrate conditions indicated.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, with Installer present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work.

1. Verify that finishes of substrates comply with tolerances and other requirements specified in other Sections and that substrates are free of cracks, ridges, depressions, scale, and foreign deposits that might interfere with adhesion of resilient products.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

1. Installation of resilient products indicates acceptance of surfaces and conditions.

3.2 PREPARATION

A. Prepare substrates according to manufacturer's written instructions to ensure adhesion of resilient products.

B. Do not install resilient products until they are the same temperature as the space where they are to be installed.

1. At least 48 hours in advance of installation, move resilient products and installation materials into spaces where they will be installed.

C. Immediately before installation, sweep and vacuum clean substrates to be covered by resilient products.

3.3 RESILIENT BASE INSTALLATION

A. Comply with manufacturer's written instructions for installing resilient base.

B. Apply resilient base to walls, columns, pilasters, casework and cabinets in toe spaces, and other permanent fixtures in rooms and areas where base is required.

C. Install resilient base in lengths as long as practical without gaps at seams and with tops of adjacent pieces aligned.

D. Tightly adhere resilient base to substrate throughout length of each piece, with base in continuous contact with horizontal and vertical substrates.

E. Do not stretch resilient base during installation.

F. Preformed Corners: Install preformed corners before installing straight pieces.

3.4 RESILIENT ACCESSORY INSTALLATION

A. Comply with manufacturer's written instructions for installing resilient accessories.

3.5 CLEANING AND PROTECTION

A. Comply with manufacturer's written instructions for cleaning and protecting resilient products.

B. Perform the following operations immediately after completing resilient-product installation:

1. Remove adhesive and other blemishes from exposed surfaces.

C. Protect resilient products from mars, marks, indentations, and other damage from construction operations and placement of equipment and fixtures during remainder of construction period.

D. Cover resilient products subject to wear and foot traffic until Substantial Completion.

END OF SECTION 09 6513

SECTION 09 6519 - RESILIENT TILE FLOORING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Solid vinyl floor tile, LVT.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Samples: For each exposed product and for each color and pattern specified.

1.3 CLOSEOUT SUBMITTALS

A. Maintenance data.

1.4 QUALITY ASSURANCE

A. Installer Qualifications: An entity that employs installers and supervisors who are competent in techniques required by manufacturer for floor tile installation.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Fire-Test-Response Characteristics: For resilient floor tile, as determined by testing identical products according to ASTM E 648 or NFPA 253 by a qualified testing agency.

1. Critical Radiant Flux Classification: Class I, not less than 0.45 W/sq. cm.

2.2 SOLID VINYL FLOOR TILE: LVT 'F07'

A. Basis-of-Design Product: Subject to compliance with requirements, provide products indicated on Drawings:

1. Tarkett, Inc.

B. Tile Standard: ASTM F 1700.

1. Class: Class III, Printed Film Vinyl Tile.
2. Type: B, Embossed Surface.

C. Thickness: 32 mil.

D. Size: As indicated on drawings.

E. Colors and Patterns: As indicated on drawings.

2.3 INSTALLATION MATERIALS

A. Trowelable Leveling and Patching Compounds: Latex-modified, portland-cement-based or blended hydraulic-cement-based formulation provided or approved by floor tile manufacturer for applications indicated.

B. Adhesives: Water-resistant type recommended by floor tile and adhesive manufacturers to suit floor tile and substrate conditions indicated.

PART 3 - EXECUTION

3.1 PREPARATION

A. Prepare substrates according to floor tile manufacturer's written instructions to ensure adhesion of resilient products.

B. Concrete Substrates: Prepare according to ASTM F 710.

1. Verify that substrates are dry and free of curing compounds, sealers, and hardeners.
2. Remove substrate coatings and other substances that are incompatible with adhesives and that contain soap, wax, oil, or silicone, using mechanical methods recommended by floor tile manufacturer. Do not use solvents.
3. Alkalinity and Adhesion Testing: Perform tests recommended by floor tile manufacturer. Proceed with installation only after substrate alkalinity falls within range on pH scale recommended by manufacturer in writing, but not less than 5 or more than 9 pH.
4. Moisture Testing: Perform tests so that each test area does not exceed 200 sq. ft., and perform no fewer than three tests in each installation area and with test areas evenly spaced in installation areas.

    a. Anhydrous Calcium Chloride Test: ASTM F 1869. Proceed with installation only after substrates have maximum moisture-vapor-emission rate of 3 lb of water/1000 sq. ft. in 24 hours.
    b. Relative Humidity Test: Using in-situ probes, ASTM F 2170. Proceed with installation only after substrates have a maximum 75 percent relative humidity level measurement.

C. Fill cracks, holes, and depressions in substrates with trowelable leveling and patching compound; remove bumps and ridges to produce a uniform and smooth substrate.

D. Do not install floor tiles until materials are the same temperature as space where they are to be installed.

1. At least 48 hours in advance of installation, move resilient floor tile and installation materials into spaces where they will be installed.

E. Immediately before installation, sweep and vacuum clean substrates to be covered by resilient floor tile.

3.2 FLOOR TILE INSTALLATION

A. Comply with manufacturer's written instructions for installing floor tile.

B. Lay out floor tiles from center marks established with principal walls, discounting minor offsets, so tiles at opposite edges of room are of equal width. Adjust as necessary to avoid using cut widths that equal less than one-half tile at perimeter.

1. Lay tiles in pattern indicated.

C. Match floor tiles for color and pattern by selecting tiles from cartons in the same sequence as manufactured and packaged, if so numbered. Discard broken, cracked, chipped, or deformed tiles.

1. Lay tiles with grain running in one direction.

D. Scribe, cut, and fit floor tiles to butt neatly and tightly to vertical surfaces and permanent fixtures including built-in furniture, cabinets, pipes, outlets, and door frames.

E. Extend floor tiles into toe spaces, door reveals, closets, and similar openings. Extend floor tiles to center of door openings.

F. Maintain reference markers, holes, and openings that are in place or marked for future cutting by repeating on floor tiles as marked on substrates. Use chalk or other nonpermanent marking device.

G. Install floor tiles on covers for telephone and electrical ducts, building expansion-joint covers, and similar items in installation areas. Maintain overall continuity of color and pattern between pieces of tile installed on covers and adjoining tiles. Tightly adhere tile edges to substrates that abut covers and to cover perimeters.

H. Adhere floor tiles to substrates using a full spread of adhesive applied to substrate to produce a completed installation without open cracks, voids, raising and puckering at joints, telegraphing of adhesive spreader marks, and other surface imperfections.

END OF SECTION

SECTION 09 6813 - TILE CARPETING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section includes modular, tufted carpet tile.

B. Related Requirements:

1. Section 09 6513 "Resilient Base and Accessories" for resilient wall base and accessories installed with carpet tile.

1.3 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1. Review methods and procedures related to carpet tile installation including, but not limited to, the following:

a. Review delivery, storage, and handling procedures.
b. Review ambient conditions and ventilation procedures.
c. Review subfloor preparation procedures.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include manufacturer's written data on physical characteristics, durability, and fade resistance.
2. Include installation recommendations for each type of substrate.

B. Samples: For each of the following products and for each color and texture required. Label each Sample with manufacturer's name, material description, color, pattern, and designation indicated on Drawings and in schedules.

1. Carpet Tile: Full-size Sample.
2. Exposed Edge, Transition, and Other Accessory Stripping: 12-inch-long Samples.

C. Product Schedule: For carpet tile. Use same designations indicated on Drawings.

1.5 INFORMATIONAL SUBMITTALS

A. Product Test Reports: For carpet tile, for tests performed by a qualified testing agency.

1.6 CLOSEOUT SUBMITTALS

A. Maintenance Data: For carpet tiles to include in maintenance manuals. Include the following:

1. Methods for maintaining carpet tile, including cleaning and stain-removal products and procedures and manufacturer's recommended maintenance schedule.
2. Precautions for cleaning materials and methods that could be detrimental to carpet tile.

1.7 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials, from the same product run, that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Carpet Tile: Full-size units equal to 5 percent of amount installed for each type indicated, but not less than 10 sq. yd.
2. Walk-Off Entry Tile: 10 full tiles.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Comply with CRI 104.

1.9 FIELD CONDITIONS

A. Comply with CRI 104 for temperature, humidity, and ventilation limitations.

B. Environmental Limitations: Do not deliver or install carpet tiles until spaces are enclosed and weathertight, wet work in spaces is complete and dry, and ambient temperature and humidity conditions are maintained at occupancy levels during the remainder of the construction period.

C. Do not install carpet tiles over concrete slabs until slabs have cured and are sufficiently dry to bond with adhesive and concrete slabs have pH range recommended by carpet tile manufacturer.

D. Where demountable partitions or other items are indicated for installation on top of carpet tiles, install carpet tiles before installing these items.

1.10 WARRANTY

A. Special Warranty for Carpet Tiles: Manufacturer agrees to repair or replace components of carpet tile installation that fail in materials or workmanship within specified warranty period.

1. Warranty does not include deterioration or failure of carpet tile due to unusual traffic, failure of substrate, vandalism, or abuse.
2. Failures include, but are not limited to, more than 10 percent edge raveling, snags, runs, dimensional stability, loss of tuft bind strength, loss of face fiber, and delamination.
3. Warranty Period: 10 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 CARPET TILE 'F01':

A. Products: Subject to compliance with requirements, provide the following:

1. Light Shift by Tarkett.

a. Color: See drawings.
b. Size: 24 by 24 inches.
c. Pattern: Horizontal Ashlar.

2.2 CARPET TILE 'F02':

A. Products: Subject to compliance with requirements, provide the following:

1. Parallel Ray by Tarkett.

a. Color: See drawings.
b. Size: 24 by 24 inches.
c. Pattern: Horizontal Ashlar.

2.3 WALK-OFF TYPE ENTRY TILE 'F03':

A. Products: Subject to compliance with requirements, provide the following:

1. Assertive Action by Tarkett.

a. Color: See drawings.
b. Size: 24 by 24 inches.
c. Pattern: As selected by Architect.

2.4 INSTALLATION ACCESSORIES

A. Trowelable Leveling and Patching Compounds: Latex-modified, hydraulic-cement-based formulation provided or recommended by carpet tile manufacturer.

B. Translation Strips: Rubber transition strips in style and color acceptable to Architect.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for maximum moisture content, alkalinity range, installation tolerances, and other conditions affecting carpet tile performance. Examine carpet tile for type, color, pattern, and potential defects.

B. Concrete Subfloors: Verify that concrete slabs comply with ASTM F 710 and the following:

1. Slab substrates are dry and free of curing compounds, sealers, hardeners, and other materials that may interfere with adhesive bond. Determine adhesion and dryness characteristics by performing bond and moisture tests recommended by carpet tile manufacturer.
2. Subfloor finishes comply with requirements specified in Section 03 3000 "Cast-in-Place Concrete" for slabs receiving carpet tile.
3. Subfloors are free of cracks, ridges, depressions, scale, and foreign deposits.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. General: Comply with CRI 104, Section 6.2, "Site Conditions; Floor Preparation," and with carpet tile manufacturer's written installation instructions for preparing substrates indicated to receive carpet tile installation.

B. Use trowelable leveling and patching compounds, according to manufacturer's written instructions, to fill cracks, holes, depressions, and protrusions in substrates. Fill or level cracks, holes and depressions 1/8 inch wide or wider and protrusions more than 1/32 inch unless more stringent requirements are required by manufacturer's written instructions.

C. Remove coatings, including curing compounds, and other substances that are incompatible with adhesives and that contain soap, wax, oil, or silicone, without using solvents. Use mechanical methods recommended in writing by carpet tile manufacturer.

D. Clean metal substrates of grease, oil, soil and rust, and prime if directed by adhesive manufacturer. Rough sand painted metal surfaces and remove loose paint. Sand aluminum surfaces, to remove metal oxides, immediately before applying adhesive.

E. Broom and vacuum clean substrates to be covered immediately before installing carpet tile.

3.3 INSTALLATION

A. General: Comply with CRI 104, Section 14, "Carpet Modules," and with carpet tile manufacturer's written installation instructions.

B. Installation Method: As recommended in writing by carpet tile manufacturer.

C. Maintain dye lot integrity. Do not mix dye lots in same area.

D. Cut and fit carpet tile to butt tightly to vertical surfaces, permanent fixtures, and built-in furniture including cabinets, pipes, outlets, edgings, thresholds, and nosings. Bind or seal cut edges as recommended by carpet tile manufacturer.

E. Extend carpet tile into toe spaces, door reveals, closets, open-bottomed obstructions, removable flanges, alcoves, and similar openings.

F. Maintain reference markers, holes, and openings that are in place or marked for future cutting by repeating on finish flooring as marked on subfloor. Use nonpermanent, nonstaining marking device.

G. Install pattern parallel to walls and borders.

3.4 CLEANING AND PROTECTION

A. Perform the following operations immediately after installing carpet tile:

1. Remove yarns that protrude from carpet tile surface.
2. Vacuum carpet tile using commercial machine with face-beater element.

B. Protect installed carpet tile to comply with CRI 104, Section 16, "Protecting Indoor Installations."

C. Protect carpet tile against damage from construction operations and placement of equipment and fixtures during the remainder of construction period. Use protection methods indicated or recommended in writing by carpet tile manufacturer.

END OF SECTION 09 6813

SECTION 09 9113 – EXTERIOR PAINTING

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Furnish all labor, materials, equipment, tools, and services required to fully complete all Exterior Painting work as is indicated on the drawings and/or specified herein including, but not limited to, the following described items.

1. Field application of paints and on the following surfaces as applicable

    a. Concrete.
    b. Concrete masonry units (CMU).
    c. Steel.
    d. Galvanized metal.
    e. Aluminum (not adonized or otherwise coated).
    f. Wood.

B. Surface preparation of substrates as required for acceptance of paintings, including high-pressure washing, abrasive blasting, cleaning, small crack repair, patching, and caulking.

C. Scope: Finish exterior surfaces exposed to view, unless fully factory-finished and unless otherwise indicated, including the following:

1. The term "exposed" includes areas visible though permanent and built-in fixtures when they are in place.
2. Both sides and edges of plywood backboards for electrical and telecom equipment before installing equipment.
3. Finish top, bottom, and side edges of exterior doors the same as exposed faces.
4. Exposed surfaces of steel lintels and ledge angles.
5. Mechanical and Electrical:

    a. On the roof and outdoors, paint equipment that is exposed to weather or to view, unless factory finished.

6. Finish interior surfaces of air ducts that are visible through grilles and louvers with one coat of flat black paint to visible surfaces.
7. Finish dampers exposed behind louvers, and grilles, to match face panels.

D. Do Not Paint or Finish the Following Items:

1. Items factory-finished unless otherwise indicated; materials and products having factory-applied primers are not considered factory finished.
2. Items indicated to receive other finishes.
3. Items indicated to remain unfinished.
4. Fire rating labels, equipment serial number, and capacity labels, and operating parts of equipment.
5. Non-metallic roofing and flashing.
6. Stainless steel, anodized aluminum, bronze, terne-coated stainless steel, zinc, and lead.
7. Unless indicated
8. Marble, granite, slate, and other natural stones.
9. Floors, unless specifically indicated.
10. Ceramic and other types of tiles.
11. Brick, glass unit masonry, architectural concrete, cast stone, integrally colored plaster, and stucco.
12. Glass.
13. Concealed pipes, ducts, and conduits.

E. Do not include sales tax, refer to Section 00 0104 - Notice to Contractors

1.2 RELATED REQUIREMENTS

A. Section 05 5000 - Metal Fabrications: Shop-primed items.

B. Section 05 5100 - Metal Stairs: Shop-primed items.

C. Section 07 1900 - Exterior Water Repellents and Graffiti Resistant Sealers

D. Section 09 9123 - Interior Painting.

E. Section 09 9724 - Sealers - Interior Concrete, Precast and Masonry Sealers

1.3 DEFINITIONS

A. Comply with ASTM D16 for interpretation of terms used in this section.

B. Gloss Level 1: Not more than 5 units at 60 degrees and 10 units at 85 degrees, according to ASTM D523, a matte flat finish.

C. Gloss Level 2: Not more than 10 units at 60 degrees and 10 to 35 units at 85 degrees, according to ASTM D 523, a high-side sheen flat, velvet-like finish.

D. Gloss Level 3: 10 to 25 units at 60 degrees and 10 to 35 units at 85 degrees, according to ASTM D 523, an eggshell finish.

E. Gloss Level 4: 20 to 35 units at 60 degrees and not less than 35 units at 85 degrees, according to ASTM D 523, a satin-like finish.

F. Gloss Level 5: 35 to 70 units at 60 degrees, according to ASTM D 523, a semi-gloss finish.

G. Gloss Level 6: 70 to 85 units at 60 degrees, according to ASTM D 523, a gloss finish.

1.4 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. ASTM D523 - Standard Test Method for Specular Gloss 2014 (Reapproved 2018).

E. MPI (APSM) - Master Painters Institute Architectural Painting Specification Manual Current Edition.

F. SSPC-SP 1 - Solvent Cleaning 2015, with Editorial Revision (2016).

G. SSPC-SP 2 - Hand Tool Cleaning 2018.

H. SSPC-SP 6 - Commercial Blast Cleaning 2007.

I. SSPC-SP 13 - Surface Preparation of Concrete 1997 (Reaffirmed 2003).

1.5 SUBMITTALS

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

B. Product Data: Provide a complete list of products to be used, with the following information for each:

1. Manufacturer's name, product name and/or catalog number, and general product category (e.g. "alkyd enamel").
2. Cross-reference to specified paint system(s) product is to be used in; include a description of each system.
3. Manufacturer's installation instructions.
4. If the proposal of substitutions is allowed under submittal procedures, an explanation of substitutions is proposed.

C. Samples: Submit three paper "drawdown" samples, 8-1/2 by 11 inches in size, illustrating the range of colors available for each finishing product specified.

1. Where sheen is specified, submit samples in only that sheen.
2. Where sheen is not specified, submit each color in each sheen available.
3. Allow 30 days for approval process, after receipt of complete samples by Architect.
4. Paint color submittals will not be considered until color submittals for major materials not to be painted, such as masonry, have been approved.

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 Section 01 6000 - 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 and type in addition to the manufacturer's label.

1.6 QUALITY ASSURANCE

A. This Contractor shall have a minimum of five (5) years proven satisfactory experience and shall show proof before commencement of work that he will maintain a qualified crew of painters throughout the duration of the work. Contractor shall provide a list of the last three comparable jobs including, name and location, project manager, start/completion dates and value of painting work.

B. Material Safety Data Sheets: At project site maintain file of MSDS sheets for each product used; become familiar with and follow manufacturer's stated application and safety requirements.

C. All surfaces requiring painting/coating shall be inspected by the Painting/Coating Manufacturer's Product Representative who shall notify the Architect and General Contractor in writing of any defects or problems, prior to commencing painting work, or after the prime coat shows defects in the substrate. The Manufacturer's Product Representative shall provide a written certification of all surfaces and conditions for paint or coating system application as well as on site supervision, inspection and approval of the application.

D. The painting contractor shall receive written confirmation of the specific surface preparation procedures and primers used for all fabricated steel items from the fabricator/supplier to ascertain appropriate and manufacturer compatible finish coat materials to be used before painting any such work.

E. Manufacturer Qualifications: Company specializing in manufacturing the products specified, with minimum three years documented experience.

F. Applicator Qualifications: Company specializing in performing the type of work specified with minimum 5 years experience and approved by manufacturer.

1.7 MOCK-UP

A. See Section 01 4000 - Quality Requirements, for general requirements for mock-up.

B. Prepare and paint each type of surface shown as requiring finish, to requirements specified herein, with specified paint or coating showing selected colors, gloss/sheen, textures and workmanship for review and approval.

C. Provide door and frame assembly illustrating paint color, texture, and finish.

D. Locate where directed by Architect.

E. When approved, surfaces shall become acceptable standard of finish quality and workmanship for remainder of on-site work.

F. Mock-up may remain as part of the work.

1.8 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.

1.9 FIELD CONDITIONS

A. Do not apply materials when surface and ambient temperatures are outside the temperature ranges required by the paint product manufacturer.

B. Follow manufacturer's recommended procedures for producing best results, including testing of substrates, moisture in substrates, and humidity and temperature limitations.

C. Do not apply exterior paint and finishes during rain or snow, or when relative humidity is outside the humidity ranges required by the paint product manufacturer.

D. Minimum Application Temperatures for Latex Paints: 50 degrees F for exterior; unless required otherwise by manufacturer's instructions.

E. Provide lighting level of 80 ft candles measured mid-height at substrate surface.

1.10 GUARANTEE

A. The Contractor shall guarantee his work for a period of One (1) year from date of Substantial Completion. Guarantee shall be on form included in Section 01 7800.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Provide paints and finishes from the same manufacturer to the greatest extent possible.

1. In the even that a single manufacturer cannot provide specified products, minor exceptions will be permitted provided approval by Architect is obtained using the specified procedures for substitutions.

2. Substitution of other products by the same manufacturer is preferred over substitution of products by a different manufacturer.

B. **Basis of Design Product:** Subject to compliance with requirements, provide company products indicated from one of the following:

1. PPG Paints

C. Acceptable Manufacturers:

1. PPG Paints
2. Sherwin-Williams Company
3. Benjamin Moore

D. Provide Paints and finishes from the same manufacturer to the greatest extent possible.

1. Int the even that a single manufacturer cannot provide specified products, minor exceptions will be permitted provided approval by Architect is obtained using the specified procedures for substitutions.
2. Substitution of other products by the same manufacturer is preferred over substitution of products by a different manufacturer.

E. Primer Sealers: Same manufacturer as topcoats.

F. Substitutions: See Section 01 6000 – Product Requirements.

2.2 PAINTS AND FINISHES – GENERAL

A. Paints and Finishes: Ready-mixed, unless required to be a field-catalyzed paint.

1. Provide paints and finishes of a soft paste consistency, capable of being readily and uniformly dispersed to a homogeneous coating, with good flow and brushing properties, and capable of drying or curing free of streaks or sags.
2. Provide materials that are compatible with one another, and the substrates indicated under conditions of service and application, as demonstrated by manufacturer based on testing and field experience.
3. Supply each paint material in quantity required to complete entire project's work from a single production run.
4. Do not reduce, thin, or dilute paint or finishes or add materials unless such procedure is specifically described in the 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. VOC Content: Utah Administrative Code R307-361 Products shall comply with VOC limits of authorities having jurisdiction and, for interior and exterior paints and coatings applied at Project site, the following VOC limits, exclusive of colorants added to a tint base, when calculated according to 40 CFR 59, Subpart D--National Volatile Organic Compound Emission Standards for Architectural Coatings.
   b. Flat Paints and Coatings: 50 g/L.
   c. Non flat Paints and Coatings: 100 g/L.
   d. Dry-Fog Coatings: 150 g/L.
   e. Primers, Sealers, and Undercoaters: 100 g/L.
   f. Industrial maintenance Coatings Applied to Ferrous Metals: 250 g/L.
   g. Zinc-Rich Industrial Maintenance Primers: 340 g/L.
   h. Pretreatment Wash Primers: 420 g/L.
   i. Floor Coatings Foot Traffic: 100 g/L.
   j. Floor Coatings High Performance: 250 g/L.

k. Shellacs, Clear: 730 g/L.
l. Shellacs, Pigmented: 550 g/L.
m. Wood Coatings: 275 g/L

C. Flammability: Comply with applicable code for surface burning characteristics.

D. Chemical Content: The following compounds are prohibited.

1. Aromatic Compounds: In excess of 1.0 percent by weight of total aromatic compounds (hydrocarbon compounds containing one or more benzene rings).
2. Acrolein, acrylonitrile, antimony, benzene, butyl benzyl phthalate, cadmium, di (2-ethylhexyl) phthalate, di-n-butyl phthalate, di-n-octyl phthalate, 1,2-dichlorobenzene, diethyl phthalate, dimethyl phthalate, ethylbenzene, formaldehyde, hexavalent chromium, isophorone, lead, mercury, methyl ethyl ketone, methyl isobutyl ketone, methylene chloride, naphthalene, toluene (methylbenzene), 1,1,1-trichloroethane, vinyl chloride.

E. Sheens: Provide the sheens specified; where sheen is not specified, sheen will be selected later by Architect from the manufacturer's full line.

F. Colors: To be selected from manufacturer's full range of available colors.

1. Selection to be made by Architect after award of contract.
2. Allow for minimum of three colors for each system, unless otherwise indicated, without additional cost to Owner.
3. Extend colors to surface edges; colors may change at any edge as directed by Architect.

2.3 PAINT SYSTEMS – EXTERIOR

A. Concrete Masonry Units and Precast Architectural Concrete:

1. Refer to Section 03 3511 - Exposed Concrete Floor Finishes
2. Refer to Section 07 1900 - Exterior Water Repellents and Graffiti Resistant Sealers
3. Refer to Section 09 9724 - Sealers - Interior Concrete, Precast and Masonry Sealers

B. Concrete and Masonry – Walls (smooth) Satin Finish

1. Primer:

a. Product: PPG 4-603XI Perma-Crete Alkali Resistant High PH Masonry Primer

2. 1st coat:

a. Product: PPG 6-2045XI series Speedhide 100% Acrylic Exterior Latex Satin

3. 2nd coat:

a. Product: PPG Speedhide 100% Acrylic Exterior Latex Satin, 6-2045XI Series

C. CMU & Block Areas (Porous): Satin Finish

1. Filler:

a. Product: PPG Perma Create Concrete Masonry Surfacer/Filler, 4-100XI

2. 1st coat:

a. Product: PPG Speedhide 100% Acrylic Exterior Latex Satin, 6-2045XI Series

3. 2nd coat:

a. Product: PPG Speedhide 100% Acrylic Exterior Latex Satin, 6-2045XI Series

D. Exterior Ferrous Metal – Semi-Gloss Finish

a. HM Doors, Frames, and Miscellaneous Metals

1. Primer:

a. Product: PPG Pitt-Tech Plus Primer, 4020 PF

2. 1st coat:

a. Product: Product: Pitt-Tech Plus Acrylic DTM Semi-Gloss, 90-1610 Series.
b. Applied Dry Film Thickness: 2.0 mils min.

3. 2nd coat:

a. Product: Pitt-Tech Plus Acrylic DTM Semi-Gloss, 90-1610 Series.
b. Applied Dry Film Thickness: 2.0 mils min.

E. Exterior Non-Ferrous Metal – Galvanized/Aluminum Metal Surfaces: Semi-Gloss Finish

a. Handrails, Miscellaneous Metals

1. Primer:

a. Product: PPG Pitt-Tech Plus Primer, 4020 PF

2. 1st coat:

a. Product: PPG Pitt-Tech Plus Acrylic DTM Semi-Gloss, 90-1610 Series.
b. Applied Dry Film Thickness: 2.0 mils min.

3. 2nd coat:

a. Product: PPG Pitt-Tech Plus Acrylic DTM Semi-Gloss, 90-1610 Series.
b. Applied Dry Film Thickness: 2.0 mils min

F. Stainless Steel Substrates: Epoxy System

1. Prime Coat: Primer, epoxy, anti-corrosive, for metal.

a. Product: PPG Amerlock 2/400 High Solids Epoxy;
b. Applied at 4 mils dft.

2. Intermediate Coat:

a. Epoxy, matching topcoat.

3. Topcoat:

a. Product: Product: PPG Pitthane Ultra Acrylic Aliphatic Urethane Gloss, 95-812/95-819 Series; applied at 2 mils dft per coat.

2.4 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

3.1 EXAMINATION

A. Do not begin application of paints and finishes until substrates have been properly prepared.

B. Obtain written certification from Manufacturer's Product Representative that surfaces are ready to receive Work.

C. Examine surfaces scheduled to be finished prior to commencement of work. Report any condition that may potentially affect proper application.

D. Test shop-applied primer for compatibility with subsequent cover materials.

E. Measure moisture content of surfaces using an electronic moisture meter. Do not apply finishes unless moisture content of surface is below the following maximums:

1. Masonry, Concrete, and Concrete Masonry Units: 12 percent.
2. Exterior Wood: 15 percent, measured in accordance with ASTM D4442.

F. Measure the ph factor of concrete, masonry, and mortar before starting any finishing process.

1. Report results in writing to Architect before starting work.
2. If results of test indicate need for remedial action, provide written description of remedial action. If a different primer or paint systems is required, state the total cost of the change. Do not proceed with remedial action or change without receiving written authorization from Architect.

3.2 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 for finishing.

E. Seal surfaces that might cause bleed through or staining of topcoat.

F. Remove mildew from impervious surfaces by scrubbing with solution of tetra-sodium phosphate and bleach. Rinse with clean water and allow surface to dry.

G. Concrete:

1. Remove release agents, curing compounds, efflorescence, and chalk. Do not coat surfaces if moisture content or alkalinity of surfaces to be coated exceeds that permitted in manufacturer's written instructions.
2. Clean surfaces with pressurized water. Use pressure range of 1,500 to 4,000 psi at 6 to 12 inches. Allow to dry.
3. Prepare surface as recommended by topcoat manufacturer and according to SSPC-SP 13.

H. 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 topcoat manufacturer.
3. Clean surfaces with pressurized water. Use pressure range of 600 to 1,500 psi at 6 to 12 inches. Allow to dry.

I. Aluminum: Remove surface contamination and oils and wash with solvent according to SSPC-SP 1.

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. All dirt, fabrication and cutting oils, accumulated salts, rust, and mill must be removed prior to application of finish materials.
3. Clean galvanized surfaces with nonpetroleum-based solvents so surface is free of oil and surface contaminants. Remove pretreatment from galvanized sheet metal fabricated from coil stock by mechanical or chemical methods as recommended as best practice by primer manufacturer.
4. Shop-Primed Steel Surfaces to be Finish Painted: Use solvent or mechanical cleaning methods that comply with the Steel Structures Painting Council's (SSPC) recommendations. Touch up bare areas and shop-applied prime coats that have been damaged. Wire-brush, clean with solvents recommended by paint manufacturer, and touch up with the same primer as the shop coat. Re-prime entire shop-primed item.
5. 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.

L. Exterior Wood Surfaces to Receive Opaque Finish: Remove dust, grit, and foreign matter. Seal knots, pitch streaks, and sappy sections. Fill nail holes with tinted exterior calking compound after prime coat has been applied. Back prime concealed surfaces before installation.

M. Metal Doors to be Painted: Prime metal door top and bottom edge surfaces.

3.3 APPLICATION:

A. Remove unfinished louvers, grilles, covers, and access panels on mechanical and electrical components and paint separately.

B. Exterior Wood to Receive Opaque Finish: If final painting must be delayed more than 2 weeks after installation of woodwork, apply primer within 2 weeks and final coating within 4 weeks.

C. Apply products in accordance with manufacturer's written instructions and recommendations in "MPI Architectural Painting Specification Manual".

D. Where adjacent sealant is to be painted, do not apply finish coats until sealant is applied.

E. Do not apply finishes over dirt, rust, scale, grease, moisture, scuffed surfaces, or other conditions detrimental to formation of a durable coating film.

F. Do not apply finishes to surfaces that are not dry. Allow applied coats to dry before next coat is applied.

G. Apply each coat to uniform appearance.

H. Vacuum clean surfaces of loose particles. Use tack cloth to remove dust and particles just prior to applying next coat.

I. Reinstall electrical cover plates, hardware, light fixture trim, escutcheons, and fittings removed prior to finishing.

J. Use applicators and methods best suited for substrate and type of material being applied and according to manufacturer's instructions.

1. Brush Application: Use brushes best suited for the type of material applied; use brush of appropriate size for the surface or item being painted; produce results free of visible brush marks.
2. Roller Application: Use rollers of carpet, velvet back, or high-pile sheep's wool as recommended by manufacturer for material and texture required.
3. Spray Application: Use airless spray equipment with orifice size as recommended by manufacturer for material and texture required.

K. Minimum Coating Thickness: Apply paint materials no thinner than manufacturer's recommended spreading rate; provide total dry film thickness of entire system as recommended by manufacturer.

1. Number of coats and film thickness required are the same regardless of application method.
2. If undercoats, stains, or other conditions show through final coat of paint, apply additional coats until paint film is of uniform finish, color, and appearance.
3. Give special attention to ensure edges, corners, crevices, welds, and exposed fasteners receive dry film thickness equivalent to that of flat surfaces.
4. Dark Colors and Deep Clear Colors: Regardless of number of coats specified, apply as many coats as necessary for complete hide.

L. Apply finish to completely cover surfaces with uniform appearance without brush marks, runs, sags, laps, ropiness, holidays, spotting, cloudiness, or other surface imperfections.

1. Apply each coat of paint slightly darker than preceding coat unless otherwise approved.
2. Before applying finish coats, apply a prime coat of material recommended by manufacturer, unless the surface has been prime coated by others; where evidence of suction spots or unsealed areas in first coat appear, recoat primed and sealed surfaces to ensure finish coat with no burn through or other defects due to insufficient sealing.
3. Apply first coat to surface that has been cleaned, pretreated, or otherwise prepared as soon as practical after preparation and before subsequent surface deterioration.
4. Do not apply succeeding coats until the previous coat has cured as recommended by manufacturer.
5. Do not recoat until paint has dried to where it feels firm, does not deform or feel sticky under moderate thumb pressure, and application of another coat will not cause the undercoat to lift or lose adhesion.
6. If manufacturer's instructions recommend sanding to produce a smooth, even surface, sand between coats.
7. Before applying next coat vacuum clean surfaces of loose particles. Use tack cloth to remove dust and particles just prior to applying next coat.
8. Pigmented (Opaque) Finishes: Provide smooth, opaque surface of uniform finish, color, appearance, and coverage.

3.4 FIELD QUALITY CONTROL

A. See Section 01 4000 - Quality Requirements, for general requirements for field inspection.

B. All surfaces, preparation and paint applications shall be inspected.

C. Manufacturer's Product Representative to provide field inspection and written certification of product application.

D. Painted exterior surfaces shall be considered to lack uniformity and soundness if any of the following defects are apparent to the Manufacturer's Product Representative and/or Architect:

1. Brush/roller marks, streaks, laps, runs, sags, drips, heavy stippling, hiding or shadowing by inefficient application methods, skipped or missed areas, and foreign materials in paint coatings.
2. Evidence of poor coverage at rivet heads, plated edges, lap joints, crevices, pockets, corners and re-entrant angles.
3. Damage due to touching before paint is sufficiently dry or any other contributory cause.
4. Damage due to application on moist surfaces or caused by inadequate protection from the weather.
5. Damage and/or contamination of paint due to blown contaminants (dust, spray paint, etc.).

E. Painted surfaces shall be considered unacceptable if any of the following are evident under natural lighting source for exterior surfaces:

1. Visible defects are evident on vertical surfaces when viewed at normal viewing angles from a distance of not less than 39 inches (1000 mm).
2. Visible defects are evident on horizontal surfaces when viewed at normal viewing angles from a distance of not less than 39 inches (1000 mm).
3. Visible defects are evident on ceiling, soffit and other overhead surfaces when viewed at normal viewing angles.
4. When the final coat on any surface exhibits a lack of uniformity of color, sheen, texture, and hiding across full surface area.

F. Painted surfaces rejected by the Manufacturer's Product Representative and/or Architect shall be made good at the expense of the Contractor. Small, affected areas may be touched up; large, affected areas or areas without sufficient dry film thickness of paint shall be repainted. Runs and sags shall be removed by a scraper or by sanding prior to application of paint.

3.5 CLEANING

A. Collect waste material that could constitute a fire hazard, place in closed metal containers, and remove daily from site.

B. At the end of each workday, remove empty cans, rags, rubbish, and other discarded paint materials from site.

3.6 PROTECTION

A. Protect finishes until completion of project.

B. Protect other work, whether being painted or not, against damage by painting. Correct damage by cleaning, repairing or replacing, and repainting as approved by Architect.

C. Provide "Wet Paint" signs to protect newly painted finishes. Remove temporary protective wrappings provided by others to protect their work after completing painting operations.

D. At completion of construction activities of other trades, touch up and restore damaged or defaced painted surfaces.

END OF SECTION

SECTION 09 9123 – INTERIOR PAINTING

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Furnish all labor, materials, equipment, tools, and services required to fully complete all Interior Painting work as is indicated on the drawings and/or specified herein including, but not limited to, the following described items.

B. Surface preparation of substrates as required for acceptance of painting, including high-pressure washing, abrasive blasting, cleaning, small crack repair, patching, and caulking.

C. Field application of paints.

D. Materials for back priming woodwork.

E. Scope: Finish interior surfaces exposed to view, unless fully factory-finished and unless otherwise indicated, including the following:

1. If a surface, material, or item is not specifically mentioned, paint in the same manner as similar surfaces, materials, or items, regardless of whether colors are indicated or not.
2. Finish surfaces behind movable equipment and furnishings the same as similar exposed surfaces.
3. Finish surfaces to be concealed behind permanently installed fixtures, equipment, and furnishings, using primer only, prior to installation of the permanent item.
4. Finish semi-exposed structure, miscellaneous pipes, conduit, ducts, etc. visible through finished ceiling elements.
5. Finish the back sides of access panels and removable and hinged covers to match exposed surfaces.
6. Both sides and edges of plywood backboards for electrical and telecom equipment before installing equipment.
7. Elevator pit ladders.
8. Prime surfaces to receive wall coverings.

F. 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. Tile Backer Board
4. Items indicated to remain unfinished.
5. Fire rating labels, equipment serial number and capacity labels, bar code labels, and operating parts of equipment.
6. Stainless steel, anodized aluminum, bronze, terne-coated stainless steel, and lead items.

    a. Unless indicated

7. Marble, granite, slate, and other natural stones.
8. Floors, unless specifically indicated.
9. Ceramic and other tiles.
10. Brick, architectural concrete, cast stone, integrally colored plaster, and stucco.
11. Glass.
12. Concrete masonry units in utility, mechanical, and electrical spaces.
13. Acoustical materials, unless specifically indicated.
14. Concealed pipes, ducts, and conduits.

G. Do not include sales tax, refer to Section 00 0104 – Notice to Contractors

1.2 RELATED REQUIREMENTS

A. Section 05 5100 - Metal Stairs: Shop-primed items.

B. Section 09 9113 - Exterior Painting.

C. Section 09 9724 - Sealers - Interior Concrete, Precast and Masonry Sealers

D. Division 21 - Identification for Fire Suppression Piping and Equipment: Color coding scheme for items to be painted under this section.

E. Division 22 - Identification for Plumbing Piping and Equipment: Color coding scheme for items to be painted under this section.

F. Division 23 - Identification for HVAC Piping and Equipment: Color coding scheme for items to be painted under this section.

G. Division 26 - Identification for Electrical Systems: Color coding scheme for items to be painted under this section.

H. Section: 32 1723 - Pavement Markings Painted pavement markings.

1.3 DEFINITIONS

A. Comply with ASTM D16 for interpretation of terms used in this section.

B. Gloss Level 1: Not more than 5 units at 60 degrees and 10 units at 85 degrees, according to ASTM D523, a matte flat finish.

C. Gloss Level 2: Not more than 10 units at 60 degrees and 10 to 35 units at 85 degrees, according to ASTM D 523, a high-side sheen flat, velvet-like finish.

D. Gloss Level 3: 10 to 25 units at 60 degrees and 10 to 35 units at 85 degrees, according to ASTM D 523, an eggshell finish.

E. Gloss Level 4: 20 to 35 units at 60 degrees and not less than 35 units at 85 degrees, according to ASTM D 523, a satin-like finish.

F. Gloss Level 5: 35 to 70 units at 60 degrees, according to ASTM D 523, a semi-gloss finish.

G. Gloss Level 6: 70 to 85 units at 60 degrees, according to ASTM D 523, a gloss finish.

1.4 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 D4258 - Standard Practice for Surface Cleaning Concrete for Coating 2005 (Reapproved 2017).

D. ASTM D4442 - Standard Test Methods for Direct Moisture Content Measurement of Wood and Wood-Based Materials 2020.

E. ASTM D523 - Standard Test Method for Specular Gloss 2014 (Reapproved 2018).

F. MPI (APSM) - Master Painters Institute Architectural Painting Specification Manual Current Edition.

G. SSPC-SP 1 - Solvent Cleaning 2015, with Editorial Revision (2016).

H. SSPC-SP 2 - Hand Tool Cleaning 2018.

I. SSPC-SP 3 - Power Tool Cleaning 2018.

J. SSPC-SP 13 - Surface Preparation of Concrete 1997 (Reaffirmed 2003).

1.5 SUBMITTALS

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

B. Product Data: Provide a complete list of products to be used, with the following information for each:

1. Manufacturer's name, product name and/or catalog number, and general product category (e.g., "alkyd enamel").
2. Cross-reference to specified paint system(s) product is to be used in; include a description of each system. Use the same designations indicated on Drawings and in schedules.
3. Manufacturer's installation instructions.
4. Manufacturer's Instructions: Indicate special surface preparation procedures and substrate conditions requiring special attention.
5. Product characteristics.
6. Primer requirements and finish specification.
7. Storage and handling requirements and recommendations.
8. Application methods.
9. Cautions.

C. Selection Samples: Submit a complete set of color chips that represent the full range (including premium) of the manufacturer's color samples available.

1. Allow 30 days for the approval process, after receipt of complete samples by the Architect.
2. Paint color submittals will not be considered until color submittals for major materials not to be painted, such as masonry, factory-finished metals, wood doors, and casework, have been approved.
3. Where sheen is specified, submit samples in only that sheen.
4. Where sheen is not specified, discuss sheen options with Architect before preparing samples, to eliminate sheens not required.
5. Within a reasonable amount of time after all color-related submittals have been reviewed and accepted, the Architect will issue the "Color Schedule" for the project which will include all required paint color selections for the Contractor's use.

D. Samples for Verification: For eah type of paint system and in each color and gloss of topcoat.

1. Submit Samples on rigid backing, 8 inches (200 mm) square.
2. Step coats on Samples to show each coat required for the system.
3. Label each coat of each Sample.
4. Label each Sample for location and application area.

E. Certification: By manufacturer that paints, and finishes comply with VOC limits specified.

1.6 MAINTENANCE MATERIAL SUBMITTALS

A. Maintenance Data: Submit coating maintenance manual including finish schedule showing where each product/color/finish was used, product technical datasheets, 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.

B. Maintenance Materials: Furnish the following for the Owner's use in the maintenance sheets of the project.

1. See Section 01 6000 - Product Requirements, for additional provisions.

2. Extra Paint and Finish Materials: 1 gallon of each color; from the same product run, the store where directed.
3. Label each container with color, type, texture, and room locations in addition to the manufacturer's label.

1.7 QUALITY ASSURANCE

A. This Contractor shall have a minimum of five (5) years of proven satisfactory experience and shall show proof before the commencement of work that he will maintain a qualified crew of painters throughout the duration of the work. The contractor shall provide a list of the last three comparable jobs including, name and location, project manager, start/completion dates, and value of painting work.

B. Material Safety Data Sheets: At the project, the site maintains files of MSDS sheets for each product used; become familiar with and follow the manufacturer's stated application and safety requirements.

C. All surfaces requiring painting/coating shall be inspected by the Painting/Coating Manufacturer's Product Representative who shall notify the Architect and General Contractor in writing of any defects or problems, prior to commencing painting work, or after the prime coat shows defects in the substrate. The Manufacturer's Product Representative shall provide written certification of all surfaces and conditions for paint or coating system application as well as on-site supervision, inspection, and approval of the application.

D. The painting contractor shall receive written confirmation of the specific surface preparation procedures and primers used for all fabricated steel items from the fabricator/supplier to ascertain appropriate and manufacturer compatible finish coat materials to be used before painting any such work.

E. Manufacturer Qualifications: Company specializing in manufacturing the products specified, with minimum of three years of documented experience.

F. Applicator Qualifications: Company specializing in performing the type of work specified with minimum of 3 years' experience and approved by manufacturer.

1.8 MOCK-UP

A. See Section 01 4000 - Quality Requirements, for general requirements for mock-up.

B. Mockups: Apply mockups of each paint system indicated and each color and finish selected to verify preliminary selections made under Sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.

1. Architect will select one surface to represent surfaces and conditions for application of each paint system specified in Part 3.

    a. Vertical and Horizontal Surfaces: Provide samples of at least 100 sq. ft. (9 sq. m).
    b. Other Items: Architect will designate items or areas required.

2. Final approval of color selections will be based on mockups.

    a. If preliminary color selections are not approved, apply additional mockups of additional colors selected by Architect at no added cost to Owner.

3. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
4. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

C. Locate where directed by Architect.

D. Mock-up may remain as part of the work.

a. site.

1.9 DELIVERY, STORAGE, AND HANDLING

A. Delivery and Handling: Deliver products to Project site in an undamaged condition in manufacturer's original sealed containers, complete with labels and instructions for handling, storing, unpacking, protecting, and installing. Packaging shall bear the manufacturer's label with the following information:

1. Product name and type (description).
2. Batch date.
3. Color number.
4. VOC content.
5. Environmental handling requirements.
6. Surface preparation requirements.
7. Application instructions.

B. Paint Materials: Store materials not in use in tightly covered containers in well-ventilated areas 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. Maintain containers in clean condition, free of foreign materials and residue.
2. Remove rags and waste from storage areas daily.

1.10 FIELD CONDITIONS

A. Apply paints only when temperature of surfaces to be painted and ambient air temperatures are between 50 and 95 deg F (10 and 35 deg C).

B. Follow manufacturer's recommended procedures for producing best results, including testing of substrates, moisture in substrates, and humidity and temperature limitations.

C. Do not apply materials when relative humidity exceeds 85 percent; at temperatures less than 5 degrees F above the dew point; or to damp or wet surfaces.

D. Provide lighting level of 80 ft candles measured mid-height at substrate surface.

1.11 GUARANTEE

A. This Contractor shall guarantee his work for a period of One (1) year from date of Substantial Completion. The guarantee shall be on the form included in Section 01 7800.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Basis-of-Design Product: Subject to compliance with requirements, provide products indicated from one of the following:

1. PPG Paints.

B. Acceptable Manufacturers:

PPG Paints
Sherwin-Williams Company,
Benjamin Moore

C. Provide paints and finishes from the same manufacturer to the greatest extent possible.

1. In the event that a single manufacturer cannot provide specified products, minor exceptions will be permitted provided approval by Architect is obtained using the specified procedures for substitutions.
2. Substitution of other products by the same manufacturer is preferred over substitution of products by a different manufacturer.

D. Primer Sealers: Same manufacturer as topcoats.

E. Substitutions: See Section 01 6000 - Product Requirements.

2.2 PAINTS AND FINISHES – GENERAL

A. Material Compatibility:

1. Provide paints and finishes of a soft paste consistency, capable of being readily and uniformly dispersed to a homogeneous coating, with good flow and brushing properties, and capable of drying or curing free of streaks or sags.
2. Provide materials that are compatible with one another, and the substrates indicated under conditions of service and application, as demonstrated by the manufacturer based on testing and field experience.
3. For opaque finishes, tint each coat including primer coat and intermediate coats, one-half shade lighter than succeeding coat, with final finish coat as base color.
4. Supply each paint material in quantity required to complete entire project's work from a single production run.
5. Do not reduce, thin, or dilute paint or finishes or add materials unless such procedure is specifically described in manufacturer's product instructions.
6. For each coat in a paint system, provide products recommended in writing by manufacturers of topcoat for use in paint system and on substrate indicated.

B. VOC Content: Utah Administrative Code R307-361 Products shall comply with VOC limits of authorities having jurisdiction and, for interior and exterior paints and coatings applied at Project site, the following VOC limits, exclusive of colorants added to a tint base, when calculated according to 40 CFR 59, Subpart D (EPA Method 24)].

1. Flat Paints and Coatings: 50 g/L.
2. Non flat Paints and Coatings: 100 g/L.
3. Dry-Fog Coatings: 150 g/L.
4. Primers, Sealers, and Undercoaters: 100 g/L.
5. Industrial maintenance Coatings Applied to Ferrous Metals: 250 g/L.
6. Zinc-Rich Industrial Maintenance Primers: 340 g/L.
7. Pretreatment Wash Primers: 420 g/L.
8. Floor Coatings Foot Traffic: 100 g/L.
9. Floor Coatings High Performance: 250 g/L.
10. Shellacs, Clear: 730 g/L.
11. Shellacs, Pigmented: 550 g/L.
12. Wood Coatings: 275 g/L.

C. Flammability: Comply with applicable code for surface burning characteristics.

D. Sheens: Provide the sheens specified; where sheen is not specified, the sheen will be selected later by Architect from the manufacturer's full line.

E. Colors: To be selected from the manufacturer's full range of available colors.

1. Selection to be made by Architect after awarding of contract.
2. Allow for a minimum of three colors for each system, unless otherwise indicated, without additional cost to the Owner.

3. Extend colors to surface edges; colors may change at any edge as directed by Architect.
4. In finished areas, finish pipes, ducts, conduit, and equipment the same color as the wall/ceiling they are mounted on/under.
5. In utility areas, finish equipment, piping, conduit, and exposed ductwork in colors according to the color-coding scheme indicated.

2.3 PAINT SYSTEMS – INTERIOR

A. NOTE:

1. Refer to Section 03 3511 - Exposed Concrete Floor Finishes for concrete floor sealers
2. Refer to Section 07 1900 - Exterior Water Repellents and Graffiti Resistant Sealers for Exterior Sealers
3. Refer to Section 09 9724 - Sealers - Interior Concrete, Precast and Masonry Sealers for Interior Sealers

B. Gypsum - ceilings and soffits: Acrylic, Flat finish

1. Primer:

a. Product: PPG Seal Grip Gripper Acrylic Primer, 17-921XI

2. 1st coat:

a. Product: PPG Speedhide Zero Interior Latex Flat, 6-5110 Series

3. 2nd coat:

a. Product: PPG Speedhide Zero Interior Latex Flat, 6-5110 Series

C. Gypsum - walls: Acrylic, Satin finish

Gypsum walls under tackable wall systems - (2) coats primer only.

1. Primer:

a. Product: PPG Seal Grip Gripper Acrylic Primer, 17-921XI

2. 1st coat:

a. Product: PPG Speedhide Zero Latex Satin, 6-5410 Series

3. 2nd coat:

a. Product: PPG Speedhide Zero Latex Satin, 6-5410 Series

D. Gypsum - walls and ceilings: Epoxy, semi-gloss finish.

For: Restrooms, Locker rooms, Kitchen, Gyms, Cafeteria, Hallways and Custodial.

1. Primer:

a. Product: PPG Seal Grip Gripper Acrylic Primer, 17-921XI

2. 1st coat:

a. Product: PPG Pitt Glaze WB1 Interior Pre-Catalyzed Semi-Gloss, 16-510 Series

3. 2nd coat:

a. Product: PPG Pitt Glaze WB1 Interior Pre-Catalyzed Semi-Gloss, 16-510 Series

E. Pipe Insulation and Pipe Wrappings

1. Primer:

a. Product: PPG Seal Grip Gripper Acrylic Primer, 17-921XI

2. 1st coat:

a. Product: PPG Speedhide Zero Latex Satin, 6-5410 Series

3. 2nd coat:

a. Product: PPG Speedhide Zero Latex Satin, 6-5410 Series

F. Ferrous Metal: Epoxy Semi-Gloss Finish

a. HM Doors, Frames, Galvanized metals, non-galvanized metals, and miscellaneous metals

1. Primer:

a. Product: PPG Pitt-Tech Plus Primer, 4020 PF

2. 1st coat:

a. Product: PPG Pitt Glaze WB1 Interior Pre-Catalyzed Semi-Gloss, 16-510 Series

3. 2nd coat:

a. Product: PPG Pitt Glaze WB1 Interior Pre-Catalyzed Semi-Gloss, 16-510 Series

G. Ferrous Metal: Semi-Gloss Finish

Handrails

1. Primer:

a. Product: PPG Amercoat 385 Epoxy Primer

2. 1st coat:

a. Product: PPG Pitthane Ultra Gloss, 95-812

3. 2nd coat:

a. Product: PPG Pitthane Ultra Gloss, 95-812

H. Non-Ferrous Metal

1. Primer:

a. Product: PPG Pitt-Tech Plus Primer, 4020 PF

2. 1st coat:

a. Product: PPG Pitt Tech Plus EP DTM Acrylic Semi-Gloss Finish, 90-1610 Series

3. 2nd coat:

a. Product: PPG Pitt Tech Plus EP DTM Acrylic Semi-Gloss Finish, 90-1610 Series

I. Concrete Floors: Epoxy Coating (medium / heavy duty)

For: Kitchens, Labs, Restrooms, Custodial, and Corridors

1. Primer: Type recommended by flooring manufacturer on data sheet for substrate and flooring system indicated.
2. 1st Coat:

a. Product: PPG Aquapon WB EP Waterborne Semi-Gloss Epoxy, 98E-51/98E-100 Series; (applied at 2-3 mils dft per coat).

3. 2nd Coat:

a. Product: PPG Aquapon WB EP Two-Component Waterborne Semi-Gloss Epoxy Coating, 98E-51/98E-100 Series; (applied at 2-3 mils dft per coat).

2.4 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.

2.5 SOURCE QUALITY CONTROL

A. Testing of Paint Materials: Owner reserves the right to invoke the following procedure:

1. Owner will engage the services of a qualified testing agency to sample paint materials. Contractor will be notified in advance and may be present when samples are taken. If paint materials have already been delivered to Project site, samples may be taken at Project site. Samples will be identified, sealed, and certified by testing agency.
2. Testing agency will perform tests for compliance with product requirements.
3. Owner may direct Contractor to stop applying coatings if test results show materials being used do not comply with product requirements. Contractor shall remove noncomplying paint materials from Project site, pay for testing, and repaint surfaces painted with rejected materials. Contractor will be required to remove rejected materials from previously painted surfaces if, on repainting with complying materials, the two paints are incompatible.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify that surfaces are ready to receive work as instructed by the product manufacturer.

B. Examine substrates and conditions, with Applicator present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work. Verify suitability of substrates, including surface conditions and compatibility with existing finishes and primers. Where acceptability of substrate conditions is in question, apply samples and perform in-situ testing to verify compatibility, adhesion, and film integrity of new paint application.

1. Report, in writing, conditions that may affect application, appearance, or performance of paint.

C. Substrate Conditions:

1. Measure moisture content of surfaces using an electronic moisture meter. Do not apply finishes unless moisture content of surfaces are below the following maximums:

a. Gypsum Wallboard: 12 percent.
b. Plaster and Stucco: 12 percent.
c. Masonry, Concrete, and Concrete Masonry Units: 12 percent.
d. Interior Wood: 15 percent, measured in accordance with ASTM D4442.
e. Concrete Floors and Traffic Surfaces: 8 percent.

2. Gypsum Board Substrates: Verify that finishing compound is sanded smooth.
3. Plaster Substrates: Verify that plaster is fully cured.
4. Spray-Textured Ceiling Substrates: Verify that surfaces are dry.

D. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

E. Test shop-applied primer for compatibility with subsequent cover materials.

3.2 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 mask surface appurtenances, including electrical plates, hardware, light fixture trim, escutcheons, and fittings, prior to preparing surfaces or finishing.

D. Seal surfaces that might cause bleed through or staining of topcoat.

E. Concrete:

1. Remove release agents, curing compounds, efflorescence, and chalk. Do not coat surfaces if moisture content or alkalinity of surfaces to be coated exceeds that permitted in the manufacturer's written instructions.
2. Clean surfaces with pressurized water. Use a pressure range of 1,500 to 4,000 psi at 6 to 12 inches. Allow to dry.
3. Clean concrete according to ASTM D4258. Allow to dry.
4. Prepare the surface as recommended by the topcoat manufacturer and according to SSPC-SP 13.

F. Masonry:

1. Remove efflorescence and chalk. Do not coat surfaces if moisture content or alkalinity of surfaces or if alkalinity of mortar joints exceeds that permitted in manufacturer's written instructions. Allow to dry.
2. Prepare the surface as recommended by the topcoat manufacturer.
3. Clean surfaces with pressurized water. Use a pressure range of 600 to 1,500 psi at 6 to 12 inches. Allow to dry.

G. Concrete Floors and Traffic Surfaces: Remove contamination, acid etch, and rinse floors with clear water. Verify required acid-alkali balance is achieved. Allow to dry.

H. Gypsum Board: Fill minor defects with filler compound. Spot prime defects after repair.

I. Plaster: Fill hairline cracks, small holes, and imperfections with latex patching plaster. Make smooth and flush with adjacent surfaces. Wash and neutralize high alkali surfaces.

J. Insulated Coverings: Remove dirt, grease, and oil from canvas and cotton.

K. Aluminum: Remove surface contamination and oils and wash with solvent according to SSPC-SP 1.

L. 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.

M. Ferrous Metal:

1. Solvent clean according to SSPC-SP 1.
2. Shop-Primed Surfaces: Sand and scrape to remove loose primer and rust. Feather edges to make touch-up patches inconspicuous. Clean surfaces with solvent. Prime bare steel surfaces. Re-prime entire shop-primed item.
3. Steel Substrates: Remove rust, loose mill scale, and shop primer, if any. Clean using methods recommended in writing by paint manufacturer but not less than the following:

    a. SSPC-SP 2, "Hand Tool Cleaning."
    b. SSPC-SP 3, "Power Tool Cleaning."
    c. SSPC-SP 11, "Power Tool Cleaning to Bare Metal."

N. Galvanized-Metal Substrates: Remove grease and oil residue from galvanized sheet metal fabricated from coil stock by mechanical methods to produce clean, lightly etched surfaces that promote adhesion of subsequently applied paints.

O. Aluminum Substrates: Remove loose surface oxidation.

P. Wood Surfaces to Receive Opaque Finish:

1. Wipe off dust and grit prior to priming.
2. Seal knots, pitch streaks, and sappy sections with sealer.
3. Fill nail holes and cracks after primer has dried.
4. Sand between coats.

5. Back prime concealed surfaces before installation.

Q. Glue-Laminated Beams: Prior to finishing, wash surfaces with solvent, remove grease and dirt.

R. Wood Doors to be Field Finished: Seal wood door top and bottom edge surfaces with clear sealer.

S. Metal Doors to be Painted: Prime metal door top and bottom edge surfaces.

T. Cotton or Canvas Insulation Covering Substrates: Remove dust, dirt, and other foreign material that might impair bond of paints to substrates.

3.3 APPLICATION

A. Remove unfinished louvers, grilles, covers, and access panels on mechanical and electrical components and paint separately.

B. Apply products in accordance with manufacturer's written instructions and recommendations in "MPI Architectural Painting Specification Manual".

1. Use applicators and techniques suited for paint and substrate indicated.
2. Paint surfaces behind movable equipment and furniture same as similar exposed surfaces. Before final installation, paint surfaces behind permanently fixed equipment or furniture with prime coat only.
3. Paint front and backsides of access panels, removable or hinged covers, and similar hinged items to match exposed surfaces.
4. Do not paint over labels of independent testing agencies or equipment name, identification, performance rating, or nomenclature plates.
5. Primers specified in painting schedules may be omitted on items that are factory primed or factory finished if acceptable to topcoat manufacturers.

C. Where adjacent sealant is to be painted, do not apply finish coats until sealant is applied.

D. Do not apply finishes to surfaces that are not dry. Allow applied coats to dry before next coat is applied.

E. Apply paints to produce surface films without cloudiness, spotting, holidays, laps, brush marks, roller tracking, runs, sags, ropiness, or other surface imperfections. Cut in sharp lines and color breaks.

1. Tint each undercoat a lighter shade to facilitate identification of each coat if multiple coats of same material are to be applied. Tint undercoats to match color of topcoat but provide sufficient difference in shade of undercoats to distinguish each separate coat.
2. If undercoats or other conditions show through topcoat, apply additional coats until cured film has a uniform paint finish, color, and appearance.

F. Dark Colors and Deep Clear Colors: Regardless of number of coats specified, apply as many coats as necessary for complete hide.

G. Sand wood and metal surfaces lightly between coats to achieve required finish.

H. Vacuum clean surfaces of loose particles. Use tack cloth to remove dust and particles just prior to applying next coat.

I. Reinstall electrical cover plates, hardware, light fixture trim, escutcheons, and fittings removed prior to finishing.

3.4 FIELD QUALITY CONTROL

A. See Section 01 4000 - Quality Requirements, for general requirements for field inspection.

B. Dry Film Thickness Testing: Owner may engage the services of a qualified testing and inspecting agency to inspect and test paint for dry film thickness.

1. Contractor shall touch up and restore painted surfaces damaged by testing.
2. If test results show that dry film thickness of applied paint does not comply with paint manufacturer's written recommendations, Contractor shall pay for testing and apply additional coats as needed to provide dry film thickness that complies with paint manufacturer's written recommendations.

3.5 CLEANING

A. Collect waste material that could constitute a fire hazard, place in closed metal containers, and remove daily from site.

B. After completing paint application, clean spattered surfaces. Remove spattered paints by washing, scraping, or other methods. Do not scratch or damage adjacent finished surfaces.

3.6 PROTECTION

A. Protect finishes until completion of project.

B. Touch-up damaged finishes after Substantial Completion.

END OF SECTION

SECTION 09 9300 - STAINING AND TRANSPARENT FINISHING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section includes surface preparation and application of wood stains and transparent finishes on the following substrates:

1. Interior Substrates:

a. Dressed lumber (finish carpentry or woodwork).
b. Wood-based panel products.

1.3 DEFINITIONS

A. MPI Gloss Level 1: Not more than 5 units at 60 degrees and 10 units at 85 degrees, according to ASTM D 523.

B. MPI Gloss Level 4: 20 to 35 units at 60 degrees and not less than 35 units at 85 degrees, according to ASTM D 523.

C. MPI Gloss Level 5: 35 to 70 units at 60 degrees, according to ASTM D 523.

D. MPI Gloss Level 6: 70 to 85 units at 60 degrees, according to ASTM D 523.

E. MPI Gloss Level 7: More than 85 units at 60 degrees, according to ASTM D 523.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product. Include preparation requirements and application instructions.

1. Include printout of current "MPI Approved Products List" for each product category specified, with the proposed product highlighted.
2. Indicate VOC content.

B. Samples for Initial Selection: For each type of product.

C. Samples for Verification: For each type of finish system and in each color and gloss of finish required.

1. Submit Samples on representative samples of actual wood substrates, 8 inches square.
2. Apply coats on Samples in steps to show each coat required for system.
3. Label each coat of each Sample.
4. Label each Sample for location and application area.

1.5 QUALITY ASSURANCE

A. Mockups: Apply mockups of each finish system indicated and each color selected to verify preliminary selections made under Sample submittals, to demonstrate aesthetic effects, and to set quality standards for materials and execution.

1. Architect will select one surface to represent surfaces and conditions for application of each type of finish system and substrate.

a. Vertical and Horizontal Surfaces: Provide samples of at least 100 sq. ft.
b. Other Items: Architect will designate items or areas required.

2. Final approval of stain color selections will be based on mockups.

a. If preliminary stain color selections are not approved, apply additional mockups of additional stain colors selected by Architect at no added cost to Owner.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Store materials not in use in tightly covered containers in well-ventilated areas with ambient temperatures continuously maintained at not less than 45 deg F.

1. Maintain containers in clean condition, free of foreign materials and residue.
2. Remove rags and waste from storage areas daily.

1.7 FIELD CONDITIONS

A. Apply finishes only when temperature of surfaces to be finished and ambient air temperatures are between 50 and 95 deg.

B. Do not apply finishes when relative humidity exceeds 85 percent, at temperatures less than 5 deg F above the dew point, or to damp or wet surfaces.

C. Do not apply exterior finishes in snow, rain, fog, or mist.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Products: Subject to compliance with requirements, provide product listed in wood finish systems schedules for the product category indicated.

2.2 MATERIALS, GENERAL

A. MPI Standards: Products shall comply with MPI standards indicated and shall be listed in its "MPI Approved Products List."

B. Material Compatibility:

1. Materials for use within each paint system shall be compatible with one another and substrates indicated, under conditions of service and application as demonstrated by manufacturer, based on testing and field experience.
2. For each coat in a paint system, products shall be recommended in writing by manufacturers of topcoat for use in paint system and on substrate indicated.

C. Stain Colors: As selected by Architect from manufacturer's full range.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and conditions, with Applicator present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work.

B. Verify suitability of substrates, including surface conditions and compatibility with existing finishes and primers.

C. Proceed with finish application only after unsatisfactory conditions have been corrected.

1. Beginning finish application constitutes Contractor's acceptance of substrates and conditions.

3.2 PREPARATION

A. Comply with manufacturer's written instructions and recommendations in "MPI Architectural Painting Specification Manual" applicable to substrates indicated.

B. Remove hardware, covers, plates, and similar items already in place that are removable. If removal is impractical or impossible because of size or weight of item, provide surface-applied protection before surface preparation and finishing.

1. After completing finishing operations, use workers skilled in the trades involved to reinstall items that were removed. Remove surface-applied protection if any.

C. Clean and prepare surfaces to be finished according to manufacturer's written instructions for each substrate condition and as specified.

1. Remove dust, dirt, oil, and grease by washing with a detergent solution; rinse thoroughly with clean water and allow to dry. Remove grade stamps and pencil marks by sanding lightly. Remove loose wood fibers by brushing.
2. Remove mildew by scrubbing with a commercial wash formulated for mildew removal and as recommended by stain manufacturer.

D. Interior Wood Substrates:

1. Scrape and clean knots, and apply coat of knot sealer before applying primer.
2. Apply wood filler paste to open-grain woods, as defined in "MPI Architectural Painting Specification Manual," to produce smooth, glasslike finish.
3. Sand surfaces exposed to view and dust off.
4. After priming, fill holes and imperfections in the finish surfaces with putty or plastic wood filler. Sand smooth when dry.

3.3 APPLICATION

A. Apply finishes according to manufacturer's written instructions and recommendations in "MPI Architectural Painting Specification Manual."

1. Use applicators and techniques suited for finish and substrate indicated.
2. Finish surfaces behind movable equipment and furniture same as similar exposed surfaces.
3. Do not apply finishes over labels of independent testing agencies or equipment name, identification, performance rating, or nomenclature plates.

B. Apply finishes to produce surface films without cloudiness, holidays, lap marks, brush marks, runs, ropiness, or other surface imperfections.

3.4 CLEANING AND PROTECTION

A. At end of each workday, remove rubbish, empty cans, rags, and other discarded materials from Project site.

B. After completing finish application, clean spattered surfaces. Remove spattered materials by washing, scraping, or other methods. Do not scratch or damage adjacent finished surfaces.

C. Protect work of other trades against damage from finish application. Correct damage by cleaning, repairing, replacing, and refinishing, as approved by Architect, and leave in an undamaged condition.

D. At completion of construction activities of other trades, touch up and restore damaged or defaced finished wood surfaces.

3.5 INTERIOR WOOD -FINISH-SYSTEM SCHEDULE

A. Woodwork – Stained and Varnished – Clear Finish

1. Open Grained Wood

a. 1st Coat: S-W WoodClassics 250 g/L Stain, A49W800 Series.
b. 2nd Coat: S-W Sherwood Natural Filler, D70T1.
c. 3rd Coat: S-W WoodClassics WB Polyurethane, A68 Series.
d. 4th Coat: S-W WoodClassics WB Polyurethane, A68 Series.

2. Closed Grained Wood

a. 1st Coat: S-W WoodClassics 250 g/L Stain, A49W800 Series.
b. 2nd Coat: S-W Sherwood WB Polyurethane, A68 Series.
c. 2nd Coat: S-W Sherwood WB Polyurethane, A68 Series.

B. Woodwork – Natural – Clear Finish

1. Open Grained Wood

a. 1st Coat: S-W Sherwood Natural Filler, D70T1.
b. 2nd Coat: S-W WoodClassics WB Polyurethane, A68 Series.
c. 3rd Coat: S-W WoodClassics WB Polyurethane, A68 Series.

2. Closed Grained Wood

a. 1st Coat: S-W Sherwood WB Polyurethane, A68 Series.
b. 2nd Coat: S-W Sherwood WB Polyurethane, A68 Series.

END OF SECTION 09 9300

DIVISION 10 - SPECIALTIES:

10 1423	Panel Signage
10 2800	Toilet and Bath Accessories
10 4413	Fire Protection Cabinets
10 4416	Fire Extinguishers
10 7516	Ground-Set Flagpoles

SECTION 10 1423 - PANEL SIGNAGE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Panel signs at restroom doors.

1.3 DEFINITIONS

A. Accessible: In accordance with the accessibility standard.

1.4 COORDINATION

A. Furnish templates for placement of sign-anchorage devices embedded in permanent construction by other installers.

1.5 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings: For panel signs.

1. Include fabrication and installation details and attachments to other work.
2. Show sign mounting heights, locations of supplementary supports to be provided by others, and accessories.
3. Show message list, typestyles, graphic elements, including raised characters and Braille, and layout for each sign at least half size.

C. Samples for Initial Selection: For each type of sign assembly, exposed component, and exposed finish.

1. Include representative Samples of available typestyles and graphic symbols.

1.6 FIELD CONDITIONS

A. Field Measurements: Verify locations of anchorage devices embedded in permanent construction by other installers by field measurements before fabrication, and indicate measurements on Shop Drawings.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Accessibility Standard: Comply with applicable provisions in the U.S. Architectural & Transportation Barriers Compliance Board's ADA-ABA Accessibility Guidelines for Buildings and Facilities and ICC A117.1 for signs.

2.2 SIGNS

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

1. Mohawk Sign Systems
2. Equal as accepted by Architect.

B. Panel Restroom Signs: Sign with smooth, uniform surfaces; with message and characters having uniform faces, sharp corners, and precisely formed lines and profiles; and as follows:

1. Restroom signs design ADA-3, size 8" x 8" with a 4" accessibility and gender symbol with the verbal description placed directly below and followed by Grade 2 braille.
2. Plaque material shall be Special Purpose SP125 decorative thermosetting high pressure laminate. Material to be 1/8" thick laminate with a melamine resin surface and a phenolic resin core which provides resistance to abrasion, stains, alcohol, solvents, boiling water, and heat. The material shall be NEMA rated and have flammability and smoke values that meet the standards for flammability of interior materials.
3. Sign-Panel Perimeter: Finish edges smooth.

    a. Edge Condition, Vertical Edges, Horizontal Edges: Square cut.

4. Mounting: Manufacturer's standard method for substrates indicated with concealed anchors.
5. Text and Typeface: Typeface as selected by Architect from manufacturer's full range, and finish raised characters to contrast with background color, and finish Braille to match background color.
6. Flatness Tolerance: Sign panel shall remain flat under installed conditions as indicated and within a tolerance of plus or minus 1/16 inch measured diagonally from corner to corner.

2.3 FABRICATION

A. General: Provide manufacturer's standard sign assemblies according to requirements indicated.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of signage work.

B. Verify that sign-support surfaces are within tolerances to accommodate signs without gaps or irregularities between backs of signs and support surfaces unless otherwise indicated.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. General: Install signs using mounting methods indicated and according to manufacturer's written instructions.

1. Install signs level, plumb, true to line, and at locations and heights indicated, with sign surfaces free of distortion and other defects in appearance.
2. Install signs so they do not protrude or obstruct according to the accessibility standard.
3. Before installation, verify that sign surfaces are clean and free of materials or debris that would impair installation.

B. Mounting Methods:

1. Signs shall be mounted using vinyl tape and silastic adhesive. All signs shall be mounted 60" from the floor to the center of the sign and the latch side. The distance between the door frame and sign should be 2". Installer user assumes responsibility for suitable installation of the signs.

3.3 ADJUSTING AND CLEANING

A. Remove and replace damaged or deformed signs and signs that do not comply with specified requirements. Replace signs with damaged or deteriorated finishes or components that cannot be successfully repaired by finish touchup or similar minor repair procedures.

B. Remove temporary protective coverings and strippable films as signs are installed.

C. On completion of installation, clean exposed surfaces of signs according to manufacturer's written instructions, and touch up minor nicks and abrasions in finish. Maintain signs in a clean condition during construction and protect from damage until acceptance by Owner.

END OF SECTION 10 1423

SECTION 10 2800 - TOILET AND BATH ACCESSORIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes the following:

1. Toilet and bath accessories.
2. Installation of Owner-furnished Items: Restroom dispensers.

1.3 SUBMITTALS

A. Product Data: Include construction details, material descriptions and thicknesses, dimensions, profiles, fastening and mounting methods, specified options, and finishes for each type of accessory specified.

1.4 QUALITY ASSURANCE

A. Source Limitations: Provide products of same manufacturer for each type of accessory unit and for units exposed to view in same areas, unless otherwise approved by Architect.

B. Product Options: Accessory requirements, including those for materials, finishes, dimensions, capacities, and performance, are established by specific products indicated in the Toilet and Bath Accessory Schedule.

1. Other manufacturers' products with equal characteristics may be considered. See Division 1 Section "Substitutions."
2. Do not modify aesthetic effects, as judged solely by Architect, except with Architect's approval. Where modifications are proposed, submit comprehensive explanatory data to Architect for review.

1.5 COORDINATION

A. Coordinate accessory locations with other work to prevent interference with clearances required for access by disabled persons, proper installation, adjustment, operation, cleaning, and servicing of accessories.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide accessories by one of the following:

1. Toilet and Bath Accessories:

a. A & J Washroom Accessories, Inc.
b. American Specialties, Inc.
c. Bobrick Washroom Equipment, Inc.
d. Bradley Corporation.
e. Sugastune, Inc.

B. Products: Subject to compliance with requirements, provide one of the products indicated for each designation in the Toilet and Bath Accessory Schedule at the end of Part 3.

2.2 TOILET ACCESSORIES

A. RA-01, RA-02, RA-03 Grab Bar: Where this designation is indicated, provide stainless-steel grab bar complying with the following:

1. Basis of Design: 3200 Series by ASI.
2. Mounting: Concealed with manufacturer's standard flanges and anchors.
3. Gripping Surfaces: Manufacturer's standard slip-resistant texture.
4. Outside Diameter: 1-1/4 inches for medium-duty applications, 1-1/2 inches for heavy-duty applications.

B. RA-04: Toilet Tissue Dispenser: Where this designation is indicated, provide toilet tissue dispenser complying with the following:

1. Furnished and installed by Owner.

C. RA-05: Mirror Unit: Where this designation is indicated, provide mirror unit complying with the following:

1. Basis of Design: B-165 by Bobrick.
2. Stainless-Steel, Channel-Framed Mirror: Fabricate frame from stainless-steel channels in manufacturer's standard satin or bright finish with square corners mitered to hairline joints and mechanically interlocked.

D. RA-06: Towel Dispenser: Where this designation is indicated, provide stainless steel paper towel dispenser complying with the following:

1. Furnished and installed by Owner.

E. RA-07: Soap Dispenser:

1. Furnished and installed by Owner.

F. RA-08: Sanitary Napkin Disposal: Where this designation is indicated, provide sanitary napkin disposal complying with the following:

1. Furnished and installed by Owner.

G. RA-09: Utility Shelf/Mop Holder: Where this designation is indicated, provide utility shelf/mop holder complying with the following:

1. Basis of Design: UJ41A by A & J.
2. Stainless-steel shelf with three integral mop hooks.

2.3 MATERIALS

A. Stainless Steel: ASTM A 666, Type 304, with No. 4 finish (satin), in 0.0312-inch minimum nominal thickness, unless otherwise indicated.

B. Sheet Steel: ASTM A 366/A 366M, cold rolled, commercial quality, 0.0359-inch minimum nominal thickness; surface preparation and metal pretreatment as required for applied finish.

C. Chromium Plating: ASTM B 456, Service Condition Number SC 2 (moderate service), nickel plus chromium electrodeposited on base metal.

D. Mirror Glass: ASTM C 1036, Type I, Class 1, Quality q2, nominal 6.0 mm thick, with silvering, electroplated copper coating, and protective organic coating complying with FS DD-M-411.

E. Galvanized Steel Mounting Devices: ASTM A 153/A 153M, hot-dip galvanized after fabrication.

F. Fasteners: Screws, bolts, and other devices of same material as accessory unit, tamper and theft resistant when exposed, and of galvanized steel when concealed.

2.4 FABRICATION

A. General: Names or labels are not permitted on exposed faces of accessories. On interior surface not exposed to view or on back surface of each accessory, provide printed, waterproof label or stamped nameplate indicating manufacturer's name and product model number.

B. Surface-Mounted Toilet Accessories: Unless otherwise indicated, fabricate units with tight seams and joints, and exposed edges rolled. Hang doors and access panels with continuous stainless-steel hinge. Provide concealed anchorage where possible.

C. Framed Glass-Mirror Units: Fabricate frames for glass-mirror units to accommodate glass edge protection material. Provide mirror backing and support system that permits rigid, tamper-resistant glass installation and prevents moisture accumulation.

1. Provide galvanized steel backing sheet, not less than 0.034 inch and full mirror size, with nonabsorptive filler material. Corrugated cardboard is not an acceptable filler material.

D. Mirror-Unit Hangers: Provide mirror-unit mounting system that permits rigid, tamper- and theft-resistant installation, as follows:

1. One-piece, galvanized steel, wall-hanger device with spring-action locking mechanism to hold mirror unit in position with no exposed screws or bolts.

E. Keys: Provide universal keys for internal access to accessories for servicing and resupplying. Provide minimum of four keys to Owner's representative.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install accessories according to manufacturers' written instructions, using fasteners appropriate to substrate indicated and recommended by unit manufacturer. Install units level, plumb, and firmly anchored in locations and at heights indicated.

B. Secure mirrors to walls in concealed, tamper-resistant manner with special hangers, toggle bolts, or screws. Set units level, plumb, and square at locations indicated, according to manufacturer's written instructions for substrate indicated.

C. Install grab bars to withstand a downward load of at least 250 lbf, when tested according to method in ASTM F 446.

3.2 ADJUSTING AND CLEANING

A. Adjust accessories for unencumbered, smooth operation and verify that mechanisms function properly. Replace damaged or defective items.

B. Remove temporary labels and protective coatings.

C. Clean and polish exposed surfaces according to manufacturer's written recommendations.

END OF SECTION 10 2800

SECTION 10 4413 - FIRE PROTECTION CABINETS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Fire-protection cabinets for the following:

a. Portable fire extinguishers.

B. Related Requirements:

1. Section 10 4416 "Fire Extinguishers."

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product. Show door hardware, cabinet type, trim style, and panel style. Include roughing-in dimensions and details showing semi-recessed, mounting method and relationships of box and trim to surrounding construction.

B. Shop Drawings: For fire-protection cabinets. Include plans, elevations, sections, details, and attachments to other work.

1.4 COORDINATION

A. Coordinate size of fire-protection cabinets to ensure that type and capacity of fire extinguishers indicated are accommodated.

B. Coordinate sizes and locations of fire-protection cabinets with wall depths.

PART 2 - PRODUCTS

2.1 FIRE-PROTECTION CABINET

A. Cabinet Type: Suitable for fire extinguisher.

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

a. JL Industries, Bloomington.
b. Larsen's Manufacturing Co.
c. Modern Metal Products / Technico.
d. National Fire Equipment Ltd.
e. Potter-Roemer.
f. Samson Products Inc.
g. Seton Inc.

B. Cabinet Construction: Nonrated.

C. Cabinet Material: Aluminum sheet.

D. Semi-recessed Cabinet: One-piece combination trim and perimeter door frame overlapping surrounding wall surface with exposed trim face and wall return at outer edge (backbend).

1. Rolled-Edge Trim: 2-1/2-inch backbend depth.

E. Cabinet Trim Material: Aluminum sheet.

F. Door Material: Aluminum sheet.

G. Door Style: Center glass panel with frame.

H. Door Glazing: Tempered float glass (clear).

I. Door Hardware: Manufacturer's standard door-operating hardware of proper type for cabinet type, trim style, and door material and style indicated.

1. Provide projecting door pull and friction latch.
2. Provide manufacturer's standard hinge permitting door to open 180 degrees.

J. Accessories:

1. Identification: Lettering complying with authorities having jurisdiction for letter style, size, spacing, and location.

a. Identify fire extinguisher in fire-protection cabinet with the words " FIRE EXTINGUISHER."

1) Location: Applied to cabinet door.
2) Application Process: Decals or Pressure-sensitive vinyl letters.
3) Lettering Color: Red.
4) Orientation: Vertical.

K. Materials:

1. Aluminum: ASTM B 221 with strength and durability characteristics of not less than Alloy 6063-T5 for aluminum sheet. ASTM B 221or extruded shapes.

a. Finish: Clear anodic.

2. Tempered Float Glass: ASTM C 1048, Kind FT, Condition A, Type I, Quality q3, 3 mm thick, Class 1 (clear).

2.2 FABRICATION

A. Fire-Protection Cabinets: Provide manufacturer's standard box (tub) with trim, frame, door, and hardware to suit cabinet type, trim style, and door style indicated.

1. Weld joints and grind smooth.
2. Provide factory-drilled mounting holes.
3. Prepare doors and frames to receive locks.

B. Cabinet Doors: Fabricate doors according to manufacturer's standards, from materials indicated and coordinated with cabinet types and trim styles.

1. Fabricate door frames with tubular stiles and rails and hollow-metal design, minimum 1/2 inch thick.
2. Fabricate door frames of one-piece construction with edges flanged.
3. Miter and weld perimeter door frames.

C. Cabinet Trim: Fabricate cabinet trim in one piece with corners mitered, welded, and ground smooth.

2.3 GENERAL FINISH REQUIREMENTS

A. Comply with NAAMM's AMP 500, "Metal Finishes Manual for Architectural and Metal Products," for recommendations for applying and designating finishes.

B. Protect mechanical finishes on exposed surfaces of fire-protection cabinets from damage by applying a strippable, temporary protective covering before shipping.

C. Finish fire-protection cabinets after assembly.

D. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine walls and partitions for suitable framing depth and blocking where semi-recessed cabinets will be installed.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Prepare recesses for semi-recessed fire-protection cabinets as required by type and size of cabinet and trim style.

3.3 INSTALLATION

A. General: Install fire-protection cabinets in locations and at mounting heights indicated or, if not indicated, at heights acceptable to authorities having jurisdiction.

B. Fire-Protection Cabinets: Fasten cabinets to structure, square and plumb.

C. Identification: Apply decals or vinyl lettering at locations indicated.

3.4 ADJUSTING AND CLEANING

A. Remove temporary protective coverings and strippable films, if any, as fire-protection cabinets are installed unless otherwise indicated in manufacturer's written installation instructions.

B. Adjust fire-protection cabinet doors to operate easily without binding. Verify that integral locking devices operate properly.

C. On completion of fire-protection cabinet installation, clean interior and exterior surfaces as recommended by manufacturer.

D. Touch up marred finishes, or replace fire-protection cabinets that cannot be restored to factory-finished appearance. Use only materials and procedures recommended or furnished by fire-protection cabinet and mounting bracket manufacturers.

E. Replace fire-protection cabinets that have been damaged or have deteriorated beyond successful repair by finish touchup or similar minor repair procedures.

END OF SECTION 10 4413

SECTION 10 4416 - FIRE EXTINGUISHERS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section includes portable, hand-carried fire extinguishers and mounting brackets for fire extinguishers.

B. Related Requirements:

1. Section 10 4413 "Fire Protection Cabinets."

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product. Include rating and classification, material descriptions, dimensions of individual components and profiles, and finishes for fire extinguisher.

1.4 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For fire extinguishers to include in maintenance manuals.

1.5 COORDINATION

A. Coordinate type and capacity of fire extinguishers with fire-protection cabinets to ensure fit and function.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. NFPA Compliance: Fabricate and label fire extinguishers to comply with NFPA 10, "Portable Fire Extinguishers."

B. Fire Extinguishers: Listed and labeled for type, rating, and classification by an independent testing agency acceptable to authorities having jurisdiction.

2.2 PORTABLE, HAND-CARRIED FIRE EXTINGUISHERS

A. Fire Extinguishers: Type, size, and capacity for each fire-protection cabinet and mounting bracket indicated.

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

a. JL Industries, Bloomington.
b. Larsen's Manufacturing Co.
c. Modern Metal Products / Technico.
d. National Fire Equipment Ltd.
e. Potter-Roemer.
f. Samson Products Inc.
g. Seton Inc.

B. Ten pound dry chemical ABC stored pressurized type equipped with pressure gauge and which does not need recharging except after use.

C. Instructions for repairs, maintenance, and recharging shall be attached.

D. Unit shall be tested and approved by UL and have minimum 4A:60-B:C UL rating. UL rating shall appear on extinguisher labels and be attached to and a part of fire extinguisher units.

2.3 MOUNTING BRACKETS

A. Mounting Brackets: Manufacturer's standard steel, designed to secure fire extinguisher to wall or structure, of sizes required for types and capacities of fire extinguishers indicated, with plated or red baked-enamel finish.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine fire extinguishers for proper charging and tagging.

1. Remove and replace damaged, defective, or undercharged fire extinguishers.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. General: Install fire extinguishers and mounting brackets in locations indicated and in compliance with requirements of authorities having jurisdiction.

1. Mounting Brackets: 54 inches above finished floor to top of fire extinguisher.

B. Mounting Brackets: Fasten mounting brackets to surfaces, square and plumb, at locations indicated.

END OF SECTION 10 4416

SECTION 10 7516 - GROUND-SET FLAGPOLES

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes ground-set flagpoles made from aluminum.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include construction details, material descriptions, dimensions of individual components and profiles, operating characteristics, fittings, accessories, and finishes for flagpoles.

B. Delegated-Design Submittal: For flagpoles.

1.3 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For flagpoles to include in operation and maintenance manuals.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Source Limitations: Obtain flagpoles as complete units, including fittings, accessories, bases, and anchorage devices, from single source from single manufacturer.

2.2 PERFORMANCE REQUIREMENTS

A. Wind Loads: Determine according to NAAMM FP 1001. Basic wind speed for Project location is 90 M.P.H.

2.3 ALUMINUM FLAGPOLES

A. Aluminum Flagpoles: Cone-tapered flagpoles fabricated from seamless extruded tubing complying with ASTM B 241/B 241M, Alloy 6063, with a minimum wall thickness of 3/16 inch.

B. Exposed Height: 30 feet.

C. Metal Foundation Tube: Manufacturer's standard corrugated-steel foundation tube, 0.060-inch wall thickness with 3/16-inch steel bottom plate and support plate; 3/4-inch-diameter, steel ground spike; and steel centering wedges welded together. Galvanize foundation tube after assembly. Furnish loose hardwood wedges at top of foundation tube for plumbing pole.

D. Sleeve for Aluminum Flagpole: Fiberglass for PVC pipe foundation sleeve, made to fit flagpole, for casting into concrete foundation.

2.4 FITTINGS

A. Finial Ball: Flush-seam ball, sized as indicated or, if not indicated, to match flagpole-butt diameter.

1. 0.063-inch spun aluminum, finished to match flagpole.

B. Internal Halyard, Winch System: Manually operated winch with control stop device and removable handle, stainless-steel cable halyard, and concealed revolving truck assembly with plastic-coated counterweight and sling. Furnish flush access door secured with cylinder lock. Finish truck assembly to match flagpole.

1. Halyard Flag Snaps: Chromium-plated bronze swivel snap hooks. Furnish two per halyard.

2.5 MISCELLANEOUS MATERIALS

A. Drainage Material: Crushed stone, or crushed or uncrushed gravel; coarse aggregate.

B. Sand: ASTM C 33/C 33M, fine aggregate.

C. Elastomeric Joint Sealant: Single-component nonsag urethane joint sealant complying with requirements in Section 07 9200 "Joint Sealants."

D. Bituminous Paint: Cold-applied asphalt emulsion complying with ASTM D 1187/D 1187M.

2.6 ALUMINUM FINISHES

A. Natural Satin Finish: AA-M32, fine, directional, medium satin polish; buff complying with AA-M20; seal aluminum surfaces with clear, hard-coat wax.

PART 3 - EXECUTION

3.1 PREPARATION

A. Prepare uncoated metal flagpoles that are set in foundation tubes by painting below-grade portions with a heavy coat of bituminous paint.

B. Foundation Excavation: Excavate to neat clean lines in undisturbed soil. Remove loose soil and foreign matter from excavation and moisten earth before placing concrete. Place and compact drainage material at excavation bottom.

C. Foundation Tube: Place foundation tube, center, and brace to prevent displacement during concreting. Place concrete. Plumb and level foundation tube and allow concrete to cure.

D. Sleeves: Locate and secure sleeves in forms by bracing to reinforcement and forms.

E. Place concrete, as specified in Section 03 3000 "Cast-in-Place Concrete." Compact concrete in place by using vibrators. Moist-cure exposed concrete for no fewer than seven days or use nonstaining curing compound.

F. Trowel exposed concrete surfaces to a smooth, dense finish, free of trowel marks, and uniform in texture and appearance. Provide positive slope for water runoff to perimeter of concrete base.

3.2 FLAGPOLE INSTALLATION

A. General: Install flagpoles where indicated and according to Shop Drawings and manufacturer's written instructions.

B. Foundation Tube: Place flagpole in tube, seated on bottom plate between steel centering wedges, and install hardwood wedges to secure flagpole in place. Place and compact sand in foundation tube and remove hardwood wedges. Seal top of foundation tube with a 2-inch layer of elastomeric joint sealant and cover with flashing collar.

END OF SECTION 10 7516

DIVISION 22 – PLUMBING:

22 0501	Common Plumbing Requirements
22 0529	Hangers and Supports for Plumbing Piping and Equipment
22 0553	Plumbing Identification
22 0719	Plumbing Piping Insulation
22 1116	Domestic Water Piping
22 1119	Domestic Water Piping Specialties
22 1123	Domestic Water Pumps
22 1313	Facility Sanitary Sewers
22 1319	Facility Sanitary Sewer Specialties
22 3413	Electric Water Heaters
22 4126	Disposers
22 4213	Commercial Water Closets
22 4216	Commercial Lavatories and Sinks
22 4700	Drinking Fountains

SECTION 22 0501- COMMON PLUMBING REQUIREMENTS

PART 1 - GENERAL

1.1 SUMMARY

A. Includes But Not Limited To:

1. Common requirements and procedures for plumbing systems.
2. Furnish and install sealants relating to installation of systems installed under this Division.

1.2 SUBMITTALS

A. Action Submittals:

1. Product Data:

a. Manufacturer's catalog data for each manufactured item.

1) Provide section in submittal for each type of item of equipment. Include Manufacturer's catalog data of each manufactured item and enough information to show compliance with Contract Document requirements. Literature shall show capacities and size of equipment used and be marked indicating each specific item with applicable data underlined.

B. Closeout Submittals:

1. Include following in Operations And Maintenance Manual:

a. Operations and Maintenance Data.

1) At beginning of PLUMBING section of Operations and Maintenance Manual, provide master index showing items included:

a) Provide name, address, and phone number of Architect, Architect's Mechanical Engineer, General Contractor, and Plumbing subcontractor.
b) Identify maintenance instructions by using same equipment identification used in Contract Drawings. Maintenance instructions shall include:

(1) List of plumbing equipment used indicating name, model, serial number, and nameplate data of each item together with number and name associated with each system item.
(2) Manufacturer's maintenance instructions for each piece of plumbing equipment installed in Project. Instructions shall include name of vendor, installation instructions, parts numbers and lists, operation instructions of equipment, and maintenance instructions.

b. Warranty Documentation:

1) Include copies of warranties required in individual Sections of Division 22.

1.3 DELIVERY, STORAGE, AND HANDLING

A. Delivery And Acceptance Requirements:

1. Provide temporary end caps and closures on piping and fittings. Maintain in place until installation.

B. Storage And Handling Requirements:

1. Store items subject to moisture damage in dry, heated spaces.

1.4 WARRANTY

A. Manufacturer Warranty:

1. Provide certificates of warranty for each piece of equipment made out in favor of Owner.

B. Special Warranty:

1. Guarantee plumbing systems to be free from noise in operation that may develop from failure to construct system in accordance with Contract Documents.

PART 2 - PRODUCTS

2.1 COMPONENTS

A. Components shall bear Manufacturer's name and trade name. Equipment and materials of same general type shall be of same make throughout work to provide uniform appearance, operation, and maintenance.

B. Sleeves:

1. General:

a. Two sizes larger than bare pipe or insulation on insulated pipe.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Drawings:

1. Plumbing Drawings show general arrangement of piping, equipment, etc. Follow as closely as actual building construction and work of other trades will permit.
2. Consider Architectural and Structural Drawings part of this work insofar as these drawings furnish information relating to design and construction of building. These drawings take precedence over Plumbing Drawings.
3. Because of small scale of Drawings, it is not possible to indicate all offsets, fittings, and accessories that may be required. Investigate structural and finish conditions affecting this work and arrange work accordingly, providing such fittings, valves, and accessories required to meet conditions.

B. Verification Of Conditions:

1. Ensure that items to be furnished fit space available. Make necessary field measurements to ascertain space requirements including those for connections and furnish and install equipment of size and shape so final installation shall suit true intent and meaning of Contract Documents. If approval is received by Addendum or Change Order to use other than originally specified items, be responsible for specified capacities and for ensuring that items to be furnished will fit space available.
2. Check that slots and openings provided under other Divisions through floors, walls, ceilings, and roofs are properly located. Perform cutting and patching caused by neglecting to coordinate with Divisions providing slots and openings at no additional cost to Owner.
3. No subsequent allowance for time or money will be considered for any consequence related to failure to examine site conditions.

3.2 PREPARATION

A. Changes Due To Equipment Selection:

1. Where equipment specified or otherwise approved requires different arrangement or connections from that shown in Contract Documents, submit drawings showing proposed installations.
2. If proposed changes are approved, install equipment to operate properly and in harmony with intent of Contract Documents. Make incidental changes in piping, ductwork, supports, installation, wiring, heaters, panelboards, and as otherwise necessary.
3. Provide additional motors, valves, controllers, fittings, and other equipment required for proper operation of systems resulting from selection of equipment.
4. Be responsible for proper location of rough-in and connections provided under other Divisions.

3.3 INSTALLATION

A. Cut carefully to minimize necessity for repairs to previously installed or existing work. Do not cut beams, columns, or trusses.

B. Locating Equipment:

1. Arrange pipes and equipment to permit ready access to valves, unions and to clear openings of doors and access panels.
2. Adjust locations of pipes, equipment, and fixtures to accommodate work to interferences anticipated and encountered.
3. Install plumbing work to permit removal of equipment and parts of equipment requiring periodic replacement or maintenance without damage to or interference with other parts of equipment or structure.
4. Determine exact route and location of each pipe before fabrication.

a. Right-Of-Way:

1) Lines that pitch shall have right-of-way over those that do not pitch. For example, plumbing drains shall normally have right-of-way.
2) Lines whose elevations cannot be changed shall have right-of-way over lines whose elevations can be changed.

b. Offsets, Transitions, and Changes in Direction:

1) Make offsets, transitions, and changes in direction in pipes as required to maintain proper head room and pitch of sloping lines whether or not indicated on Drawings.

C. Penetration Firestops:

1. Install Penetration Firestop System appropriate for penetration at plumbing systems penetrations through walls, ceilings, roofs, and top plates of walls.

D. Sealants:

1. Seal openings through building exterior caused by penetrations of elements of plumbing systems.

E. Furnish and install complete system of piping, valved as indicated or as necessary to completely control entire apparatus:

1. Pipe drawings are diagrammatic and indicate general location and connections. Piping may have to be offset, lowered, or raised as required or directed at site. This does not relieve this Division from responsibility for proper installation of plumbing systems.
2. Arrange piping to not interfere with removal of other equipment, ducts, or devices, or block access to doors, windows, or access openings:

a. Provide accessible flanges or ground joint unions, as applicable for type of piping specified, at connections to equipment and on bypasses.

1) Make connections of dissimilar metals with di-electric unions.

b. Do not use reducing bushings, bull head tees, close nipples, or running couplings. Street elbows are allowed only on potable water pipe 3/4 inch in diameter and smaller.
c. Place valves and specialties to permit easy operation and access.

3. Do not install piping in shear walls.
4. Cut piping accurately to measurements established at site. Remove burr and cutting slag from pipes.
5. Work piping into place without springing or forcing.
6. Make changes in direction with proper fittings.

F. Sleeves:

1. Do not place sleeves around soil, waste, vent, or roof drain lines passing through concrete slabs on grade.
2. Sleeves through floors and foundation walls shall be watertight.

G. Escutcheons:

1. Provide spring clamp plates where pipes run through walls, floors, or ceilings and are exposed in finished locations of building. Plates shall be chrome plated heavy brass of plain pattern and shall be set tight on pipe and to building surface.

3.4 REPAIR / RESTORATION

A. Each Section of this Division shall bear expense of cutting, patching, repairing, and replacing of work of other Sections required because of its fault, error, tardiness, or because of damage done by it:

1. Patch and repair walls, floors, ceilings, and roofs with materials of same quality and appearance as adjacent surfaces unless otherwise shown.
2. Surface finishes shall exactly match existing finishes of same materials.

3.5 FIELD QUALITY CONTROL

A. Field Tests:

1. Perform tests on plumbing piping systems. Furnish devices required for testing purposes.

B. Non-Conforming Work:

1. Replace material or workmanship proven defective with sound material at no additional cost to Owner.
2. Repeat tests on new material, if requested.

3.6 CLEANING

A. Remove dirt, grease, and other foreign matter from each length of piping before installation:

1. After each section of piping used for movement of water or steam is installed, flush with clean water, except where specified otherwise.
2. Arrange temporary flushing connections for each section of piping and arrange for flushing total piping system.
3. Provide temporary cross connections and water supply for flushing and drainage and remove after completion of work.

B. Clean exposed piping, equipment, and fixtures. Remove stickers from fixtures and adjust flush valves.

3.7 CLOSEOUT ACTIVITIES

A. Instruction of Owner:

1. Instruct building maintenance personnel in operation and maintenance of plumbing systems utilizing Operation And Maintenance Manual when so doing.
2. Conduct instruction period after Substantial Completion inspection when systems are properly working and before final payment is made.

3.8 PROTECTION

A. Protect piping systems from entry of foreign materials by temporary covers, completing sections of the work, and isolating parts of completed system. Cap or plug open ends of pipes and equipment to keep dirt and other foreign materials out of system. Do not use plugs of rags, wool, cotton waste, or similar materials.

END OF SECTION 22 0501

SECTION 22 0529 - HANGERS AND SUPPORTS FOR PLUMBING PIPING AND EQUIPMENT

PART 1 - GENERAL

1.1 SUMMARY

A. Includes But Not Limited To:

1. Hanger and support requirements and procedures for plumbing systems.

B. Related Requirements:

1. Section 23 0529: 'Hangers And Supports For HVAC Piping And Equipment' for gas piping used with HVAC equipment.
2. Section 23 0553: 'Identification For HVAC Piping And Equipment' for paint identification of gas piping used with HVAC equipment.

1.2 SUBMITTALS

A. Action Submittals:

1. Product Data:

a. Manufacturer's catalog data for each manufactured item.

PART 2 - PRODUCTS

2.1 ASSEMBLIES

A. Materials:

1. Hangers, Rods

a. Galvanized and UL approved for service intended.
b. Support horizontal piping from hangers. Hangers shall have double nuts.

1) Support insulated pipes 2 inches in diameter and smaller with adjustable swivel ring hanger with insulation protection shield. Gauge and length of shield shall be in accordance with Anvil design data.

a) Acceptable Products:

(1) Swivel Ring Hanger: Anvil Fig. 69.
(2) Insulation Protection Shield: Anvil Fig. 167.
(3) Equals by Cooper B-Line.

2) Support uninsulated copper pipe 2 inches in diameter and smaller from swivel ring hanger, copper plated and otherwise fully suitable for use with copper tubing. Support non-copper uninsulated pipes from swivel ring hanger.

a) Acceptable Products:

(1) Swivel Ring Hanger For Copper Pipe: Anvil Fig. CT-69.
(2) Swivel Ring Hanger For Other Pipe: Anvil Fig. 69.
(3) Equals by Cooper B-Line.

3) Support non-copper uninsulated pipes from clevis hanger.

a) Acceptable Products:

(1) Clevis Hanger For Copper Pipe: Anvil Fig. CT-65.
(2) Clevis Hanger For Other Pipe: Anvil Fig. 260.
(3) Equals by Cooper B-Line.

c. Support rods for single pipe shall be in accordance with following table:

Rod Diameter	Pipe Size
3/8 inch	2 inches and smaller
1/2 inch	2-1/2 to 3-1/2 inches
5/8 inch	4 to 5 inches
3/4 inch	6 inches
7/8 inch	8 to 12 inches

d. Riser Clamps For Vertical Piping:

1) Acceptable Products:

a) Anvil Fig. 261.
b) Equals by Cooper B-Line.

e. Clevis hanger for PPR plastic pipe:

1) Aqutherm Series 0060520-0060563 rubber or felt lined.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Piping:

1. Properly support piping and make adequate provisions for expansion, contraction, slope, and anchorage.

a. Suspend piping from roof structure or clamp to vertical walls using Unistrut and clamps. Do not hang pipe from other pipe, equipment, or ductwork. Laying of piping on any building element is not allowed.
b. Supports For Horizontal Piping:

1) Support metal piping at 96 inches on center maximum for pipe 1-1/4 inches or larger and 72 inches on center maximum for pipe 1-1/8 inch or less.
2) Support thermoplastic pipe at 48 inches on center maximum.
3) Provide support at each elbow. Install additional support as required.

c. Supports for Vertical Piping:

1) Place riser clamps at each floor or ceiling level.
2) Securely support clamps by structural members, which in turn are supported directly from building structure.
3) Provide clamps as necessary to brace pipe to wall.

d. Insulate hangers for copper pipe from piping by means of at least two layers of Scotch 33 plastic tape.

2. Gas piping Identification:

a. Apply paint identification for gas piping used with HVAC equipment as specified in Section 23 0553.

END OF SECTION 22 0529

SECTION 22 0553 - PLUMBING IDENTIFICATION

PART 1 - GENERAL

1.1 SUMMARY

A. Includes But Not Limited To

1. Furnish and install identification of equipment and piping as described in Contract Documents.

B. Pipe labels shall comply with ANSI A13.1 standards.

PART 2 - PRODUCTS

2.1 LABELS

A. Pipe Identification

1. Coiled plastic markers identifying pipe contents and flow direction.
2. Self adhesive or tape markers identifying pipe contents and flow.

PART 3 - EXECUTION

3.1 APPLICATION

A. Piping Identification

1. Only coiled plastic or self-adhesive pipe markers with legends, directional arrows, and color bands are acceptable.
2. Locate identifying legends, directional arrows, and color bands at following points on exposed piping of each piping system.

   a. Adjacent to each item of equipment.
   b. At point of entry and exit where piping goes through wall.
   c. On each riser and junction.
   d. Every 25 feet on long continuous lines.

3. Character height and marker size:

PIPE DIAMETER	MARKER WIDTH	CHARACTER HEIGHT
3/4" thru 1"	8"	1/2"
1-1/8" thru 2-3/8"	8"	3/4"
2-1/2" thru 3-1/4"	12"	1-1/4"

B. Equipment Identification

1. Black Plastic Laminate, 3/8" high engraved white lettering. Install Identification on Water Heater.

3.2 SCHEDULES

A. Schedule Pipe Identification and Background Colors for Pipe Identification

1. Apply pipe labels as follows:

Pipe Type Color Identification

Domestic Hot Water	Yellow	Hot Water
Domestic Cold Water	Green	Cold Water
Gas	Yellow	Gas

END OF SECTION 22 0553

SECTION 22 0719 - PLUMBING PIPING INSULATION

PART 1 - GENERAL

1.1 SUMMARY

A. Includes But Not Limited To:

1. Furnish and install insulation on hot and cold water lines, fittings, valves, and accessories as described in Contract Documents.

B. Related Requirements:

1. Section 22 1116: 'Domestic Water Piping'.

PART 2 - PRODUCTS

2.1 COMPONENTS

A. Materials:

1. Above Grade Metal Piping:

a. Insulation For Piping:

1) Snap-on glass fiber with ASJ pipe insulation with factory vapor jacket.
2) Insulation Thickness:

Service Water Temperature	Pipe Sizes		
	Up to 1-1/4 In	1-1/2 to 2 In	Over 2 In
170 - 180 Deg F	One In	1-1/2 In	2 In
140 - 160 Deg F	1/2 In	One In	1-1/2 In
45 - 130 Deg F	1/2 In	1/2 In	One In

3) Performance Standards: Fiberglas ASJ by Owens-Corning.
4) Acceptable Manufacturers:

a) Childers Products.
b) Knauf.
c) Manson.
d) Owens-Corning.
e) Johns-Manville.
f) Equal as approved by Architect before bidding.

b. Fitting, Valve, And Accessory Covers:

1) PVC.
2) Performance Standard: Zeston by Johns-Manville.
3) Acceptable Manufacturers:

a) Knauf.
b) Speedline.
c) Johns-Manville.
d) Equal as approved by Architect before bidding.

2. Below Grade Metal Piping:

a. Insulation:

1) 1/2 inch thick.
2) Acceptable Products:

a) SS Tubolit by Armacell.
b) ImcoLock by Imcoa.
c) Nomalock or Therma-Cel by Nomaco.

b. Joint Sealant:

1) Acceptable Products:

a) Armacell 520.
b) Nomaco K-Flex R-373.

3. PP-R Hot Water Piping, Above and Below Grade:

a. Insulation: Insulation not required on cold water PPR piping.

1) 1/2 inch thick.
2) Acceptable Products:

a) SS Tubolit by Armacell.
b) ImcoLock by Imcoa.
c) Nomalock or Therma-Cel by Nomaco.

b. Joint Sealant:

1) Acceptable Products:

a) Armacell 520.
b) Nomaco K-Flex R-373.

PART 3 - EXECUTION

3.1 APPLICATION

A. Above Grade Piping:

1. Apply insulation to clean, dry piping with joints tightly butted.
2. Apply insulation to all exposed hot and cold water lines at water heater.
3. Install insulation in manner to facilitate removal for repairs. Place sections or blocks so least possible damage to insulation will result from inspection or repairs of piping or equipment.
4. Piping up to 1-1/4 inch Diameter:

a. Adhere 'factory applied vapor barrier jacket lap' smoothly and securely at longitudinal laps with white vapor barrier adhesive.
b. Adhere 3 inch wide self-sealing butt joint strips over end joints.

5. Piping 1-1/2 inches Diameter and Larger:

a. Use broken-joint construction in application of two-layer covering.
b. Fill cracks and depressions with insulating cement mixed to thick plastic paste.

1) Apply by hand in several layers to make up total specified thickness.
2) Final layer shall have smooth uniform finish before application of covering.

6. Fittings, Valves, and Accessories:

    a. Do not apply insulation over flanged joints or couplings until piping has been brought up to operating temperature and flange bolts have been fully tightened. Insulate valves so wheel, stem, and packing nut are exposed.
    b. Insulate with same type and thickness of insulation as pipe, with ends of insulation tucked snugly into throat of fitting and edges adjacent to pipe insulation tufted and tucked in.
    c. Piping Up To 1-1/4 Inch Diameter:

        1) Cover insulation with one piece fitting cover secured by stapling or taping ends to adjacent pipe covering.
        2) Alternate Method:

            a) Insulate fittings, valves, and accessories with one inch of insulating cement and vapor seal with two 1/8 inch wet coats of vapor barrier mastic reinforced with glass fabric extending 2 inches onto adjacent insulation.

    d. Piping 1-1/2 inches To 2 Inches:

        1) Insulate with hydraulic setting insulating cement or equal, to thickness equal to adjoining pipe insulation.
        2) Apply final coat of fitting mastic over insulating cement.

7. Pipe Hangers:

    a. Do not allow copper pipes to come in contact with hangers or metal wall framing.
    b. Pipe Shield:

        1) Provide schedule 40 PVC by 6 inch long at each clevis and/or unistrut type hanger.
        2) Provide 16 ga by 6 inch long galvanized shields at each pipe hanger to protect pipe insulation from crushing by clevis hanger.
        3) Provide 22 ga by 6 inch long galvanized shield at each pipe hanger to protect insulation from crushing by Unistrut type hanger.

    c. At Pipe Hangers:

        1) Provide rigid calcium silicate insulation 100 psi compressive strength at least 2 inches beyond shield.

B. Below Grade Piping:

1. Slip underground pipe insulation onto pipe and seal butt joints.
2. Where slip-on technique is not possible, slit insulation, apply to pipe, and seal seams and joints.

END OF SECTION 22 0719

SECTION 22 1116 - DOMESTIC WATER PIPING

PART 1 - GENERAL

1.1 SUMMARY

A. Includes But Not Limited To:

1. Perform excavating and backfilling required by work of this Section.
2. Furnish and install potable water piping complete with necessary valves, connections, and accessories inside building and connect with outside utility lines 5 feet from building perimeter as described in Contract Documents.

1.2 REFERENCES

A. Reference Standards:

1. ASTM International:

a. ASTM B88-09, 'Standard Specification for Seamless Copper Water Tube'.
b. ASTM E84-13a, 'Standard Test Method for Surface Burning Characteristics of Building Materials'.
c. ASTM F2389-10, 'Standard Specification for Pressure-rated Polypropylene (PP) Piping Systems'.

2. NSF International Standard:

a. NSF P171, 'Protocol for Chlorine Resistance of Plastic Piping Materials' (1999).

3. NSF International Standard / American National Standards Institute:

a. NSF/ANSI 14-2013, 'Plastic Piping System Components and Related Materials'.
b. NSF/ANSI 61-2012, 'Drinking Water System Components - Health Effects'.
c. NSF/ANSI 372-2011, 'Drinking Water System Components - Lead Content'.

1.3 ADMINISTRATIVE REQUIREMENTS

A. Qualifications:

1. Manufacturer Qualifications:

a. PP-R pipe:

1) Certified by NSF International.

2. Installers Qualifications:

a. PP-R pipe:

1) Certified by Manufacturer.

1.4 SUBMITTALS

A. Action Submittals:

1. Product Data:

a. Manufacturer's Literature:

1) PP-R pipe and PP-R pipe fittings.

B. Informational Submittals:

1. Test And Evaluation Reports:

a. Written report of sterilization test.

1.5 QUALITY ASSURANCE

A. Regulatory Agency Sustainability Approvals:

1. Meet NSF International Standards for materials or products that come into contact with drinking water, drinking water treatment chemicals, or both for chemical contaminants and impurities that are indirectly imparted to drinking water from products, components, and materials used in drinking water systems.

PART 2 - PRODUCTS

2.1 SYSTEMS

A. Materials:

1. Design Criteria:

a. All drinking water products, components, and materials above and below grade used in drinking water systems must meet NSF International Standards for Lead Free.
b. No CPVC allowed.

2. Pipe:

a. Copper:

1) Above-Grade:

a) Meet requirements of ASTM B88, Type L.

2) Below-Grade:

a) Meet requirements of ASTM B88, Type K. 3/4 inch minimum under slabs.
b) 2 inches And Smaller: Annealed soft drawn.

b. Polypropylene-Random (PP-R):

1) Above-Grade and Below-Grade:

a) Meet requirements of ASTM F2389 and be certified by NSF International per ASTM F2389, NSF/ANSI 14, and NSF/ANSI 61.
b) SDR 7.4 Greenpipe faser for domestic hot water and SDR 7.4 or SDR 11 greenpipe for domestic cold water. Aquatherm Lilac SDR 11 purple piping for recycled/reclaimed water systems.

2) Approved Products:

a) Aquatherm Greenpipe, Greenpipe faser, and Lilac by Aquatherm.

3. Fittings:

a. For Copper Pipe: Wrought copper.

b. Viega ProPress: Copper fittings, press fit.
c. For PP-R Pipe:

1) Approved Products:

a) Greenpipe by Aquatherm.

4. Connections For Copper Pipe:

a. Above-Grade:

1) Sweat copper type with 95/5 or 96/4 Tin-Antimony solder, Bridgit solder, or Silvabrite 100 solder. Use only lead-free solder.
2) Viega ProPress System

b. Below Grade:

1) Brazed using following type rods:

a) Copper to Copper Connections:

(1) AWS Classification BCuP-4 Copper Phosphorus (6 percent silver).
(2) AWS Classification BCuP-5 Copper Phosphorus (15 percent silver).

2) Copper to Brass or Copper to Steel Connections: AWS Classification BAg-5 Silver (45 percent silver).
3) Do not use rods containing Cadmium.
4) Brazing Flux:

a) Approved Products:

(1) Stay-Silv white brazing flux by Harris Product Group.
(2) High quality silver solder flux by Handy & Harmon.

5) Joints under slabs acceptable only if allowed by local codes.

5. Connections For PP-R Pipe:

a. Above-Grade:

1) Socket-fusion, fusion-outlet, electrofusion, buttwelding, and mechanical transition fittings including threaded adapters, grooved adapters, and flanges.

b. Below-Grade:

1) All joints shall be fusion-welded PP-R except that flanges may be used when connecting to other piping systems. Mechanical fittings shall not be used below grade.
2) Joints under slabs acceptable only if allowed by local codes.

6. Ball Valves:

a. Use ball valves exclusively unless otherwise specified. Ball valves shall be by single manufacturer from approved list below.
b. Valves shall be two-piece, full port for 150 psi SWP.

1) Operate with flow in either direction, suitable for throttling and tight shut-off.
2) Body: Bronze, 150 psig wsp at 350 deg F and 400 psig wog.
3) Seat: Bubble tight at 100 psig under water.

c. Quality Standard: Nibco T585 or S585.

1) Equal by Conbraco 'Apollo,' Hammond, Milwaukee, or Watts.

d. PP-R piping if used:

1) Approved Products:

a) PP-R fusion-weld ball valves by Aquatherm.

7. Combination Pressure Reducing Valve / Strainer:

a. Integral stainless steel strainer, or separate 'Y' strainer installed upstream of pressure reducing valve.
b. 1-1/2" inlet and outlet, bronze body construction.
c. Built-in thermal expansion bypass check valve.
d. Quality Standard: Watts LFU5B:

1) Equal by Cash Acme, Cla-Val, Conbraco, or Zurn.

8. Reduced Pressure Zone Assembly - Back Flow Preventer:

a. Designed to provide separation of building water system water from domestic cold water supply in accordance with Code.
b. 1-1/2" Inlet Connection Size, Y-Strainer, Unions, Integral Inlet and Outlet Ball Valves, Test port ball valves, replaceable seats, internal relief valve.
c. Horizontal Installation with Air Gap Fitting and Elbow
d. Rated flow at 30 psi, pressure drop rated for 175 psi inlet pressure, and 180 deg F maximum operating temperature.
e. Brass or Bronze body construction.
f. Quality Standard: Watts Series 719-U-QT

1) Additional Approved Manufacturers:

a) Hersey Beeco
b) ConBraco
c) Febco
d) Wilkins

PART 3 - EXECUTION

3.1 INSTALLATION

A. Locate cold water lines a minimum of 6 inches from hot water lines.

B. Install water service entry as detailed and in accordance with recognized standards. Install in a serviceable location.

C. Provide pressure reducing valves and reduced pressure zone assembly as detailed.

D. Install ball isolation valves where indicated.

3.2 FIELD QUALITY CONTROL

A. Field Tests:

1. Before pipes are covered, test systems in presence of Architect/Engineer at 125 psig hydrostatic pressure for four (4) hours and show no leaks.
2. Disconnect equipment not suitable for 125 psig pressure from piping system during test period.
3. PP-R Piping:

    a. Test in accordance with Manufacturer's instructions prior to covering.

        1) Provide documentation.

3.3 CLEANING

A. Sterilize potable water system with solution containing 200 parts per million minimum of available chlorine and maintaining pH of 7.5 minimum. Introduce chlorinating materials into system in manner approved by Architect/Engineer. Allow sterilization solution to remain for twenty four (24) hours and open and close valves and faucets several times during that time.

B. After sterilization, flush solution from system with clean water until residual chlorine content is less than 0.2 parts per million. Water system will not be accepted until negative bacteriological test is made on water taken from system. Repeat dosing as necessary until such negative test is accomplished.

END OF SECTION 22 1116

SECTION 22 1119 - DOMESTIC WATER PIPING SPECIALTIES

PART 1 - GENERAL

1.1 SUMMARY

A. Includes But Not Limited To:

1. Furnish and install miscellaneous potable water piping specialties as described in Contract Documents.

PART 2 - PRODUCTS

2.1 ACCESSORIES

A. Materials:

1. Pressure Reducing Station:

a. Design Criteria:

1) Meet NSF International Standards for Lead Free.
2) Cast Bronze or Brass body. ASSE listed, stainless steel stem and spring. Maximum working pressure 400 psi
3) Maximum working temperature. 140 deg F
4) Threaded inlet and outlet with double unions and Y strainer on inlet.
5) Approved Products:

a) Watts LFU5B-Z3
b) Zurn 500XL3

b. Pressure Gauges:

1) Gauges shall have following features:

a) Cast aluminum case.
b) Chrome plated ring.
c) Impact resistant window.
d) Phosphor bronze alloy steel bourdon tube.
e) 1/2 percent scale range accuracy.
f) 4-1/2 inch diameter dial face.
g) Range 0 to 100 psig.

2) Quality Standard: 500X by H O Trerice.

a) Equal by Ashcroft or Weiss.

c. Brass Gauge Cocks:

1) Approved Products:

a) 1092 by Ashcroft.
b) 865 by H O Trerice.

2. Exterior Hydrants:

a. Design Criteria:

1) Provide with integral anti-siphon device. Key-operated.
2) Non-freeze.
3) Not required to meet NSF International Standards for Lead Free.

b. Approved Products:

1) Josam: 71050.
2) Jay R. Smith: 5609-QT.
3) Prier: C-634.
4) Wade: W-8600.
5) Watts: HY-725.
6) Woodford: 67.
7) Zurn: Z-1310.

3. Water Hammer Arrestors:

a. Design Criteria:

1) Meet NSF International Standards for Lead Free.
2) Nesting type, air pre-charged bellows with casing.
3) Bellows constructed of stabilized 18-8 stainless steel.

b. Approved Products:

1) Josam: 75003.
2) Jay R. Smith: 5020.
3) Sioux Chief: 650 Series.
4) Wade: 20.

4. Mixing Valves

a. Design Criteria:

1) Meet NSF International Standards for Lead Free.
2) Nesting type, air pre-charged bellows with casing.
3) Bellows constructed of stabilized 18-8 stainless steel.

b. Approved Products:

1) Josam: 75003.
2) Jay R. Smith: 5020.
3) Sioux Chief: 650 Series.
4) Wade: 20.

5. Reduced Pressure Zone Assembly - Back Flow Preventer:

a. Designed to provide separation of building water system water from domestic cold water supply in accordance with Code.
b. 1-1/2" Inlet Connection Size, Y-Strainer, Unions, Integral Inlet and Outlet Ball Valves, Test port ball valves, replaceable seats, internal relief valve.
c. Horizontal Installation with Air Gap Fitting and Elbow
d. Rated flow at 30 psi, pressure drop rated for 175 psi inlet pressure, and 180 deg F maximum operating temperature.
e. Brass or Bronze body construction.
f. Quality Standard: Watts Series 719-U-QT

1) Additional Approved Manufacturers:

a) Hersey Beeco
b) ConBraco
c) Febco
d) Wilkins

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install Pressure Reducing Station in vertical complete with pressure reducing valves, unions and gauges. Set discharge pressure to 60 psig.

B. Gauges: Connect to pipe with 1/4 inch connections utilizing gauge cocks. Install vertical and plumb. Adjust gauges to be read from floor level.

C. Exterior Hydrants: Install exterior hydrants where indicated. Furnish each hydrant with a ball isolation valve, accessible for shut-off. Mount hydrants 24" above finished grade or as indicated.

D. Water Hammer Arrestors: Install water hammer arrestor for each restroom group. Install arrestor in accessible and serviceable location above ceiling. Provide ball isolation valve for each water hammer arrestor.

E. Mixing Valves: Install mixing valves at each lavatory and where indicated. Install mixing valves high on wall under lavatory. Adjust mixing valve outlet water temperature to 110 deg F or as indicated.

F. Install Reduced Pressure Backflow Preventer (RPZ) in accordance with manufacturer's instructions. Install RPZ horizontal and level. Provide unions for service. Verify testing ports are accessible and functional. Provide galvanized or stainless steel drain pan under RPZ and pipe discharge full size to floor drain.

END OF SECTION 22 1119

SECTION 22 1123 – DOMESTIC WATER PUMPS

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following all-bronze and bronze-fitted centrifugal pumps for domestic hot-water circulation:

1. Close-coupled, horizontally mounted, in-line centrifugal pumps.

1.2 SUBMITTALS

A. Product Data: For each type and size of domestic water pump specified. Include certified performance curves with operating points plotted on curves; and rated capacities of selected models, furnished specialties, and accessories.

B. Shop Drawings: Diagram power, signal, and control wiring.

C. Operation and maintenance data.

1.3 QUALITY ASSURANCE

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

B. UL Compliance: Comply with UL 778 for motor-operated water pumps.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

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

A. Armstrong Pumps Inc.

B. Bell & Gossett Domestic Pump; ITT Industries.

C. Grundfos Pumps Corp.

D. Taco, Inc.

B. Description: Factory-assembled and -tested, single-stage, close-coupled, in-line, sealless centrifugal pumps.

1. Pump and Motor Assembly: Hermetically sealed, replaceable-cartridge-type unit with motor and impeller on common shaft and designed for installation with pump and motor shaft mounted horizontally.
2. Casing: Bronze, with threaded companion-flange connections.
3. Impeller: Corrosion-resistant material.
4. Motor: Single speed, unless otherwise indicated. Comply with requirements in Division 22 Section "Common Motor Requirements for Plumbing Equipment."

C. Capacities and Characteristics: Refer to drawings

2.2 CONTROLS

A. Thermostats and Timer: Electric; adjustable for control of hot-water circulation pump.

1. Type: Water-immersion sensor, for installation in hot-water circulation piping.

2. Operation of Pump: On or off.
3. Transformer: Provide if required.
4. Power Requirement: 120 V
5. Type: Programmable, clock with manual override on-off switch.
6. Enclosure: Suitable for wall mounting.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install pumps with access for periodic maintenance including removal of motors, impellers, couplings, and accessories.

B. Independently support pumps and piping so weight of piping is not supported by pumps and weight of pumps is not supported by piping.

C. Install centrifugal pumps with motor and pump shafts horizontal.

D. Install continuous-thread hanger rods of sufficient size to support pump weight.

E. Install immersion-type thermostats in hot-water return piping.

F. Install timers adjacent to pump on wall.

G. Piping installation requirements are specified in other Division 22 Sections. Drawings indicate general arrangement of piping, fittings, and specialties.

H. Install piping adjacent to pumps to allow service and maintenance.

I. Connect domestic water piping to pumps. Install suction and discharge piping equal to or greater than size of pump nozzles.

1. Install shutoff valve and strainer on suction side of pumps, and check valve and throttling valve on discharge side of pumps. Install valves same size as connected piping.

J. Ground equipment according to Division 26 Section "Grounding and Bonding for Electrical Systems."

K. Connect wiring according to Division 26 Section "Low-Voltage Electrical Power Conductors and Cables."

L. Connect thermostat and timer to pumps that they control. Verify and program operational hours and temperatures as directed by the owner.

END OF SECTION 22 1123

SECTION 22 1313 - FACILITY SANITARY SEWERS

PART 1 - GENERAL

1.1 SUMMARY

A. Includes But Not Limited To:

1. Furnish and install soil, waste, and vent piping systems within building and connect with outside utility lines 5 feet out from building where applicable.
2. Perform excavation and backfill required by work of this Section.

1.2 REFERENCES

A. Reference Standards:

1. ASTM International:

a. ASTM D2321-11, 'Standard Practice for Underground Installation of Thermoplastic Pipe for Sewers and Other Gravity-Flow Applications'.
b. ASTM D2564-12, 'Standard Specification for Solvent Cements for Poly (Vinyl Chloride) (PVC) Plastic Piping Systems'.
c. ASTM D3034–08, 'Standard Specification for Type PSM Poly (Vinyl Chloride) (PVC) Sewer Pipe and Fittings'.
d. ASTM F656–10, 'Standard Specification for Primers for Use in Solvent Cement Joints of Poly (Vinyl Chloride) (PVC) Plastic Pipe and Fittings'.
e. ASTM F891–10, 'Standard Specification for Coextruded Poly(Vinyl Chloride) (PVC) Plastic Pipe With a Cellular Core'.

2. International Code Council:

a. ICC IPC-2021, 'International Plumbing Code'.

PART 2 - PRODUCTS

2.1 SYSTEMS

A. Performance:

1. Design Criteria:

a. Minimum size of waste piping installed under floor slab on grade shall be 2 inches.

B. Materials:

1. Piping And Fittings: PVC Schedule 40 solid wall plastic pipe and pipe fittings meeting requirements of ASTM F891, joined using cement primer meeting requirements of ASTM F656 and pipe cement meeting requirements of ASTM D2564.
   Furnish wall cleanouts with chrome wall cover and screw.

2. Cleanouts:

a. Furnish wall cleanouts with chrome wall cover and screw.
b. Acceptable Products:

1) Finish Floors:

a) Josam: 56010.
b) J. R. Smith: 4023.
c) Mifab: C1100C-R-1.
d) Wade: W-6000.
e) Watts: CO-200-R.
f) Zurn: Z-1402.

2) Resilient Flooring:

a) Josam: 56010-12.
b) J. R. Smith: 4140.
c) Mifab: C1100C-T-1.
d) Wade: W-6000-T.
e) Watts: CO-200-T.
f) Zurn: Z-1400.

3) Finished Wall:

a) Josam: 58790.
b) J. R. Smith: 4530.
c) Mifab: C1460RD.
d) Wade: W8560E.
e) Watts: CO-460-RD.
f) Zurn: Z-1446.

4) Exposed Drain Lines:

a) Josam: 58910.
b) J. R. Smith: 4510.
c) Mifab: C1460.
d) Wade: W8560B.
e) Watts: CO-460.
f) Zurn: Z-1440.

5) General Purpose:

a) Josam: 58900.
b) J. R. Smith: 4400.
c) Mifab: C1300-MF
d) Wade: W8550E.
e) Watts: CO-380.
f) Zurn: Z-1440.

6) Equal as approved by Architect before installation.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Excavate and backfill with following requirements:

1. Runs shall be as close as possible to those shown on Drawings.
2. Excavate to required depth and grade to obtain fall required. Grade soil and waste lines within building perimeter 1/4 inch fall in one foot in direction of flow.
3. Bottom of trenches shall be hard. Tamp as required.
4. Remove debris from trench before laying of pipe.
5. Do not cut trenches near footings without consulting Architect.

B. Thermoplastic Pipe And Fittings:

1. General: Piping and joints shall be clean and installed according to Manufacturer's recommendations. Break down contaminated joints, clean seats and gaskets and reinstall.
2. Above Grade: Locate pipe hangers every 4 feet on center maximum and at elbows.
3. Below Grade:

a. Install in accordance with Manufacturer's recommendations and ASTM D2321.
b. Stabilize unstable trench bottoms.
c. Bed pipe true to line and grade with continuous support from firm base.

1) Bedding depth: 4 to 6 inches.
2) Material and compaction to meet ASTM standard noted above.

d. Trench width at top of pipe:

1) Minimum: 18 inches or diameter of pipe plus 12 inches, whichever is greater.
2) Maximum: Outside diameter of pipe plus 24 inches.

e. Do not use backhoe or power equipment to assemble pipe.
f. Initial backfill shall be 12 inches above top of pipe with material specified in referenced ASTM standard.
g. Minimum cover over top of pipe not under building slab:

1) 36 inches before wheel loading.
2) 48 inches before compaction.

C. Install piping so cleanouts may be installed as follows:

1. Where indicated.
2. At every 135 degrees of accumulative change in direction for horizontal lines.
3. Every 100 feet of horizontal run.
4. Extend piping to accessible surface. Do not install piping so cleanouts must be installed in carpeted floors. In such locations, configure piping so wall type cleanouts may be used.

D. Each fixture and appliance discharging water into sanitary sewer or building sewer lines shall have seal trap in connection with complete venting system, so gasses pass freely to atmosphere with no pressure or siphon condition on water seal.

E. Vent entire waste system to atmosphere. Join lines together in fewest practicable numbers before projecting above roof. Set back vent lines so they will not pierce roof near edge or valley. Vent line terminations shall be:

1. 10 inches minimum above roof and 12 inches minimum from any vertical surface.
2. Same size as vent pipe.
3. In areas where minimum design temperature is below 0 deg F or where frost or snow closure may be possible:

a. Vent line terminations shall be same size as vent pipe, except no smaller than 2 inches in diameter.
b. Vents shall terminate 10 inches minimum above roof or higher if required by local codes.

F. If test Tees are used for testing, plug Tees so wall finish can be installed. Do not leave as exposed cleanouts.

3.2 FIELD QUALITY CONTROL

A. Field Tests:

1. Conduct tests for leaks and defective work. Notify Architect before testing.
2. Thermoplastic Pipe System:

a. Before backfilling and compacting of trenches, Fill waste and vent system with water to roof level or 10 feet minimum, and show no leaks for two hours. Correct leaks and defective work.
b. After backfilling and compacting of trenches is complete but before placing floor slab, re-test as specified above. Uncover pipe and correct leaks and defective work. Re-backfill and compact and re-test.

END OF SECTION 22 1313

SECTION 22 1319 - FACILITY SANITARY SEWER SPECIALTIES

PART 1 - GENERAL

1.1 SUMMARY

A. Related Requirements:

1. Section 22 0501: 'Common Plumbing Requirements'.
2. Section 22 1313: 'Facility Sanitary Sewers' for installation of miscellaneous sanitary sewer specialties.

PART 2 - PRODUCTS

2.1 SYSTEMS

A. Performance:

1. Design Criteria:

a. All materials NOT required to be low lead compliant.

B. Components:

1. Drains And Drain Accessories:

a. Floor Drain FD-1:

1) Approved types with deep seal trap and chrome plated strainer.
2) Approved Products:

a) Josam: 30000-50-Z-5A.
b) J. R. Smith: 2010-A.
c) Mifab: F-1100-C.
d) Sioux Chief: 832.
e) Wade: 1100.
f) Watts: FD-200-A.
g) Zurn: Z-415.

C. Accessories:

1. Trap Guard Trap Seal:

a. Design Criteria:

1) Not required to meet NSF International Standards for Lead Free.

b. Approved Products:

1) Trap Guard by Proset
2) Sure Seal by Sure Seal:

a) Install per Manufacturer's recommendation.

PART 3 - EXECUTION: Not Used

END OF SECTION 22 1319

SECTION 22 3413 - DOMESTIC ELECTRIC WATER HEATERS

PART 1 - GENERAL

1.1 SUMMARY

A. Includes But Not Limited To:

1. Furnish and install electric tank type water heater as described in Contract Documents.

B. Related Requirements:

1. Section 22 0501: 'Common Plumbing Requirements'.
2. Section 22 1116: 'Domestic Water Piping'.

1.2 SUBMITTALS

A. Closeout Submittals:

1. Include following in Operations and Maintenance Manual specified in Section 01 7800:

a. Operations and Maintenance Data:

1) Maintenance and operational instructions.

b. Warranty Documentation:

1) Final, executed copy of Warranty.

c. Record Documentation:

1) Manufacturers documentation:

a) Manufacturer's literature or cut sheet.

1.3 QUALITY ASSURANCE

A. Regulatory Agency Sustainability Approvals:

1. Meet NSF International Standards for materials or products that come into contact with drinking water, drinking water treatment chemicals, or both for chemical contaminants and impurities that are indirectly imparted to drinking water from products, components, and materials used in drinking water systems.

1.4 WARRANTY

A. Manufacturer Warranty:

1. Electric Water Heater:

a. 6 year factory warranty on tank and 6 years on other parts.

PART 2 - PRODUCTS

2.1 MANUFACTURED UNITS

A. Electric Water Heater

1. Include P&T Valve
2. All domestic water wetted components must be Lead Free and certified to NSF Lead Free standards.
3. Approved Products:

    a. Water Heater:

        1) Bradford White RE120U6 (19 Gallon)
        2) Additional Approved Manufacturers Include: Rheem, A.O. Smith, State or as approved by architect.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Water Heaters:

1. Water heaters shall each have relief valve sized to match heat input and set to relieve at 120 psi.
2. Install temperature-pressure relief valve on hot water heater and pipe discharge directly to floor sink, drain pan or floor drain.
3. Install water heater on accessible support shelf where indicated. Provide 2" high galvanized or stainless steel drain pan with drain pipe connection. Elevate water heater 1/2" above bottom of drain pan using neoprene pads.
4. Pipe drain pan pipe connection in wall to floor sink. Terminate drain line 2" above flood rim of the sink

3.2 ADJUSTING

A. Adjust electric water heater thermostat to 120 deg F

END OF SECTION 22 3413

SECTION 22 4126 - DISPOSERS

PART 1 - GENERAL

1.1 SUMMARY

A. Includes But Not Limited To:

1. Furnish and install disposers as described in Contract Documents.

B. Related Requirements:

1. Section 22 0501: 'Common Plumbing Requirements'.

PART 2 - PRODUCTS

2.1 MANUFACTURED UNITS

A. Disposer:

1. Heavy-duty residential continuous feed type with adaptor assembly for direct sink mounting.
2. Stainless steel grinding chamber.
3. Motor: 3/4 hp, single phase, 115 volts, totally enclosed, fan cooled.
4. Approved Products:

a. 77 by In-Sink-Erator.
b. Waste King SS-5000 by Anaheim Manufacturing.

PART 3 - EXECUTION:

3.1 INSTALLATION

1. Install disposer where indicated and in accordance with manufacturer's instructions.
2. Integrate disposer control with electrical requirements.
3. Support disposer with bayonet fitting attached and sealed to sink compartment drain fitting.

END OF SECTION 22 4126

SECTION 22 4213 - COMMERCIAL WATER CLOSETS

PART 1 - GENERAL

1.1 SUMMARY

A. Includes But Not Limited To:

1. Furnish and install plumbing fixtures as described in Contract Documents.

PART 2 - PRODUCTS

2.1 ASSEMBLIES

A. Performance:

1. Design Criteria:

a. Interior exposed pipe, valves, and fixture trim, including trim behind custom casework doors, shall be chrome plated.

B. Materials:

1. Water Closets:

a. Handicap Accessible Fixture:

1) Maximum water usage of 1.6 gallons per flush.
2) 18 inch maximum rim height.
3) Approved Products:

a) American Standard: Madera Right Height Elongated 3043.001.
b) Gerber: HE 25-733.
c) Kohler: HighCliff K-4368 ET.
d) Sloan ST-2029-A.

2. Water Closet Accessories:

a. Seats:

1) Provide split front type with check hinge.
2) Approved Products:

a) Standard And Handicap Accessible Fixtures:
b) All Others:

(1) American Standard: 5905.100SS.
(2) Bemis: 1655SSC.
(3) Beneke: 527 SS.
(4) Church: 9500SSC.
(5) Kohler: K-4731-C.
(6) Olsonite: 95SSC.
(7) Toto SC534.

b. Flush Valve (Sensor Operated with Battery):

1) Standard:

a) Maximum water usage of 1.6 gallons per flush.
b) Approved Products:

(1) American Standard 6065.121.
(2) Delta: 81T201BTA
(3) Moen: 8310.
(4) Sloan: 111-SFSM.
(5) Zurn: ZR6000AV-WS1.

c. Flush Valve Filter:

1) Required in following flush valves:

a) Sloan.
b) Zurn.

2) Approved Products:

a) SFDG1 'Dirt Grabber' by South Fork Manufacturing.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install each fixture with separate vent line. Do not circuit vent.

B. Ensure provisions are made for proper support of fixtures and that rough-in piping is accurately set and protected from movement and damage.

1. Seal fixtures around edges to floor with sealant specified.

C. Adjust flush valves for proper flow.

D. Unless otherwise noted, provide each individual fixture supply with chrome-plated stop valve with hand wheel.

E. Install fixtures with accessible stop or control valve in each branch supply line.

F. Make fixture floor connections with approved brand of cast iron floor flange, soldered or caulked securely to waste pipe. Make joints between fixtures and floor flanges tight with approved fixture setting compound or gaskets. Caulk between fixtures and floor with sealant.

G. Flush Valve Filters:

1. Install in Sloan and Zurn flush valves.
2. Install after water lines have been flushed out, but before turning water into flush valve.

3.2 CLEANING

A. Polish chrome finish at completion of Project.

END OF SECTION 22 4213

SECTION 22 4216 - COMMERCIAL LAVATORIES AND SINKS

PART 1 - GENERAL

1.1 SUMMARY

A. Includes But Not Limited To:

1. Furnish and install plumbing fixtures as described in Contract Documents.

1.2 REFERENCES

A. Reference Standard:

1. American National Standards Institute / International Code Council:

a. ANSI/ICC A117.1-2009, 'Standard for Accessible and Usable Buildings and Facilities'.

2. NSF International Standard / American National Standards Institute:

a. NSF/ANSI 61-2012, 'Drinking Water System Components - Health Effects'.
b. NSF/ANSI 372-2011, 'Drinking Water System Components - Lead Content'.

1.3 WARRANTY

A. Manufacturer Warranty:

1. Manufacturer's standard Warranty against material or Manufacturing defects.

PART 2 - PRODUCTS

2.1 ASSEMBLIES

A. Performance:

1. Design Criteria:

a. Interior exposed pipe, valves, and fixture trim, including trim behind custom casework doors, shall be chrome plated.

B. Components:

1. Lavatories (L/1):

a. Handicap Accessible, Wall Mounted Lavatories:

1) Size: 20 by 18 inches.
2) Approved Products:

a) American Standard: Lucern 0355.012.
b) Gerber: Monticello II 12-654.
c) Kohler: Greenwich K-2032.

3) Carrier / Support:

a) Approved Products:

(1) Josam: 17100.
(2) Jay R. Smith: 0700.
(3) Mifab: MC-41.
(4) Wade: 520-M36.

4) Faucet and Grid Strainer for Handicap Accessible Sinks:

a) Design Criteria:

(1) Chrome Plated Grid Strainer. Meet NSF International Standards for Lead Free.

b) Approved Products:

(1) American Standard: Monterrey Two-Handle Centerset Lavatory Faucet with Vandal-Resistant Wrist Blade handles and grid strainer drain 5502.170.
(2) Chicago: 802-317CP with K7715 strainer.
(3) Delta: 2529HDF.
(4) Gerber: CO-44-412.
(5) Kohler: K-7404-5A with K-13885 strainer.
(6) Moen: 8215 with14750 grid strainer.
(7) Speakman: SC 3074.
(8) T & S: B-0890 with B-0899 Grid Strainer.
(9) Zurn: Z-81104 with McGuire 155A grid strainer.

5) Supply pipes with stops:

a) Design Criteria:

(1) Meet NSF International Standards for Lead Free.

b) Accessories:

(1) Provide chrome plated quarter-turn brass ball valve, 12 inches long braided stainless steel riser, and chrome-plated steel flange.

c) Approved Products:

(1) McGuire: BV2165CC.
(2) Zurn: Z8804 LRQ-PC.

6) Trap:

a) Description:

(1) 17 gauge tube 'P' trap, chrome plated.

b) Approved Products:

(1) Dearborn.
(2) Engineered Brass Company (EBC).
(3) Keeney Manufacturing.
(4) McGuire.
(5) Zurn.

7) Safety Covers for Handicap Accessible Lavatories:

a) Description:

(1) Provide protection on water supply pipes and on trap.

b) Approved Products:

(1) Trapwrap by Brocar Products Inc.
(2) Pro Wrap by McGuire Products.
(3) Lav Guard 2 by TrueBro.
(4) Pro Extreme by Plumberex.

2. Stainless Steel Sinks (S/1):

a. Design Criteria:

1) Self-rimming, 18 gauge stainless steel, satin finish.

b. Double Compartment Stainless Steel Sinks:

1) Approved Products:

a) Elkay: LR 3319.
b) Just: DL-1933-A-GR.
c) Kindred: LBT 4408P-1.

c. Stainless Steel Sink Fittings:

1) Faucets for Standard Double Compartment Sinks:

a) Design Criteria:

(1) Meet NSF International Standards for Lead Free.

b) Approved Products:

(1) American Standard: Heritage/Amarilis Two-Handle Bottom-Mount Kitchen Faucet with Swivel spout 7270.
(2) Chicago: 1888CP.
(3) Delta: 27C2243-S5.
(4) Gerber: CO-44-002.
(5) Kohler: K-7761-K with handles K-16012-5.
(6) Zurn Commercial Brass: Z-831J3.

2) Supply pipes with stops:

a) Design Criteria:

(1) Meet NSF International Standards for Lead Free.

b) Accessories:

(1) Provide chrome plated quarter-turn brass ball valve, 12 inches long braided stainless steel riser, and chrome-plated steel flange.

c) Approved Products:

(1) McGuire: BV2165CC.
(2) Zurn: Z8804 LRQ-PC.

3) Waste For Standard Stainless Steel Sinks:

a) Approved Products:

(1) Elkay: LK-99.
(2) Kindred: 1130.
(3) Kohler: K8801.
(4) McGuire: 151.
(5) Zurn Z-8740-PC.

4) Trap:

a) Description:

(1) 17 gauge tube 'P' trap, chrome plated.

b) Approved Products:

(1) Dearborn.
(2) Engineered Brass Company (EBC).
(3) Keeney Manufacturing.
(4) McGuire: MCT150075NCZN.
(5) Zurn.

3. Miscellaneous Sinks:

a. Service Sink (SS/1):

1) Description:

a) Floor Type, enameled cast iron, 28 inches square with vinyl coated rim guard.

2) Approved Products:

a) American Standard: Florwell Enameled Cast Iron 7741.000 with vinyl rim guard 7745.811.
b) Gerber: 12-905.
c) Kohler: Whitby K-6710.
d) Zurn: 5850.

3) Service Sink Fittings:

a) Supply:

(1) Mounting height of 42 inches.
(2) Provide 48 inch hose and clamp unless spout is threaded.
(3) Approved Products:

(a) American Standard: Exposed Yoke Wall-Mount Utility Faucet with top brace 8344.112 with threaded spout.
(b) Chicago: 897 CP.
(c) Delta: 28T9 with 28T911 hose and bracket.

(d) Gerber: C4-44-654.
(d) Kohler: K-8928.
(e) Moen: 8124.
(f) Speakman: SC-5812.
(g) T&S: B-0665-BSTP.
(h) Zurn: Z-843M1.

b) Drain and Strainer:

(1) Approved Products:

(a) American Standard: Grid strainer 7721.038.
(b) Kohler: K-9146, 3 inch IPS.

c) Trap: Cast iron, PVC, or ABS to match piping.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install each fixture with separate vent line. Do not circuit vent.

B. Ensure provisions are made for proper support of fixtures and that rough-in piping is accurately set and protected from movement and damage.

C. Seal wall-mounted fixtures around edges to wall and counter top fixtures to countertop with sealant specified.

D. Unless otherwise noted, provide each individual fixture supply with chrome-plated stop valve with hand wheel.

E. Install fixtures with accessible stop or control valve in each hot and cold water branch supply line.

F. Lavatories: Install using wall carriers. Support carrier free of finished wall.

G. Install Safety Covers on all under sink / lavatories with exposed water supply pipes and traps.

H. Install Handicap Accessible Lavatories per ADA height mounting requirements.

I. Install breakroom sink, sealed to counter-top. Install disposer where indicated.

J. Install service sink, plumb and level with floor. Install in accordance with manufacturer's instructions. Install faucet on wall at indicated height. Install check stops on hot and cold water piping.

3.2 CLEANING

A. Clean all lavatories and sinks. Remove all manufacturers stickers.

B. Polish chrome finish at completion of Project.

END OF SECTION 22 4216

SECTION 22 4700 - DRINKING FOUNTAINS AND WATER COOLERS

PART 1 - GENERAL

1.1 SUMMARY

A. Includes But Not Limited To:

1. Furnish and install drinking water cooling system units as described in Contract Documents.

1.2 REFERENCES

A. Reference Standard:

1. American National Standards Institute / International Code Council:

a. ANSI/ICC A117.1-2009, 'Standard for Accessible and Usable Buildings and Facilities'.

2. NSF International Standard / American National Standards Institute:

a. NSF/ANSI 61-2012, 'Drinking Water System Components - Health Effects'.
b. NSF/ANSI 372-2011, 'Drinking Water System Components - Lead Content'.

1.3 QUALITY ASSURANCE

A. Regulatory Agency Sustainability Approvals:

1. Handicap Accessible Products to meet ANSI/ICC A117 Accessible requirements.
2. Meet NSF International Standards for materials or products that come into contact with drinking water, drinking water treatment chemicals, or both for chemical contaminants and impurities that are indirectly imparted to drinking water from products, components, and materials used in drinking water systems.

PART 2 - PRODUCTS

2.1 MANUFACTURED UNITS

A. Design Criteria:

1. All drinking water products, components, and materials above and below grade used in drinking water systems must meet NSF International Standards for Lead Free.
2. Interior exposed pipe, valves, and fixture trim shall be chrome plated.
3. Do not use flexible water piping.

B. Materials:

1. Handicap Accessible Bi-Level Fountain with Bottle Filling Station:

a. Bi-level stainless steel basin, ADA compliant, accessory bottle filling station. Vandal proof operating bars on front. 8.0 GPH minimum of 50 deg F water with 90 deg F room temperature, 1/5 horsepower motor, 120 V, 60 Hz, single phase. Flexi-guard or chrome plated brass bubbler. R-134A. Temperature Control.
b. Furnish with in-wall support stand carrier for bi-level fountain and bottle filler.
c. Filtered water inlet, electronic bottle filler sensor
d. Quality Standard: Elkay: Model LZSTL8WSLK
e. Additional Manufacturers: Acorn, Halsey Taylor, Oasis

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install fixtures with accessible stop or control valve.

B. Mounting:

1. General:

a. Coordinate location of fountain and bottle filler with location and height of electrical outlet to ensure concealment of outlet by fountain.
b. Anchor bottom of fountain to wall.
c. Install 3/8 inch IPS union connection and Chicago No. 441 stop to building supply line.
d. Install 1-1/4 inch IPS slip cast brass 'P' trap. Install trap so it is concealed.

2. Accessible Drinking Fountains and Bottle Filler:

a. Spout outlets of wheelchair accessible drinking fountains shall be 36 inches maximum above floor.
b. Spout outlets of drinking fountains for standing persons shall be 38 inches and 43 inches maximum above floor.

3.2 CLEANING

A. Polish chrome finish at completion of Project.

END OF SECTION 22 4700

DIVISION 23 – HEATING, VENTILATING, AND AIR-CONDITIONING

23 0501	General Mechanical Requirements
23 0529	Hangers and Supports for HVAC Piping and Equipment
23 0553	Identification for HVAC Piping and Equipment
23 0713	Duct Insulation
23 0719	HVAC Refrigeration Piping Insulation
23 0933	Electric and Electronic Control System for HVAC
23 0981	Testing and Balancing
23 1123	Facility Natural Gas Piping
23 2300	Refrigerant Piping
23 2600	Condensate Drain Piping
23 3001	General Duct Requirements
23 3114	Low-Pressure Metal Ducts
23 3115	Underground Ducts
23 3300	Air Duct Accessories
23 3346	Flexible Duct
23 3401	Exhaust Fans
23 3713	Diffusers, Registers, and Grilles
23 5135	Air Piping
23 5416	Gas-Fired Furnaces
23 6213	Air-Cooled Refrigerant Condensers

SECTION 23 0501 - GENERAL MECHANICAL REQUIREMENTS

PART 1 - GENERAL

1.1 SUMMARY

A. Includes But Not Limited To

1. General requirements and procedures for mechanical systems.
2. Responsibility for proper operation of electrically powered equipment furnished under this division.
3. The mechanical contractor shall be responsible for installation and wiring of controls furnished with mechanical equipment that requires field installation of control wiring for both low and line voltage.
4. Interface with testing and balancing agency.
5. Furnish and install sealants relating to installation of systems installed under this division.
6. Furnish and install firestop penetration systems for mechanical system penetrations.

B. Scope

1. It shall be the work of this section to furnish all labor and materials for all Division 23 work required on the entire project.
2. The general provision of the contract, including the conditions of the contract (general, supplementary and other conditions) and Division 1 apply to work specified in this section.
3. Section 23 0501 is part of and shall apply to all sections of Division 23.

C. Permits and Fees

1. Any fees required for permits, hook-up, inspections in connection with this work shall be paid by Division 23 contractor.

D. Request for Substitution

1. Subject to compliance with space requirement limitations, specifications, and drawings alternate approved manufacturers may bid their equipment with the stipulation that it does not constitute prior approval due to the inability to review complete equipment specifications prior to bid.
2. It is the responsibility of the supplier to verify that the requested substitution meets all the requirements of the specifications and space.
3. Any changes required to the building, structure, or electrical to accommodate a deviation from plans or specifications, including engineering cost will be the responsibility of the supplier.
4. Request for prior consideration to bid of materials and equipment shall be made five days before bid opening. Request for prior consideration shall include model of equipment and a list of exceptions to the specifications, if any, or shall include a statement that the equipment proposed meets all the requirements of drawings and specifications.
5. Any substitutions not submitted before bid opening will not be considered. All equipment that this contractor installs must fit design conditions and space allocations.
6. Ensure that items to be furnished fit space available. Make necessary field measurements to ascertain space requirements including those for connections and furnish and install equipment of size and shape so final installation shall suit true intent and meaning of contract documents. If review for considerations is received by addendum or change order to use other than originally specified items, be responsible for specified capacities and for ensuring that items to be furnished will fit space available and connect to duct and pipe systems as shown on contract documents.
7. Reference in this specification to any product or material by name, make or catalog number does not give final approval of named equipment without showing compliance with drawings and specifications.

1.2 SUBMITTALS

A. Product Data

1. Manufacturer's catalog data for each manufactured item.

    a. Provide section in submittal for each type of item of equipment. Include Manufacturer's catalog data of each manufactured item and enough information to show compliance with contract document requirements. Literature shall show capacities and size of equipment used and be marked indicating each specific item with applicable data underlined.
    b. Capacities shown for equipment in the specifications and on the drawings are the minimum acceptable and no equipment will be considered as an alternate that has capacities or performance less than that of design equipment.
    c. Include name, address, and phone number of each supplier.

B. Shop Drawings and Product Data

1. Submit complete shop drawings and product data on all equipment and materials to be used in the installation of mechanical system for this project. Written approval shall be obtained before ordering, purchasing, acquiring, or installing any such equipment or materials for the project.

    a. State sizes, capacities, brand names, motor HP, accessories, materials, gauges, dimensions, and other pertinent information.
    b. List on catalog covers page numbers of submitted items.
    c. Highlight applicable data using yellow or pink felt tip hi-lighter.

2. If material or equipment is not as specified or submittal is not complete, it will be rejected by architect/engineer. Catalog data or shop drawings for equipment which are noted as being reviewed by architect or the engineer shall not supersede contract documents.
3. Review comments of architect or engineer shall not relieve contractors or subcontractors under this division from responsibility for deviations from contract documents unless architect's and engineer's attention has been called to such deviations in writing at time of submission, nor shall they relieve this division from responsibility for errors in items submitted.
4. A minimum period of two weeks, exclusive of transmittal time, will be required each time a shop drawing and/or brochure is submitted or resubmitted for review. This time period shall be considered by the contractor when scheduling submittal data.
5. Prior to submission of the shop drawings and project data, the contractor review and verify that they are in compliance with the contract documents. Verify all dimensional information to insure proper clearance for installation of equipment. Check all materials and equipment after arrival on the job site and verify compliance with the contract documents.
6. Engineers review of shop drawings or product data and brochures shall not relieve the contractor of responsibility for dimensions and/or errors that may be contained therein, or deviations from the contract document's requirements. It shall be clearly understood that the noting of some errors but overlooking others does not grant the contractor permission to proceed in error. Regardless of any information contained in the shop drawings and brochures, the requirements of the contract documents shall govern and are not waived, or superseded in any way by the review of the shop drawings and brochures.
7. Architect/engineer approval is for general conformity with contract documents. Approval by the architect/engineer does not alleviate the responsibility of the contractor to provide equipment and materials that meet the requirements of the specifications and drawings. Equipment shall fit the space allotted including manufacture's recommended access clearance and shall not exceed dimensions if specified on the equipment schedules.
8. Access clearance to equipment shown on the drawings or manufactures recommended clearance or as required by code is the minimum acceptable requirement and no equipment will be considered which reduces or restricts accessibility to equipment.
9. Factory wired equipment shall include shop drawings of all internal wiring to be furnished with the unit.

C. Closeout

1. The contractor shall furnish to the architect complete operating and maintenance instructions and supplier literature covering all units of equipment and systems herein specified, together with parts lists. Four copies complete shall be furnished and shall be suitably bound using three ring, hard back binder, tabbed and indexed. Cover shall be printed listing project name.

a. Include manufacturers' representatives' names and addresses.
b. Include testing and balance reports.
c. Include contractor, engineer, and architect names and addresses.
d. Furnish complete list of instruction, brochures, etc., for all items furnished under Division 23.
e. Include other items as required for a complete reference for the building mechanical operating system.
f. Include verbal description of mechanical systems, operation and startup procedures and maintenance requirements.
g. Include temperature control system diagrams and temperature set points of temperature controllers.
h. Include equipment submittal data.

1.3 QUALITY ASSURANCE

A. Requirements of Regulatory Agencies

1. Comply with all current codes, rules, regulations, and ordinances of city, county, and the State of Utah, including the Occupational Safety and Health Act, NFPA 90A, current 2018 International Building Code, International Mechanical Code, International Fuel Gas Code, ADA accessibility guidelines, and International Plumbing Code as they may apply. Provide materials and labor necessary to comply with rules, regulations, and ordinances.
2. In case of differences between building codes, state laws, local ordinances, utility company regulations, and contract documents, the most stringent shall govern. Promptly notify architect in writing of such differences.

B. Identification

1. Motor and equipment name plates as well as applicable UL and AGA labels shall be in place when project is turned over to owner.
2. Materials shall bear manufacturer's name and trade name. Equipment and materials of same general type shall be of same make throughout work to provide uniform appearance, operation, and maintenance.

C. Materials, Quality

1. All materials installed shall be new and undamaged.
2. All materials incorporated into the work shall be new.

1.4 DELIVERY, STORAGE, AND HANDLING

A. Storage

1. All materials and equipment shall be stored under cover and protected from damage. Store materials in original containers until ready for use. Packages showing evidence of water or other damage shall be rejected.

1.5 WARRANTY

A. Guarantee heating, cooling, and plumbing systems to be free from noise in operation that may develop from failure to construct system in accordance with contract documents.

B. Provide certificates of warranty for each piece of equipment made out in favor of owner. On certificate clearly record 'start-up' date of each piece of equipment.

1.6 RECORD DRAWINGS

A. During the course of construction, the contractor shall maintain a set of "Record" drawings upon which all deviations from the original layout are recorded. Upon completion of contract and before final payment, this shall be delivered to the mechanical consultant.

1.7 OWNER'S INSTRUCTIONS

A. Instruct owners maintenance personnel and in operation and maintenance of mechanical systems utilizing operation and maintenance manual when so doing.

1. Minimum Instruction periods shall not be less than 8 hours.
2. Instruction periods shall occur after substantial completion inspection when systems are properly working and before final payment is made.

PART 2 - PRODUCTS - Not Used

PART 3 - EXECUTION

3.1 EXAMINATION

A. Site Inspection

1. Examine premises to understand conditions which may affect performance of work of this division before submitting proposals for this work. Examine adjoining work on which mechanical work is dependent for deficiencies and report work which requires correction.
2. No extra payment will be allowed for work required to meet the intent of the drawings and specifications that could be determined by visiting the site to observe conditions both prior to start of construction and during ongoing construction.

B. Drawings

1. The mechanical drawings do not attempt to show complete details of building construction. Contractor is referred to the architectural, structural, and electrical drawings.
2. Drawings shall not be scaled for rough-in dimensions nor quantity take-offs. Refer to architectural drawings for dimensions.
3. Drawings are diagrammatic and do not necessarily show exact details of pipe and duct locations. No extra payment will be allowed where piping or duct work offsets are required to avoid other work or where minor changes are required to facilitate installation. Make field measurements before shop fabrication of fittings. Do not fabricate duct work before field measuring and verification.
4. Plumbing and mechanical drawings show general arrangement of piping, duct work, equipment, etc. Follow as closely as actual building construction and work of other trades will permit.
5. Consider architectural and structural drawings part of this work insofar as these drawings furnish information relating to design and construction of building. These drawings take precedence over plumbing and mechanical drawings.
6. Because of small scale of drawings, it is not possible to indicate all offsets, fittings, and accessories which may be required. Investigate structural and finish conditions affecting this work and arrange work accordingly, providing such fittings, valves, and accessories required to meet conditions.

C. Ensure that items to be furnished fit space available. Make necessary field measurements to ascertain space requirements including those for connections and furnish and install equipment of size and shape so final installation shall suit true intent and meaning of contract documents. If approval is received by addendum or change order to use other than originally specified items, the contractor shall be responsible for specified capacities and for ensuring that items to be furnished will fit space available.

3.2 PREPARATION

A. Check that slots and openings provided under other divisions through floors, walls, ceilings, and roofs are properly located. Perform cutting and patching caused by neglecting to coordinate with divisions providing slots and openings at no additional cost to owner.

B. Changes Due To Equipment Selection

1. Where equipment specified or otherwise approved requires different arrangement or connections from that shown in contract documents, submit drawings, if requested by architect, showing proposed installations.
2. If proposed changes are approved, install equipment to operate properly and in harmony with intent of contract documents. Make incidental changes in piping, duct work, supports, installation, wiring, heaters, panelboards, and as otherwise necessary.
3. Provide any additional motors, valves, controllers, fittings, and other additional equipment required for proper operation of the system resulting from selection of equipment, including all required changes in affected trades.
4. Be responsible for the proper location of roughing-in and connections provided under other divisions that affect the mechanical system.

3.3 INSTALLATION

A. Interface With Other Work

1. Electrical: Furnish exact location of electrical connections and complete information on motor controls to installer of electrical system.
2. It shall be the responsibility of Division 23 to carefully evaluate and coordinate the installation of devices, equipment, piping, ducts, registers, etc., required under this section and to be installed by others. Mechanical and electrical drawings, for example are diagrammatic and in some cases, the two crafts may tend to interfere with each other. Early conferences with other crafts and frequent conferences during construction will alleviate fixture pile-up and conflict. Coordinate mechanical equipment with mill work as shown on architectural drawings. In most cases sheet metal duct work locations are to take precedence over piping.
3. Testing and Balancing

    a. It will be the responsibility of the mechanical contractor to place the mechanical systems in operation which includes a complete and operational control system and make adjustments to the system in preparation for the test and balance contractor to complete the final test and balance of the system. Make adjustments to system as directed by the test and balance contractor.
    b. Make changes in fan speeds, and dampers or add dampers as required for correct balance as recommended by the test and balance contractor and at no additional cost to owner.

B. Cut carefully to minimize necessity for repairs to previously installed or existing work. Do not cut beams, columns, or trusses.

C. Locating Equipment

1. Arrange pipes, ducts, and equipment to permit ready access to valves, cocks, unions, traps, filters, starters, motors, control components, and to clear openings of doors and access panels.
2. Adjust locations of pipes, ducts, switches, panels, equipment, and fixtures to accommodate work to interferences anticipated and encountered.
   Install mechanical work to permit removal of equipment and parts of equipment requiring periodic replacement or maintenance without damage to or interference with other parts of equipment or structure.

3. Determine exact route and location of each pipe and duct prior to fabrication.

    a. Right-of-Way

        1) Lines which pitch shall have right-of-way over those which do not pitch.
        2) Lines whose elevations cannot be changed shall have right-of-way over lines whose elevations can be changed.

    b. Offsets, Transitions, and Changes in Direction

1) Make offsets, transitions, and changes in direction in pipes and ducts as required to maintain proper head room and pitch of sloping lines whether or not indicated on drawings.

D. Penetration Firestops: Install penetration firestop system appropriate for penetration at mechanical system penetrations through walls, ceilings, roofs, and top plates of walls.

E. Sealants

1. Seal openings through building exterior caused by penetrations of elements of mechanical systems.
2. Furnish and install fire caulk sealant around penetrations through fire rated walls, ceilings, and floors.

3.4 EXPOSED MECHANICAL SYSTEM FASTENERS

A. Screws, bolts, and fasteners removed from mechanical equipment in the course of construction shall be replaced. Fasteners that are lost shall be replaced with fasteners to match the original.

B. Screws used to secure mechanical items on finished room surfaces shall be round head screws painted to match the item being secured.

C. Hex head sheet metal screws or grabber screws shall not be used in finished rooms.

3.5 CUTTING AND PATCHING

A. Cutting and core drilling required for mechanical systems shall be work of Division 23. Any cutting and patching of finished surfaces will be accomplished by the proper trade. Cutting through concrete or masonry for pipe installation shall be by core drilling or saw cutting. Do not cut beams, joists, or other structural members. All cutting to be done under the direction of the architect.

B. Patch and repair walls, floors, ceilings, and roofs with materials of same quality and appearance as adjacent surfaces unless otherwise shown. Surface finishes shall exactly match existing finishes of same materials.

C. Expense of cutting, patching, repairing, and replacing of work is the responsibility of the division/section installing the work.

3.6 TESTS

A. Test all piping systems prior to concealing or installation of insulation or covering in the presence of the engineer. Isolate the section of piping being tested from all equipment which might be damaged by the test pressures.

3.7 TOUCH UP PAINTING

A. Touch up any damaged factory finish.

3.8 CLEANING

A. Clean exposed piping, ductwork and equipment.

B. Replace filters in equipment for moving air with new filters no more than one week before final inspection or test and balance.

3.9 PROTECTION

A. Do not operate pieces of equipment used for moving supply air without proper air filters installed properly in system.

END OF SECTION 23 0501

SECTION 23 0529 - HANGERS AND SUPPORTS FOR PIPING AND EQUIPMENT

PART 1 - GENERAL

1.1 SUMMARY

A. Includes But Not Limited To:

1. Common hanger and support requirements and procedures for piping systems.

B. Products Installed but Not Furnished Under This Section:

1. Paint identification for gas piping used in HVAC equipment.

1.2 SUBMITTALS

A. Action Submittals:

1. Product Data:

a. Manufacturer's catalog data for each manufactured item.

PART 2 - PRODUCTS

2.1 ASSEMBLIES

A. Manufacturers:

1. Manufacturer Contact List:

a. Anvil International, Portsmouth, NH www.anvilintl.com.
b. Cooper B-Line, Highland, IL www.b-line.com.
c. Unistrut, Wayne, MI www.tyco-unistrut.com.

B. Materials:

1. Hangers, Rods, And Inserts

a. Galvanized and UL approved for service intended.
b. Support horizontal piping from hangers except where trapeze type hangers are explicitly shown on Drawings. Hangers shall have double nuts.

1) Support pipes 2 inches in diameter and smaller with adjustable swivel ring hanger.

a) Acceptable Products:

(1) Swivel Ring Hanger: Anvil Fig. 69.
(2) Equals by Cooper B-Line.

c. Support rods for single pipe shall be in accordance with following table:

Rod Diameter	Pipe Size
3/8 inch	2 inches and smaller
1/2 inch	2-1/2 to 3-1/2 inches

d. Riser Clamps For Vertical Piping:

1) Acceptable Products:

a) Anvil Fig. 261.
b) Equals by Cooper B-Line.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Piping:

1. Properly support piping and make adequate provisions for expansion, contraction, slope, and anchorage.

a. Suspend piping from roof structure or clamp to vertical walls using Unistrut and clamps. Do not hang pipe from other pipe, equipment, or ductwork. Laying of piping on any building element is not allowed.
b. Supports For Horizontal Piping:

1) Support metal piping at 96 inches on center maximum for pipe 1-1/4 inches or larger and 72 inches on center maximum for pipe 1-1/8 inch or less.
2) Provide support at each elbow. Install additional support as required.

c. Supports for Vertical Piping:

1) Securely support clamps by structural members, which in turn are supported directly from building structure.
2) Provide clamps as necessary to brace pipe to wall.

d. Insulate hangers for copper pipe from piping by means of at least two layers of Scotch 33 plastic tape.

2. Gas piping Identification:

a. Apply paint identification for gas piping used with HVAC equipment as specified in Section 23 0553.

END OF SECTION 23 0529

SECTION 23 0553 - IDENTIFICATION FOR HVAC PIPING AND EQUIPMENT

PART 1 - GENERAL

1.1 SUMMARY

A. Products Furnished But not Installed Under This Section:

1. Identification of piping and equipment as described in Contract Documents including:

a. Paint identification for gas piping used in HVAC equipment.

PART 2 - PRODUCTS

2.1 SYSTEMS

A. Description:

1. Abbreviations for Equipment Identification and Band Colors for Pipe Identification:

a. Apply snap on labels and continuous painting as follows:

Pipe Type	Pipe Color	Symbol
Gas	Yellow	GAS

B. Materials:

1. Approved Products and Manufacturers.

a. Products listed in edition of MPI Approved Product List current at time of bidding and later are approved, providing they meet VOC requirements in force where Project is located.

2. Description:

a. Ferrous Metal:

1) New Surfaces: Use MPI(a) INT 5.1B Waterborne Light Industrial Finish system.

3. Performance Requirements:

a. New Surfaces: MPI Premium Grade finish requirements.
b. Maintain specified colors, shades, and contrasts.

4. Paint (one coat):

a. Primer:

1) Ferrous Metal:

a) MPI 107, 'Primer, Rust-Inhibitive, Water Based'.

(1) Color: white.

b. Finish Coat (two coats):

1) Ferrous Metal:

a) MPI 153, 'Light Industrial Coating, Interior, Water Based, Semi-Gloss (MPI Gloss Level 5)'.

5. Labels:

a. Equipment Identification:

1) Black formica, with white reveal when engraved.
2) Lettering to be 3/16 inch high minimum.

PART 3 - EXECUTION

3.1 APPLICATION

A. Painting:

1. New Surfaces:

a. Remove rust spots by sanding and immediately spot prime. If all traces of rust cannot be removed, apply rust blocker recommended by Paint Manufacturer before applying full primer coat.

2. Leave equipment in like-new appearance.
3. Only color bands are acceptable.
4. Locate identifying legends, directional arrows, and color bands at following points on exposed piping of each piping system:

a. Adjacent to each item of equipment.
b. At point of entry and exit where piping goes through wall.
c. On each riser and junction.
d. Every 25 feet on long continuous lines.

5. Equipment Labels:

a. Label the following equipment:

1) Furnaces
2) Condensing Units
3) Thermostats

END OF SECTION 23 0553

SECTION 23 0713 - DUCT INSULATION

PART 1 - GENERAL

1.1 SUMMARY

A. Includes But Not Limited To:

1. Furnish and install thermal wrap duct insulation as described in Contract Documents.

B. Related Requirements:

1. Section 23 3114: 'Low-Pressure Metal Ducts'.
2. Section 23 3300: 'Acoustic Duct Accessories' for duct liner.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Thermal Wrap Duct Insulation:

1. 1-1/2 inch or 3 inch thick fiberglass with factory-laminated, reinforced aluminum foil scrim kraft facing and density of 0.75 lb / per cu ft.
2. Thermal Conductivity: 0.27 BTU in/HR SF deg F at 75 deg F maximum.
3. Acceptable Products:

a. Type 75 standard duct insulation by Certainteed St Gobain.
b. Microlite FSK by Johns-Manville.
c. Duct Wrap FSK by Knauf Fiber Glass.
d. Alley Wrap FSK by Manson Insulation Inc.
e. FRK by Owens-Corning.
f. Equal as approved by Architect before bidding.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Thermal Wrap Duct Insulation:

1. Install insulation as follows:

a. Within Building Insulation Envelope below attic insulation:

1) 1-1/2 inches thick on all round ducts.

b. Lined ductwork above attic insulation:

1) 1-1/2 inch thick on all lined rectangular and square duct.

c. Round duct above attic insulation:

1) 3 inches thick.

2. Wrap insulation tightly on ductwork with circumferential joints butted and longitudinal joints overlapped minimum 2 inches.

a. Do not compress insulation except in areas of structural interference. Minimum thickness at corners shall be one inch thick.
b. Remove insulation from lap before stapling.
c. Staple seams at approximately 16 inches on center with outward clenching staples.
d. Seal seams with foil vapor barrier tape or vapor barrier mastic. Seal penetrations of facing to provide vapor tight system.

B. Insulate outside of ceiling diffusers and diffuser drops same as ductwork.

END OF SECTION 23 0713

SECTION 23 0719 - HVAC REFRIGERATION PIPING INSULATION

PART 1 - GENERAL

1.1 SUMMARY

A. Includes But Not Limited To:

1. Furnish and install insulation on refrigerant piping and fittings as described in Contract Documents.

1.2 DELIVERY, STORAGE, AND HANDLING

A. Storage And Handling Requirements:

1. Keep materials and work dry and free from damage.
2. Replace wet or damaged materials at no additional cost to Owner.

PART 2 - PRODUCTS

2.1 ASSEMBLIES

A. Materials:

1. Refrigeration Piping System:

a. Thickness:

Pipe Size, Outside Diameter	Insulation Thickness
One inch and smaller	1/2 Inch
1-1/8 to 2 inch	3/4 Inch

1) One inch sheet for fittings as recommended by Manufacturer.
2) Approved Products:

a) AP Armaflex 25/50 by Armacell.
b) Nitrolite by Nitron Industries. White only for exterior.
c) Nomaco K-Flex.

b. Joint Sealer:

1) Approved Products:

a) Armacell 520 by Armacell.
b) Namaco K-Flex R-373.

c. Insulation Tape:

1) Approved Products:

a) Armaflex AP Insul Tape by Armacell.
b) FT182 Tape by Nitron Industries.
c) Elastomeric Foamtape by Nomac K-Flex.

d. Exterior Finish:

1) For application to non-white, exterior insulation.

2) Approved Products:

a) WB Armaflex Finish by Armacell.
b) R-374 Protective Coating by Nomaco K-Flex.

PART 3 - EXECUTION

3.1 PREPARATION

A. Before application of insulating materials, brush clean surfaces to be insulated and make free from rust, scale, grease, dirt, moisture, and any other deleterious materials.

B. Use drop cloths over equipment and structure to prevent adhesives and other materials spotting the work.

3.2 INSTALLATION

A. Refrigeration System Piping System:

1. General:

a. Install insulation in snug contact with pipe.

1) Insulate flexible pipe connectors.
2) Insulate thermal expansion valves with insulating tape.
3) Insulate fittings with sheet insulation and as recommended by Manufacturer.

b. Slip insulation on tubing before tubing sections and fittings are assembled keeping slitting of insulation to a minimum.
c. Do not install insulation on lines through clamp assembly of pipe support. Butt insulation up against sides of clamp assembly.
d. Stagger joints on layered insulation. Seal joints in insulation.
e. Install insulation exposed outside building so 'slit' joint seams are placed on bottom of pipe.
f. Paint exterior exposed, non-white insulation with two coats of specified exterior finish.

2. System Requirements:

a. Install insulation on above ground refrigerant suction piping and fittings, including thermal bulb, from thermal expansion valve.

3.3 FIELD QUALITY CONTROL

A. Non-Conforming Work:

1. Method of installing insulation shall be subject to approval of Architect. Sloppy or unworkmanlike installations are not acceptable.

3.4 CLEANING

A. Leave premises thoroughly clean and free from insulating debris.

END OF SECTION 23 0719

SECTION 23 0933 - ELECTRIC AND ELECTRONIC CONTROL SYSTEM FOR HVAC

PART 1 - GENERAL

1.1 SUMMARY

A. Includes But Not Limited To:

1. Furnish and install an automatic temperature control system consisting of programmable thermostats, dampers, VAV controllers and as described in Contract Documents.
2. Furnish and install conductors and make connections to allcontrol devices, motors, and associated equipment.
3. Assist in air test and balance procedure.
4. Furnishing and installing of raceway, conduit, and junction boxes, including pull wires, for temperature control system.

B. Related Requirements:

1. Section 23 0501: Common HVAC Requirements.
2. Section 23 3300: Furnishing and installing of temperature control dampers.

C. Description of Controls:

1. Stand alone, low voltage, digital type, hard wired, 7-dayprogrammable thermostats with color graphics, heating-cooling operation with automatic changeover, for each furnace system. Multiple start-stop programmable occupancy schedules with night setback capability.
2. Thermostats to be located where indicated on the drawings. Two thermostats required; one for each furnace system.
3. Damper controllers for controlling low voltage motorized outside air dampers and actuators located at each furnace system. Subject to CO2 damper control when required by jurisdiction.
4. VAV damper controller for office occupancy. Damper to control based upon furnace heating-cooling mode.
5. Line voltage controllers for exhaust fan operation.
6. Occupancy sensors for exhaust fan operation.
7. CO2 sensor. Where systems are required by jurisdiction to operate with CO2 sensor/damper control.
8. Wi-Fi, wireless or Cloud Based systems controls are not acceptable for this project, unless otherwise noted.

1.2 SUBMITTALS

A. Action Submittals:

1. Product Data:

a. Installer to provide product literature or cut sheets for all products specified in Project.
b. Installer to provide questions of control equipment locations to Mechanical Engineer prior to installation.
c. Control system wiring diagrams.

PART 2 - PRODUCTS

2.1 SYSTEMS

A. Product Manufacturers

1. Acceptable Manufacturers:

a. Subject to compliance with the drawings and the specifications ; acceptable manufacturers for the temperature controls for this project include:

- **Honeywell**
- **Trane**
- **Carrier Infinity**

B. Performance:

1. Design Criteria:

a. Automatic Temperature Control System design concept utilizes communicating thermostats located near furnace, and electric / electronic actuation of dampers.

C. Components:

1. Thermostats:

a. Thermostat:

1) Approved Product:

a) Honeywell, Trane or Carrier Control Systems consisting of the following:

(1) Communicating Thermostat: Low voltage type provided with automatic change-over feature for both heating and cooling stages, seven-day / 365 day program with multiple starts and stops per day, and provisions for damper operators. Furnish with optional override button for 3 hour override.

(3) Discharge Air Sensor: Honeywell C7041B2005 or equal, 6 inch duct insertion type.

2. Transformer:

a. 120 / 24 V, 50VA
b. 120 / 24 V, 75VA

3. Damper Actuators:

a. Electric type equipped for Class I wiring.
b. Shall not consume power during UNOCCUPIED cycle or use chemicals or expandable media.
c. Have built in spring return.
d. Approved Product:

1) Honeywell MS8105A1030/U or equal by Belimo
2) Honeywell MS8105A1130 w/ End switch or equal by Belimo.

4. Conductors:

a. Color-coded and No. 16 and No. 12 AWG Type TWN, TFN, or THHN, stranded.
b. Thermostat Cable: 12, 8, or 4 conductor, 18AWG solid copper wire, insulated with high-density polyethylene. Conductors parallel enclosed in brown PVC jacket (22 AWG cable not allowed).

5. $CO2_2$ Return Air Sensor (Where required by Authority Having Jurisdiction):

a. Duct mount with display.
b. Approved Product:

1) Honeywell: C7232B1006 Carbon Dioxide Sensor or approved equal.

D. Operation Sequences:

1. Programmable thermostat shall control unoccupied and occupied status of fan system based on adjustable seven day program. Fan shall run continuously in occupied mode and cycle in unoccupied mode.
2. Adjustable heating and cooling set points shall control space temperature by activating either gas fired heating or DX cooling equipment. Programmable thermostat provides automatic change over between heating and cooling.
3. Minimum outside air damper, spring return type, shall open in occupied mode and remain closed in unoccupied mode in zones using outside air.
4. Minimum 3 hour override. Optional override control for operation of heating/cooling system for 3 hour occupied time limit.
5. Systems Using $CO2_2$ sensor to Control Outside Air Damper Operation:

    a. Minimum outside air damper, spring return type, shall open in occupied mode only when a CO2 sensor setpoint of 1200 ppm is reached. Damper shall close if CO2 level drops below 1100 ppm.
    b. Damper shall remain closed in un-occupied mode.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Interface With Other Work:

1. Program room thermostats per owners occupancy schedule during or before air test and balance. Insulate sensor J-box with fiberglass insulation; expandable/ foam insulation is NOT acceptable
2. Instruct air test and balance personnel in proper use and setting of control system components.
3. Install low voltage electrical wiring in accordance with Division 26 of these Specifications.

B. Safety Controls:

1. Interlock gas valves with cooling compressors and supply air fan. Gas valve shall be closed whenever system cooling compressors are activated.
2. Gas valves shall obtain their electrical control power from same circuit as supply fan motor.
3. Check high limit thermostats furnished with heating equipment for correct operation. Gas valves shall close when duct temperature exceeds high limit setting. Perform this work immediately after wiring burner controls.
4. Wire bonnet thermostatic switches to dissipate all heat in combustion chambers.
5. Fresh air dampers shall close on fan shut-down, power failure, open fan motor disconnect switch, and when thermostat is in UNOCCUPIED mode.
6. Gas burner safety controls furnished with furnace units shall be incorporated in control circuits for all modes of operation.

C. Mount damper actuators and actuator linkages external of airflow. Make certain dampers operate freely without binding or with actuator housing moving.

3.2 FIELD QUALITY CONTROL

A. Field Tests:

1. Calibrate, adjust, and set controls for proper operation, operate systems, and be prepared to prove operation of any part of control system. This work is to be completed before pre-substantial completion inspection.
2. Test each individual heating, cooling, and damper control for proper operation using control system.

3.3 SYSTEM STARTUP

A. Systems:

1. Contractor is responsible for configuring all thermostats with proper zone names, zone scheduling, proper holiday scheduling, all to be coordinated with owner. Set proper clock setting including day/month/year.
2. Set remote sensor to None.
3. Set remote humidity to None.
4. Set Occupancy sensor to None.
5. Set Discharge Air Temp sensor to None.
6. Set Heating / Cooling to proper stages
7. Set heat cycle rates to 9 cph and cooling to 4 cph. Set discharge high limit to 110 degrees but do not activate (check) the high limit option. This is only to be used later by Owner if equipment experiences issues with system overshoot.
8. Set Aux relay to "Time of Day".
9. Set fan switch operation to "ON".
10. Set minimum UnOcc start time for all days. No days shall be scheduled Unconfigured.
11. Set occupied start times to start times; as directed by owner.
12. Place all zone over-ride durations to one (1) hour.
13. Set Occupied default heating setpoints to 70 degrees, cooling setpoints to 74 degrees.
14. Set UnOccupied default heating setpoint to 60 degrees, cooling setpoints to 90 degrees.
15. Set each zone to applicable Holiday scheduling.

3.4 ADJUSTING

A. Program minimum of seven (7) day's operation into thermostat memory function.

3.5 CLOSEOUT ACTIVITIES

A. Instruction Of Owner:

1. Include the following training:

a. Training shall be by personnel of installing company and utilize operator's manuals and as-built documentation.
b. Provide training in (1) one session:

1) Session will occur between system completion and Substantial Completion.

c. Training shall include sequence of operation review, selection of displays, modification of schedules and setpoints, troubleshooting of sensors, etc, as follows:

1) Control System Overview:

a) Show access to system through individual thermostats. Demonstrate scheduling.

2) Thermostat Programming from Keypad: Instructions on developing setpoints and schedules and adjusting local zone temperatures.
3) Thermostat Operation:

a) Identify and explain use of buttons on thermostat face, I.E. 'i' or information button, warmer button, and cooler button.
b) Identify and explain buttons under thermostat cover.

END OF SECTION 23 0933

SECTION 23 0981 - TESTING AND BALANCING

PART 1 - GENERAL

1.1 SUBMITTALS

A. The Test and balance Agency shall submit an agenda describing procedures for:

1. An overview of system Test and balance procedures.
2. System testing which will include what traverses will be made, instrumentation to be used, how correction factors for grille and diffuser will be obtained, how measurements will be verified at maximum and minimum, and how control components will be verified.
3. Report forms with each systems components identified and numbered.

1.2 PERSONNEL

A. All personnel used on the project will be employees of the Agency. All work will be performed under the direct supervision of the Test & Balance Engineer. Resumes including education and experience of each person on the project will be submitted.

1.3 CONTRACTORS

A. Air systems test and balance shall be accomplished by a test and balance contractor approved by the Architect's Engineer.

B. Approved contractors are: Flo-Rite, Certified Test and Balance, R&S Test and Balance, Bonneville Test and Balance, BTC Services, and Intermountain Test and Balance.

1.4 WARRANTY

A. The test and balance agency shall submit a Project Performance Guaranty.

1.5 SCOPE OF WORK

A. The work included in this Section consists of the furnishing of all labor, instruments, tools and services requires in connection with the Total System Balancing of the Heating, Ventilating and Air Conditioning (HVAC) systems as described in the mechanical specifications and/or shown on the mechanical plans.

B. The Test and balance personnel shall check, adjust, and balance the components of the HVAC system which will result in the optimal performance of the equipment. This is intended to be accomplished after the system components are installed and operating as provided for in the contract documents. It is the responsibility of the Contractor to place the equipment into service.

C. The Test and balance firm personnel on the job shall act a liaison between the Architect, the Engineer, and the General Contractor.

D. After the system is balanced and the building has been occupied under working conditions in both summer and winter, the Contractor shall provide a minimum of ten hours on site of system fine tuning to eliminate hot and cold spots in occupied zones. Provide written report stating adjustments made and work accomplished.

E. The following components of the HVAC systems shall be tested, adjusted, and balanced:

1. Furnace and Condensing Units.
2. Air Distribution Systems
3. Control Systems Verifications
4. Exhaust Systems

1.6 INSTRUMENTATION

A. All instruments used will be currently calibrated and listed in the Test and balance report showing instrument description, serial number, and date of calibration.

B. The accuracy of instruments used will be as shown in the current AABC National Standards.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 RESPONSIBILITIES OF THE TEST AND BALANCE AGENCY

A. Liaison and Early Inspection - The following reviews (observations) and tests shall be preformed by the Test and balance Agency:

1. During construction, review all approved HVAC submittals such as control diagrams, air handling devices, etc., that pertain to Test and balance work.

B. Perform a pre-balance site review and submit a written report.

C. During the balancing process, as abnormalities and malfunctions of equipment or components are discovered by the Test and balance personnel, the Architect, and Engineer shall be advised in writing so that the condition(s) can be corrected by the General Contractor. The written document need not be formal, but must be understandable and legible. The Test and balance Firm shall not instruct or direct the General Contractor in any of the work, but will make reports as are necessary to the Architect, and Engineer.

3.2 FINAL AIR BALANCE

A. When systems are complete and ready for operation, the Test and balance Agency will perform a final air balance for all air systems and record the results. The volume of air for the supply return, exhaust, and outside air equipment and terminals will be tested and balanced. Air handling and fan volumes shall be adjusted by changing fan speed. Duct volume dampers shall be adjusted to provide air volume to branch ducts where such dampers are shown. The general scope of balancing by the Test and balance Agency will include, but in not limited to, the following:

1. Filter: Check air filters and filter media and balance only systems with essentially clean filters and filter media.
2. Fan Speed: Measure and record RPM at each fan speed.
3. Voltage and Amperage Readings: Measure and record the final operating amperages and voltage for each motor.
4. Static Pressure Profile: Static pressure profiles shall be measured and recorded across each supply fan, cooling coil, filter and exhaust fan, and at the furthest air device or terminal unit from the air handler supplying that device. Static pressure profiles shall also be provided for systems which do not perform as designed.
5. Equipment Air Flow: Adjust and record exhaust, return, outside, and supply air CFM and temperatures, as applicable, at each fan and coil.
6. Zone Air Flow: Adjust each HVAC terminal unit, and air handling unit for design CFM
7. Outlet Air Flow: Adjust each exhaust inlet and supply diffuser, register and grille to within 5% of the air flow shown on the contract drawings. Include all terminal points of air supply and all points of exhaust.
8. Pitot Tube Traverses: For use in future troubleshooting by maintenance personnel, all exhaust ducts, main supply ducts, outside air, and return ducts shall have air velocity and volume measured and recorded by the Pitot tube traverse method shown in the AABC Standard. Locations of these traverse test stations shall be described on the sheet containing the data.

3.3 TESTING OF TEMPERATURE CONTROL SYSTEMS

A. Verify that all control devices are properly connected and operated by the intended controller.

3.4 REPORTS

A. The Test and balance activities described shall culminate in a report neatly typed and arranged. Include with the data the date tested, personnel present, records of test instruments used, and a list of all measurements taken. The intent of the final report is to provide a reference of actual operating conditions for the Owners operations personnel.

B. All measurements and recorded readings (of air, electricity, etc.) That appear in the reports shall be certified by the Agencys Test and Balance Engineer. Submit reports on forms approved by the Engineer. Three copies of the final report shall be submitted to the Engineer indicating a summary of actual operating data and any abnormal operating conditions. The report will contain all required information as described within the specification, including the information formatted and shown in the AABC Standard.

END OF SECTION 23 0981

SECTION 23 1123 - FACILITY NATURAL-GAS PIPING

PART 1 - GENERAL

1.1 SUMMARY

A. Includes But Not Limited To:

1. Furnish and install gas piping and fittings within building as described in Contract Documents.
2. Coordinate gas service and meter installation with Dominion Energy Co and pay all associated costs.

1.2 REFERENCES

A. Reference Standards:

1. ASTM International:

a. ASTM A53/A53M-12, 'Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless'.
b. ASTM A234/A234M-11a, 'Standard Specification for Piping Fittings of Wrought Carbon Steel and Alloy Steel for Moderate and High Temperature Service'.

1.3 QUALITY ASSURANCE

PART 2 - PRODUCTS

2.1 SYSTEM

A. Materials:

1. Above-Ground Pipe and Fittings:

a. Black carbon steel, butt welded, Schedule 40 pipe meeting requirements of A53/A53M.
b. Welded forged steel fittings meeting requirements of ASTM A234/A234M or standard weight malleable iron screwed.
c. Viega ProPress or MegaPress pipe and fittings are not allowed.

2. Valves:

a. 125 psi bronze body ball valve, UL listed.
b. Approved Products.

1) CIM 102.1 by Cimbrio Valve.
2) Apollo Series 80-100 by ConBraCo.
3) 'Red Cap' R602 by Jenkins NH Canada.
4) Model T-204 by Jomar International.
5) Model B-6000-UL by Watts Regulator.

3. Flexible Connector:

a. Type 304 stainless steel corrugated tube coated for corrosion protection.
b. Approved Products.

1) Dormont Supr-Safe.
2) BrassCraft Procoat.

4. Seismic Valves:

a. Natural gas seismic shut-off valves.

1) Rate at maximum 20 psi pressure with positive seating from minus 40 deg F to plus 150 deg F for exterior mounting near gas meter.
2) UL listed valve, factory set for IBC Seismic Design Category D, E, or F.
3) Size to be determined by total cu ft per hour gas flow requirement of building and following conditions: 0.1 inch water column maximum allowable pressure-drop through valve with available pressure of 4 oz.
4) Approved Product:

a) California Seismic Gas Shutoff Valve (formally KOSO):

(1) Horizontal installation: Model 314F or 315F.
(2) Vertical installation with bottom inlet: Model VB314F or VB315F.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Steel pipe installed through air plenums, in walls, and pipes 2-1/2 inches and larger shall have welded fittings and joints. Other steel pipe may have screwed or welded fittings.

B. On lines serving gas-fired equipment, install gas cocks with stainless steel flexible connectors adjacent to equipment outside of equipment cabinet and easily accessible.

C. Install 6 inch long minimum dirt leg, with pipe cap, on vertical gas drop serving each gas-fired equipment unit.

D. Use fittings for changes of direction in pipe and for branch runouts.

E. Install stainless steel flexible connector at each equipment connection.

F. Paint gas piping as indicated and specified.

3.2 FIELD QUALITY CONTROL

A. Field tests:

1. Subject all portions of gas piping system, in sections or in entirety, to air pressure of 75 psig and prove airtight for 4 hours.
2. Disconnect equipment not suitable for 75 psig pressure from piping system during test period.

END OF SECTION 23 1123

SECTION 23 2300 - REFRIGERANT PIPING

PART 1 - GENERAL

1.1 SUMMARY

A. Includes But Not Limited To:

1. Furnish and install piping and specialties for refrigeration systems as described in Contract Documents.

B. Related Requirements:

1. Section 23 0501: 'Common HVAC Requirements'.
2. Section 23 0719: 'Refrigerant Piping Insulation'.
3. Section 23 6213: 'Air-Cooled Condensing Units'.

1.2 REFERENCES

A. Association Publications:

1. Federal Emergency Management Agency (FEMA) / Vibration Isolation and Seismic Control Manufacturers Association (VISCMA) / American Society of Civil Engineers (ASCE):

a. FEMA 412, 'Installing Seismic Restraints For Mechanical Equipment' (December 2002).

2. Vibration Isolation and Seismic Control Manufacturers Association (VISCMA):

a. VISCMA 101-15, 'Seismic Restraint Specification Guidelines for Mechanical, Electrical, and Plumbing Systems'.
b. VISCMA 102-12, 'Vibration Isolation Specification Guidelines for Mechanical, Electrical, and Plumbing Systems'.

B. Reference Standards:

1. American National Standards Institute (ANSI) / American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE):

a. ANSI/ASHRAE 5-2013 (packaged w/ 34-2013, 'Safety Standard and Designation and Classification of Refrigerants'.

2. American National Standards Institute / American Welding Society:

a. ANSI/AWS A5.8M/A5.8-2011, 'Specification for Filler Metals for Brazing and Braze Welding'.

3. ASTM International:

a. ASTM B280-13, 'Standard Specification for Seamless Copper Tube for Air Conditioning and Refrigeration Field Service'.

4. National Fire Protection Association / American National Standards Institute:

a. NFPA 90A-2015, 'Installation of Air Conditioning and Ventilating Systems'.

5. Underwriters Laboratories:

a. UL 2182, 'Refrigerants' (April 2006).

1.3 QUALITY ASSURANCE

A. Qualifications:

1. Installer: Refrigerant piping shall be installed by refrigeration contractor licensed by State and by technicians certified in use of HFC and HCFC refrigerants.

PART 2 - PRODUCTS

2.1 COMPONENTS

A. Materials:

1. Refrigerant Piping:

a. Meet requirements of ASTM B280, hard drawn straight lengths where exposed above ground. **Soft copper tubing is not allowed.**

2. Refrigerant Fittings:

a. Wrought copper with long radius elbows.
b. Approved Manufacturers:

1) Mueller Streamline.
2) Nibco Inc.
3) Elkhart.

3. Tee Access:

a. Brass:

1) Approved Manufacturers:

a) JB Industries: Part #A3 Series with Factory Cap and Valve Core.

4. Connection Material:

a. Brazing Rods in accordance with ANSI/AWS A5.8M/A5.8:

1) Copper to Copper Connections:

a) Classification BCuP-4 Copper Phosphorus (6 percent silver).
b) Classification BCuP-5 Copper Phosphorus (15 percent silver).

2) Copper to Brass or Copper to Steel Connections: Classification BAg-5 Silver (45 percent silver).
3) Do not use rods containing Cadmium.

b. Flux:

1) Acceptable Products:

a) Stay-Silv White Brazing Flux by Harris Products Group.
b) High quality silver solder flux by Handy & Harmon.
c) Equal as approved by Architect before use.

5. Valves:

a. Expansion Valves:

1) For pressure type distributors, externally equalized with stainless steel diaphragm, and same refrigerant in thermostatic elements as in system.
2) Size valves to provide full rated capacity of cooling coil served. Coordinate selection with evaporator coil and condensing unit.
3) Approved Manufacturers:

a) Emerson Climate Technologies.
b) Henry.
c) Mueller.
d) Parker.
e) Sporlan.

b. Manual Refrigerant Shut-Off Valves:

1) Ball valves designed for refrigeration service and full line size.
2) Valve shall have cap seals.
3) Valves with hand wheels are not acceptable.
4) Provide service valve on each liquid and suction line at compressor.
5) If service valves come as integral part of condensing unit, additional service valves shall not be required.
6) Approved Manufacturers:

a) Henry.
b) Mueller.
c) Sherwood.
d) Virginia.

6. Filter-Drier:

a. On lines smaller than 3/4 inch outside diameter, filter-drier shall be sealed type with brazed end connections.
b. Size shall be full line size.
c. Approved Manufacturers:

1) Emerson Climate Technologies.
2) Mueller.
3) Parker.
4) Sporlan.
5) Virginia.

7. Sight Glass:

a. Combination moisture and liquid indicator with protection cap.
b. Sight glass shall be full line size.
c. Sight glass connections and sight glass body shall be solid copper or brass, no copper-coated steel sight glasses allowed.
d. Approved Product:

1) HMI by Emerson Climate Technologies.

8. Flexible Connectors:

a. Designed for refrigerant service with bronze seamless corrugated hose and bronze braiding.
b. Approved Products:

1) Vibration Absorber Model VAF by Packless Industries.
2) Vibration Absorbers by Virginia KMP Corp.
3) Anaconda 'Vibration Eliminators' by Universal Metal Hose.
4) Style 'BF' Spring-flex freon connectors by Vibration Mountings.

9. Refrigerant Piping Supports:

a. Base, Angles, And Uprights: Steel meeting requirements of ASTM A36.
b. Securing Channels:

1) At Wall Support:

a) Quality Standard: P-3300 channels by Unistrut.
b) Acceptable Manufacturers: Hilti, Thomas & Betts.
c) Equal as approved by Architect before installation.

2) At Suspended Support:

a) Quality Standard: P-1001 channels by Unistrut.
b) Acceptable Manufacturers: Hilti, Thomas & Betts.
c) Equal as approved by Architect before installation.

c. Pipe Clamps:

1) Acceptable Manufacturers:

a) Hydra-Zorb.
b) ZSI Cush-A-Clamp.
c) Hilti Cush-A-Clamp.
d) Equal as approved by Architect before installation.

10. Locking Refrigerant Cap:

a. Provide and install on charging valves:

1) Quality Standard: 'No Vent' locking refrigerant cap.
2) Acceptable Manufacturers: Airtec.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Refrigerant Lines:

1. Install as high in upper mechanical areas as possible.
2. Slope suction lines down toward compressor one inch/10 feet.

B. Connections:

1. Refrigeration system connections shall be copper-to-copper, copper-to-brass, or copper-to-steel type properly cleaned and brazed with specified rods. Use flux only where necessary. No soft solder (tin, lead, antimony) connections will be allowed in system.
2. Braze manual refrigerant shut-off valve, sight glass, and flexible connections.
3. Circulate dry nitrogen through tubes being brazed to eliminate formation of copper oxide during brazing operation.

C. Specialties:

1. Install valves and specialties in accessible locations. Install refrigeration distributors and suction outlet at same end of coil.
2. Install thermostatic bulb as close to cooling coil as possible. Do not install on vertical lines.
3. Install equalizing line in straight section of suction line, downstream of and reasonably close to thermostatic bulb. Do not install on vertical lines.

D. Refrigerant Supports:

1. Support Spacing:

a. Piping 1-1/8 inch And Smaller: 6 feet on center maximum.
b. Support each elbow.

2. Isolate pipe from supports and clamps with Hydrozorb or Cush-A-Clamp systems.

3.2 FIELD QUALITY CONTROL

A. Field Tests:

1. Make evacuation and leak tests in presence of Architect's Engineer after completing refrigeration piping systems. Positive pressure test will not suffice for procedure outlined below.

a. Draw vacuum on each entire system with two stage vacuum pump. Draw vacuum to 300 microns using micron vacuum gauge capable of reading from atmosphere to 10 microns. Do not use cooling compressor to evacuate system nor operate it while system is under high vacuum.
b. Break vacuum with nitrogen and re-establish vacuum test. Vacuum shall hold for 30 minutes at 300 microns without vacuum pump running.
c. Conduct tests at 70 deg F ambient temperature minimum.
d. Do not run systems until above tests have been made and systems started up as specified. Inform Owner's Representative of status of systems at time of final inspection and schedule start-up and testing if prevented by outdoor conditions before this time.
e. After testing, fully charge system with refrigerant and conduct test with Halide Leak Detector.
f. Recover all refrigerant in accordance with applicable codes. Do not allow any refrigerant to escape to atmosphere.

B. Non-Conforming Work:

1. If it is observed that refrigerant lines are being or have been brazed without proper circulation of nitrogen through lines, all refrigerant lines installed up to that point in time shall be removed and replaced at no additional cost to Owner.

END OF SECTION 23 2300

SECTION 23 2600 - CONDENSATE DRAIN PIPING

PART 1 - GENERAL

1.1 SUMMARY

A. Includes But Not Limited To:

1. Installation of condensate drain piping as described in Contract Documents.

B. Related Requirements:

1. Section 22 0501: 'Common Plumbing Requirements'.
2. Section 23 0501: 'Common HVAC Requirements'.

1.2 REFERENCES

A. Reference Standards:

1. ASTM International:

a. ASTM D1785-12, 'Standard Specification for Poly (Vinyl Chloride) (PVC) Plastic Pipe, Schedules 40, 80, and 120'.

PART 2 - PRODUCTS

2.1 SYSTEMS

A. Materials:

1. Condensate Drains:

a. Schedule 40 PVC for condensate drains from water heater, furnace combustion chambers and furnace cooling coils.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Condensate Drains:

1. Support piping and protect from damage.
2. Do not combine PVC condensate drain piping from furnace combustion chamber with copper condensate drain piping from cooling coil.

END OF SECTION 23 2600

SECTION 23 3001 - GENERAL DUCT REQUIREMENTS

PART 1 - GENERAL

1.1 SUMMARY

A. Includes But Not Limited To

1. General procedures and requirements for ductwork.
2. Repair leaks in ductwork, as identified by smoke test, at no additional cost to Owner.

B. Related Sections

1. Section 23 0501: General Mechanical Requirements
2. Section 23 0981: Testing and Balancing

1.2 QUALITY ASSURANCE

A. Requirements: Construction details not specifically called out in this Section shall conform to applicable requirements of SMACNA HVAC Duct Construction Standards.

PART 2 - PRODUCTS

2.1 FINISHES

A. Finishes, where applicable, colors as selected by Architect.

2.2 HANGERS

A. Duct Hangers

1. One inch by 20 ga galvanized steel straps or steel rods as shown on Drawings and spaced not more than 96 inches apart. Do not use wire hangers.
2. Nails not allowed. Attach to steel structure as shown on drawings.

2.3 FABRICATION

A. Ducts

1. Straight and smooth on inside with joints neatly finished.

    a. Duct dimensions shown on the drawings are for free area inside insulation.

2. Duct panels through 48 inch dimension having acoustic duct liner need not be crossbroken or beaded. Crossbreak unlined ducts, duct panels larger than 48 inch vertical and horizontal sheet metal barriers, duct offsets, and elbows, or bead 12 inches on center.

    a. Apply cross-breaking to sheet metal between standing seams or reinforcing angles.
    b. Center of cross-break shall be of required height to assure surfaces being rigid.

3. Duct drops to diffusers shall be round, square, or rectangular as shown to accommodate diffuser neck. Drops shall be same gauge as branch duct.

    a. Seal joints air tight.

4. Fabricate duct fitting to match adjoining ducts, and to comply with duct requirements as applicable to fittings. Except as otherwise indicated, fabricate elbows with center-line radius equal to associated duct width; and fabricate to include turning vanes in elbows where shorter radius is necessary. Limit angular tapers to 30º for contracting tapers and 20º for expanding tapers.
5. Seal duct work after installation, using specified sealer. Reseal any ducts showing leakage.

PART 3 - EXECUTION

3.1 INSTALLATION

A. During installation, protect open ends of ducts by covering with plastic sheet tied in place to prevent entrance of debris and dirt.

B. Make necessary allowances and provisions in installation of sheet metal ducts for structural conditions of building. Revisions in layout and configuration may be allowed, with prior written approval of Architect. Maintain required airflows in suggesting revisions.

C. Hangers And Supports

1. Install pair of hangers close to each transverse joint and elsewhere as required by spacing indicated in table on Drawings.
2. Install upper ends of hanger securely to floor or roof construction above by method shown on Drawings.
3. Attach strap hangers to ducts with cadmium-plated screws. Use of pop rivets or other means will not be accepted.

D. General: Assemble and install ductwork in accordance with recognized industry practices which will achieve air tight (1% leakage) and noiseless (no objectionable noise) systems, capable of performing each indicated service. Install each run with minimum of joints.

E. Align duct work accurately at connections, within 1/8" misalignment tolerance and with internal surfaces smooth. Support ducts rigidly with suitable ties, braces, hangers and anchors of type which will hold ducts true-to-shape and to prevent buckling.

F. Seal ductwork, after installation, in accordance with recommendations of SMACNA HVAC Duct Construction Standards Seal Class B.

G. Complete fabrication of work at projects as necessary to match shop-fabricated work and accommodate installation requirements.

H. Locate duct work runs, except as otherwise indicated, vertically plumb and horizontally level. Locate runs as indicated by diagrams, details and notations. Coordinate layout with suspended ceiling and lighting layouts and similar finished work.

I. Where ducts pass through interior partitions, conceal space between construction opening and duct or duct-plus-insulation with sheet metal mitered flanges of same gage as duct. Overlap opening on four sides by at least 1-1/2".

J. Coordinate duct installations with installation of accessories, dampers, equipment, controls and other associated work of duct work system.

3.2 CLEANING

A. Clean ductwork internally, unit-by-unit as it is installed, of dust and debris. Clean external surfaces of foreign substances which might cause corrosive deterioration of metal or, where ductwork is to be painted, might interfere with painting, or cause paint deterioration.

B. Temporary Closure: At ends of ducts which are not connected to equipment or air distribution devices at time of ductwork installation, provide temporary closure of polyethylene film or other covering which will prevent entrance of dust and debris until time connections are to be completed.

3.3 TESTING FOR LEAKAGE

A. General: After each duct system is completed, test for duct leakage. Repair leaks and repeat test until total leakage is less than 1% of system design air flow. Requirements for pressure test may be waived at the discretion of the Engineer/Architect if there is no question as to the quality of workmanship of the ductwork.

END OF SECTION 23 3001

SECTION 23 3114 - LOW-PRESSURE METAL DUCTS

PART 1 - GENERAL

1.1 SUMMARY

A. Includes But Not Limited To:

1. Furnish and install above-grade low-pressure steel ducts and related items as described in Contract Documents.

B. Related Requirements:

1. Section 23 0981: Testing And Balancing
2. Section 23 3001: 'General Duct Requirements'.
3. Section 23 0933: 'Electric And Electronic Control System For HVAC':

a. Temperature control damper actuators and actuator.

1.2 REFERENCES

A. Association Publications:

1. Sheet Metal And Air Conditioning Contractors' National Association / American National Standards Institute:
2. SMACNA, 'HVAC Duct Construction Standards - Metal and Flexible' (Third Edition).

B. Reference Standards:

1. ASTM International:

a. ASTM A653/A653M-13, 'Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process'.
b. ASTM E84-14, 'Standard Test Method for Surface Burning Characteristics of Building Materials'.

2. Underwriters Laboratories, Inc.:

a. UL 723: 'Standard for Safety Test for Surface Burning Characteristics of Building Materials'; (2010 - Tenth Edition).

1.3 QUALITY ASSURANCE

A. Regulatory Agency Sustainability Approvals:

1. Duct Sealer:

a. Meet Class A flame spread rating in accordance with ASTM E84 or UL 723.
b. Handle, store, and apply materials in compliance with applicable regulations and material safety data sheets (MSDS).

1.4 DELIVERY, STORAGE, AND HANDLING

A. Storage and Handling Requirements:

1. Duct Sealer:

a. Handle, store, and apply materials in compliance with applicable regulations and material safety data sheets (MSDS).

b. Handle to prevent inclusion of foreign matter, damage by water, or breakage.
c. Store in a cool dry location, but never under 35 deg F or subjected to sustained temperatures exceeding 110 deg F or as per Manufacturer's written recommendations.
d. Do use sealants that have exceeded shelf life of product.

1.5 FIELD CONDITIONS

A. Ambient Conditions:

1. Duct Sealer:

a. Do not apply under 35 deg F or subjected to sustained temperatures exceeding 110 deg F or as per Manufacturer's written recommendations.
b. Do not apply when rain or freezing temperatures will occur within seventy two (72) hours.

PART 2 - PRODUCTS

2.1 SYSTEM

A. Materials:

1. Sheet Metal:

a. Fabricate ducts, plenum chambers and casings of zinc-coated, lock-forming quality steel sheets meeting requirements A653/A653M, with G 60 coating.

2. Duct Sealer For Interior Ducts:

a. Approved Products:

1) Duct Butter or ButterTak by Cain Manufacturing Co Inc, Pelham, AL www.cainmfg.com.
2) DP 1010 by Design Polymerics, Fountain Valley, CA www.designpoly.com.
3) PROseal, FIBERseal, EVERseal, or EZ-seal by Ductmate Industries, Inc., Charleroi, PA www.ductmate.com.
4) SAS by Duro Dyne, Bay Shore, NY or Duro Dyne Canada, Lachine, QB www.durodyne.com.
5) Iron Grip 601 by Hardcast Inc, Wylie, TX www.hardcast.com.
6) MTS100 or MTS 200 by Hercules Mighty Tough, Denver CO, www.herculesindustries.com.
7) 15-325 by Miracle / Kingco, Div ITW TACC, Rockland, MA www.taccint.com.
8) 44-39 by Mon-Eco Industries Inc, East Brunswick, NJ www.mon-ecoindustries.com.
9) Airseal Zero by Polymer Adhesive Sealant Systems Inc, Weatherford, TX www.polymeradhesives.com.
10) Airseal #22 Water Base Duct Sealer by Polymer Adhesive Sealant Systems Inc, Weatherford, TX www.polymeradhesives.com.

B. Fabrication:

1. General:

a. Straight and smooth on inside with joints neatly finished.
b. Duct drops to diffusers shall be round, square, or rectangular to accommodate diffuser neck. Drops shall be same gauge as branch duct. Seal joints air tight.

2. Standard Ducts:

a. General:

1) Ducts shall be large enough to accommodate inside acoustic duct liner. Dimensions shown on Drawings are net clear inside dimensions after duct liner has been installed.

b. Round Duct:

1) Spiral Seam:

a) 28 ga minimum for ducts up to and including 14 inches in diameter.
b) 26 ga minimum for ducts over 14 inches and up to and including 26 inches in diameter.

PART 3 - EXECUTION

3.1 PREPARATION

A. Metal duct surface must be clean and free of moisture, contamination and foreign matter before applying duct sealer for interior and exterior ducts.

3.2 INSTALLATION

A. Install internal ends of slip joints in direction of flow. Seal transverse and longitudinal joints air tight using specified duct sealer as per Manufacturer's written instructions. Cover horizontal and longitudinal joints on exterior ducts with two layers of specified tape installed with specified adhesive.

B. Securely anchor ducts and plenums to building structure with specified duct hangers attached with screws. Do not hang more than one duct from a duct hanger. Brace and install ducts so they shall be free of vibration under all conditions of operation.

C. Ducts shall not bear on top of structural members.

D. Paint ductwork visible through registers, grilles, and diffusers flat black.

E. Properly flash where ducts protrude above roof.

F. Under no conditions will pipes, rods, or wires be allowed to penetrate ducts.

3.3 FIELD QUALITY CONTROL

A. Non-Conforming Work:

1. Reseal transverse joint duct leaks and seal longitudinal duct joint leaks discovered during air test and balance procedures at no additional cost to Owner.

END OF SECTION 23 3114

SECTION 23 3115 - UNDERGROUND DUCTS

PART 1 - GENERAL

1.1 SUMMARY

A. Includes But Not Limited To

1. Furnish and install underground ducts as described in Contract Documents.

B. Related Sections

1. Section 23 0501: General Mechanical Requirements

1.2 REFERENCES

A. American Society For Testing And Materials

1. ASTM A 653-96, 'Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process'

PART 2 - PRODUCTS

2.1 COMPONENTS

A. Underground Return Air Single Wall Ductwork shall be the following:

1. PVS or PVC coated for underground HVAC applications, galvanized spiral strand steel duct with 4 mil PVS or PVC thick coating on outside and 1 mil on inside. UL listed.

a. Duct shall have and bear mark of approval of building code in authority for this Project.
b. Gauges shall be as follows and be marked on each duct section.

Size	Gauge
4 to 8 inches	26
9 to 12 inches	24
14 to 22 inches	22

2. Spiral PVC Coated Duct:

a. Approved Manufacturers:

1) United McGill
2) Spiral Tech Pipe
3) Metco
4) Vent Line

B. Accessories

1. Joint Sleeves: Galvanized sheet metal, galvanizing meeting requirements of ASTM A 527, G 60.

Size	Gauge	Width
4 to 12 inches	26	4 inches
14 to 24 inches	24	4 inches
26 to 36 inches	22	6 inches

2. Metal Boots: 20 gauge galvanized steel, galvanizing meeting requirements of ASTM A 527, G 60.
3. Connection Tape:

a. Approved Manufacturers:

1) Coated Steel: Hardcast tape with Hardcast RTA-50 adhesive.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Coated Steel Duct

1. Fittings shall be PVS or PVC.
2. Join duct sections, fittings, and boots with sheet metal screws as detailed on Drawings.
3. Wrap duct connections, including boot connections to ducts, with 2 layers of specified tape installed in accordance with Manufacturer's recommendations. Cover screw heads with tape.
4. **Encase ducts and boots completely in a minimum of 2 inches light weight concrete**, covering well around and below sheet metal.
5. Where PVS or PVC coating has been scratched, scuffed, or peeled during shipping or installation, cover exposed metal with coating compound recommended by Manufacturer and in accordance with his recommendations.

B. Duct Protection

1. After duct insulation protect duct from damage by other trades.
2. Before floor slab is poured verify that the underground ductwork has not been damaged.

C. Alignment

1. Carefully align underground duct and sheet metal wall boots prior to pouring concrete slab. Align sheet metal boots with spacing for wall studs.
2. Temporary sheet metal cap floor penetrations before pouring concrete slab.

END OF SECTION 23 3115

SECTION 23 3300 - AIR DUCT ACCESSORIES

PART 1 - GENERAL

1.1 SUMMARY

A. Includes But Not Limited To:

1. Furnish and install duct accessories in specified ductwork as described in Contract Documents.

B. Related Requirements:

1. Section 23 0933: 'Electric And Electronic Control System For HVAC'
2. Section 23 3001: 'Common Duct Requirements'.

1.2 REFERENCES

A. Reference Standards:

1. ASTM International:

a. ASTM A653/A653M-11, 'Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process'.
b. ASTM C1071-12, 'Standard Specification for Fibrous Glass Duct Lining Insulation (Thermal and Sound Absorbing Material)'.
c. ASTM C1338-08, 'Standard Test Method for Determining Fungi Resistance of Insulation Materials and Facings'.

PART 2 - PRODUCTS

2.1 ACCESSORIES

A. Materials:

1. Acoustical Liner System:

a. Duct Liner:

1) One inch thick, 1-1/2 lb density fiberglass conforming to requirements of ASTM C1071. Liner will not support microbial growth when tested in accordance with ASTM C1338.
2) Approved Products.

a) ToughGard by CertainTeed.
b) Duct Liner E-M by Knauf Fiber Glass.
c) Akousti-Liner by Manson Insulation.
d) Quiet R by Owens Corning.
e) Permacote Linacoustic HP by Johns-Manville.

b. Adhesive:

1) Approved Water-Based Products.

a) Cain: Hydrotak.
b) Design Polymerics: DP2501 or DP2502 (CMCL-2501).
c) Duro Dyne: WSA.
d) Elgen Manufacturing: A-410-WB.

e) Hardcast: Coil-Tack.
f) Hercules Mighty Tough: MTA 500 or MTA 600.
g) Miracle / Kingco: PF-101.
h) Mon-Eco: 22-67 or 22-76.
i) Polymer Adhesive: Glasstack #35.
j) Techno Adhesive: 133.
k) McGill Airseal: Uni-tack.

2) Approved Solvent-Based (non-flammable) Products

a) Cain: Safetak.
b) Duro Dyne: FPG.
c) Hardcast: Glas-Grip 648-NFSE.
d) Miracle / Kingco: PF-91.
e) Mon-Eco: 22-24.
f) Polymer Adhesive: Q-Tack.
g) Techno Adhesive: 'Non-Flam' 106.

3) Approved Solvent-Based (flammable) Products.

a) Cain: HV200.
b) Duro Dyne: MPG.
c) Hardcast: Glas-Grip 636-SE.
d) Miracle / Kingco: PF-96.
e) Mon-Eco: 22-22.
f) Polymer Adhesive: R-Tack.
g) Techno Adhesive: 'Flammable' 106.

c. Fasteners:

1) Adhesively secured fasteners not allowed.
2) Approved Products.

a) AGM Industries Inc: 'DynaPoint' Series RP-9 pin.
b) Cain.
c) Duro Dyne.
d) Gripnails may be used if each nail is installed by 'Grip Nail Air Hammer' or by 'Automatic Fastener Equipment' in accordance with Manufacturer's recommendations.

2. Dampers And Damper Accessories:

a. Locking Quadrant Damper Regulators:

1) Approved Products.

a) Duro Dyne: KS-385.
b) Dyn Air: QPS-385.
c) Elgen Manufacturing: EQR-4.
d) Ventfabrics: Ventline 555.
e) Young: No. 1.

b. Volume Dampers:

1) Rectangular Duct:

a) Factory-manufactured 16 ga galvanized steel, single blade and opposed blade type with 3/8 inch axles and end bearings. Blade width 8 inches maximum. Blades shall have 1/8 inch clearance all around.
b) Approved Products.

(1) Air-Rite: Model CD-2.
(2) American Warming: VC-2-AA.
(3) Arrow: OBDAF-207.
(4) C & S: AC40.
(5) Cesco: AGO.
(6) Daniel: CD-OB.
(7) Greenheck: VCD-20.
(8) Nailor: 1810 or 1820.
(9) Pottorff: CD-42.
(10) Ruskin: MD-35.
(11) Utemp: CD-OB.

c. Motorized Outside Air Dampers:

1) General:

a) Low leakage type. AMCA certified.
b) Make provision for damper actuators and actuator linkages to be mounted external of air flow.

2) Rectangular Ducts:

a) Damper Blades:

(1) Steel or aluminum airfoil type with mechanically locked blade seals, 8 inch blade width maximum measured perpendicular to axis of damper.
(2) Jamb seals shall be flexible metal compression type.
(3) Opposed or single blade type.

b) Approved Products:

(1) Air Balance: AC 526.
(2) American Warming: AC526.
(3) Arrow: AFD-20.
(4) C & S: AC50.
(5) Cesco: AGO3.
(6) Honeywell: D-643.
(7) Nailor: 2020.
(8) Pottorff: CD-52.
(9) Ruskin: CD-60.
(10) Tamco: Series 1000.

3. Air Turns:

a. Single thickness vanes. Double thickness vanes not acceptable.
b. 4-1/2 inch wide vane rail. Junior vane rail not acceptable.

B. Fabrication:

1. Duct Liner:

a. Install mat finish surface on airstream side. Secure insulation to cleaned sheet metal duct with continuous 100 percent coat of adhesive and with 3/4 inch long mechanical fasteners 12 inches on center maximum unless detailed otherwise on Drawings. Pin all duct liner.
b. Accurately cut liner and thoroughly coat ends with adhesive. Butt joints tightly. Top and bottom sections of insulation shall overlap sides. If liner is all one piece, folded corners shall be tight against metal. Ends shall butt tightly together.
c. Coat longitudinal and transverse edges of liner with adhesive.

2. Air Turns:

a. Permanently install vanes arranged to permit air to make abrupt turn without appreciable turbulence, in 90 degree elbows of above ground supply and return ductwork.
b. Quiet and free from vibration when system is in operation.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Duct Liner:

1. Furnish and install acoustic lining in following types of square and rectangular ducts unless noted otherwise on Contract Documents:

a. Supply air.
b. Return air.
c. Outside air.
d. Exhaust air
e. Elbows, fittings, and diffuser drops.

B. Motorized and Manual Volume Dampers:

1. Furnish and install the motorized and manual volume dampers as indicated in the Contract Documents. Locate motorized dampers in serviceable and accessible locations. Provide duct access door adjacent to each motorized damper.
2. Provide manual volume dampers for balancing and adjustment in:

a. Supply air branch ducts to each diffuser.
b. Return air branch ducts from each grille.
c. Outside air ducts.
d. Exhaust air ducts.

3. Where manual volume dampers are installed above inaccessible ceiling areas, provide remote cable operated damper actuators with flush ceiling actuator mechanisms and flush painted ceiling cover plates or escutcheons.

END OF SECTION 23 3300

SECTION 23 3346 - FLEXIBLE DUCTS

PART 1 - GENERAL

1.1 SUMMARY

A. Includes But Not Limited To:

1. Furnish and install supply air branch duct runouts to diffusers as described in Contract Documents.

B. Related Requirements:

1. Section 23 3001: Common Duct Requirements.

1.2 REFERENCES

A. Reference Standards:

1. National Fire Protection Association / American National Standards Institute:

a. NFPA 90A: 'Standard for the Installation of Air-Conditioning and Ventilating Systems' (2012 Edition).

2. Underwriters Laboratories:

a. UL 181, 'Factory-Made Ducts and Air Connectors' (10th Edition).
b. UL 181B, 'Closure Systems for Use With Flexible Air Ducts and Air Connectors' (3rd Edition).

PART 2 - PRODUCTS

2.1 SYSTEM

A. Materials:

1. Ducts:

a. Formable, flexible, circular duct which shall retain its cross-section, shape, rigidity, and shall not restrict airflow after bending.
b. Insulation:

1) Nominal 1-1/2 inches, 3/4 lb per cu ft density fiberglass insulation with air-tight, polyethylene or polyester core, sheathed in seamless vapor barrier jacket factory installed over flexible assembly.

c. Assembly, including insulation and vapor barrier, shall meet Class I requirement of NFPA 90A and be UL 181 rated, with flame spread of 25 or less and smoke developed rating of 50 or under.
d. Approved Products:

1) ANCO-FLEX 4625 by Anco Products.
2) M-KC by Thermaflex by Flexible Technologies.
3) Type 4m Insulated by Flexmaster.

2. Cinch Bands: Nylon, 3/8 inch removable and reusable type.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install duct in fully extended condition free of sags and kinks, using 36 inch maximum lengths.

B. Make duct connections by coating exterior of duct collar for 3 inches with duct sealer and securing duct in place over sheet metal collar with specified cinch bands.

END OF SECTION 23 3346

SECTION 23 3401 - EXHAUST FANS

PART 1 - GENERAL

1.1 SUMMARY

A. Includes But Not Limited To:

1. Furnish and install exhaust fans as described in Contract Documents.

B. Related Requirements:

1. Section 23 3001: 'Common Duct Requirements'.
2. Division 26: Control device and electrical connection.

1.2 QUALITY ASSURANCE

A. Regulatory Agency Sustainability Approvals:

1. Bear AMCA seal and UL label.

PART 2 - PRODUCTS

2.1 MANUFACTURED UNITS

A. Ceiling Mounted Exhaust Fans:

1. Acoustically insulated housings. Sound level rating of 5.0 sones maximum for CFM and static pressure listed on Contract Drawings.
2. Include chatterproof integral back-draft damper with no metal-to-metal contact.
3. True centrifugal wheels.Entire fan, motor, and wheel assembly shall be easily removable.
4. Suitably ground motors and mount on rubber-in shear vibration isolators.
5. Provide soffit grille for connection.
6. Approved Products:

    a. Acme: VQ.
    b. Broan: LoSone.
    c. Carnes: VCD.
    d. Cook: Gemini.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Anchor fan units securely to structure.

END OF SECTION 23 3401

SECTION 23 3713 - DIFFUSERS, REGISTERS, AND GRILLES

PART 1 - GENERAL

1.1 SUMMARY

A. Includes But Not Limited To:

1. Furnish and install diffusers, registers, and grilles connected to ductwork as described in Contract Documents.

B. Related Requirements:

1. Section 23 3001: General Duct Requirements.

PART 2 - PRODUCTS

2.1 MANUFACTURED UNITS

A. Low Sidewall Return Grilles:

1. Finish: Off-white baked enamel.
2. 38 or 45 degree deflection.
3. Approved Products.

a. Carnes: RSHA.
b. Nailor: 6145H-HD.
c. Price: 91
d. Titus: 33RL or 33RS.

B. Ceiling Diffusers:

1. Type for surface mount ceilings.
2. Finish: Off-white baked enamel.
3. Approved Products.

a. Carnes: SKSA.
b. Nailor: 6500B.
c. Price: SMD-6.
d. Titus: TDC-6.

C. Ceiling Diffusers:

1. For "T" bar lay in ceiling.
2. Finish: Off-white baked enamel.
3. Approved Products.

a. Carnes: SKTA.
b. Nailor: 6500L.
c. Price: SMD-36.
d. Titus: TDC-3.

D. Soffit Grilles:

1. Finish: Baked enamel. Match soffit color.
2. Aluminum with aluminum mesh insect screen.
3. Approved Products:

a. Carnes: RAAA.
b. J & J: ALS95H.
c. Krueger: S585H.
d. Metal*Aire: RHE.
e. Nailor: 5155-IS.
f. Price: 635.
g. Titus: 355FL.
h. Tuttle & Bailey: A75D.

E. Door Grilles:

1. Finish: Off white baked enamel.
2. Flange frame both sides.
3. Approved Products:

a. Nailor: 61DGD
b. Or equal by:

1) Carnes
2) Price
3) Titus

PART 3 - EXECUTION

3.1 INSTALLATION

A. Anchor securely into openings. Secure frames to ductwork by using four sheet metal screws, one per side. Level floor registers and anchor securely into floor.

END OF SECTION 23 3713

SECTION 23 5135 - AIR PIPING

PART 1 - GENERAL

1.1 SUMMARY

A. Includes But Not Limited To:

1. Furnish and install heating equipment exhaust piping and combustion air intake piping as described in Contract Documents.

B. Related Requirements:

1. Section 23 0501: 'Common HVAC Requirements'.

1.2 REFERENCES

A. Reference Standards:

1. ASTM International:

a. ASTM D1785-12, 'Standard Specification for Poly(Vinyl Chloride) (PVC) Plastic Pipe, Schedules 40, 80, and 120'.
b. ASTM D2564-12, 'Standard Specification for Solvent Cements for Poly (Vinyl Chloride) (PVC) Plastic Piping Systems'.
c. ASTM D2661-11, 'Standard Specification for Acrylonitrile-Butadiene-Styrene (ABS) Schedule 40 Plastic Drain, Waste, and Vent Pipe and Fittings'.
d. ASTM D2665-14, 'Standard Specification for Poly (Vinyl Chloride) (PVC) Plastic Drain, Waste, and Vent Pipe and Fittings'.

PART 2 - PRODUCTS

2.1 ASSEMBLIES

A. Materials:

1. Air Piping: Schedule 40 pipe and fittings meeting requirements of ASTM D1785, ASTM D2661, or ASTM D2665.
2. Piping Primer And Cement:

a. Meet requirements of ASTM D2564.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Installation For Condensing Furnaces:

1. Run individual vent and individual combustion intake piping from each furnace to concentric roof termination kit provided by Furnace Manufacturer. Slope lines downward toward furnace.
2. Slope combustion chamber drain downward to funnel drain. Anchor to wall with wall clamps, allowing free movement through clamp for expansion.
3. Use concentric roof termination kit provided by Furnace Manufacturer. Install vent and combustion air intake piping at clearance and distances required by Furnace Manufacturer.
4. Attach factory-supplied neoprene coupling to combustion-air inlet connection and secure with clamp.
5. Ensure that factory-supplied perforated metal disc is installed in flexible coupling, unless its removal is required.
6. York Furnaces: Install air piping on side of furnace in horizontal or vertical installation.

B. Support:

1. Support concentric roof termination kit at ceiling or roof line.
2. Support horizontal and sloping sections of pipe with clevis type pipe hangers. Anchor securely to structure, not allowing pipe to sway.

END OF SECTION 23 5135

SECTION 23 5416 - GAS-FIRED FURNACES

PART 1 - GENERAL

1.1 SUMMARY

A. Includes But Not Limited To:

1. Furnish and install vertical gas-fired condensing furnaces as described in Contract Documents.

1.2 SUBMITTALS

A. Informational Submittals:

1. Manufacturer Reports: Equipment check-out sheets.

PART 2 - PRODUCTS

2.1 ASSEMBLIES

A. Performance:

1. Design Criteria:

a. Rated at 92 percent minimum AFUE (Annual Fuel Utilization Efficiency) calculated in accordance with DOE test procedures.

B. Manufactured Units:

1. Furnaces:

a. Factory assembled units certified by CSA complete with blower section, furnace section, steel casing, piped, and wired.
b. Blower section shall consist of cabinet, blower, and motor.

1) Cabinet shall be of 22 ga minimum cold rolled steel and have finish coat of baked-on enamel.
2) Blower shall be Class 1, full DIDW, statically and dynamically balanced.

c. Automatic controls shall consist of:

1) Manual gas shut-off valve.
2) Operating automatic gas valve.
3) Solid-state type fan and thermal limit controls.
4) 24-volt transformer.
5) Hot surface ignition system.

d. Blower shall be driven by multi-speed direct driven motor.
e. Furnace section shall be enclosed in 22 ga minimum enameled steel casing lined with foil covered insulation.
f. Heat Exchanger: Aluminized steel.
g. Gas Burners: Aluminized steel.
h. PVC intake of outside air and PVC combustion product exhaust, with sealed combustion, direct vent system.
i. Concentric roof termination kit for roof mounting.
j. Approved Products:

1) Standard Furnaces:

a) Carrier: 59SC5A.
b) Lennox: ML195.

2) Two Stage Heat with ECM motor:

a) Carrier: 59TN6.
b) Lennox: EL296V.

2. Cooling Coil:

a. Cooling coil shall consist of heavy gauge steel cabinet with baked-on enamel finish to match furnace:

1) Coil shall have aluminum fins bonded to seamless copper or aluminum tubing.
2) Coil shall be ARI rated. Provide drain pans with connections at one end.
3) Use thermal expansion valve.

b. Approved Products:

1) Vertical:

a) Carrier: CNPVP.
b) Lennox: CX34.

2.2 ACCESSORIES

A. Filter Frame:

1. Build filter frame external to furnace as detailed on Drawings.

B. Vibration Isolators:

1. Vertical Installation: 4 inches square by 1/2 inch thick minimum neoprene type vibration isolation pads.

PART 3 - EXECUTION

3.1 INSTALLATION

A. General:

1. Install furnace in accordance with manufacturer's written instructions.
2. Install furnace on 12" high return air plenum as detailed. Field verify location of furnace prior to construction or return air plenum.
3. Install cooling coil as part of the complete installation.
4. Make all required duct, gas and condensate piping connections for a complete and functional heating and cooling system.

3.2 FIELD QUALITY CONTROL

A. Field Tests And Inspections:

1. Manufacturer Services:

a. Furnace installer shall:

1) Verify proper gas orifice size.
2) Clock gas meter for rated input.
3) Verify and set gas pressure at furnace.

4) Check and measure temperature rise.
5) Check safety controls for proper operation.
6) Check combustion vent sizes and combustion air sizes.

b. In addition, furnace installer shall start up, check out, and adjust furnaces using equipment check-out sheet provided by Manufacturer. Complete and sign all items on sheet.

END OF SECTION 23 5417

SECTION 23 6213 - AIR-COOLED CONDENSING UNITS

PART 1 - GENERAL

1.1 SUMMARY

A. Includes But Not Limited To:

1. Furnish and install condensing units as described in contract documents.

1.2 REFERENCES

A. Reference Standards:

1. American National Standards Institute / Air-Conditioning, Heating, and Refrigeration Institute:

a. ANSI/AHRI Standard 210/240-2008, 'Performance Rating of Unitary Air-Conditioning & Air-Source Heat Pump Equipment' (formerly ARI Standard 210/240).

1.3 SUBMITTALS

A. Informational Submittals:

1. Tests and Evaluation Reports:

a. Manufacturer Reports: Equipment check-out sheets.

2. Qualification Statements:

a. Technician certificate for use in HFC and HCFC refrigerants.

B. Closeout Submittals:

1. Include following in Operations And Maintenance Manual:

a. Warranty Documentation:

1) Final, executed copy of Warranty.

b. Record Documentation:

1) Manufacturers Documentation:

a) Equipment checkout sheet: Complete and sign all items for each unit.

1.4 QUALITY ASSURANCE

A. Regulatory Agency Sustainability Approvals:

1. Each unit shall be UL / ULC or ETL labeled.
2. Comply with ANSI/AHRI Standard 210/240.
3. Refrigeration compressor, coils, and specialties shall be designed to operate with CFC-free refrigerants.

B. Qualifications:

1. Installer: Refrigerant piping shall be installed by refrigeration contractor licensed by State and by technicians certified in use of HFC and HCFC refrigerants.

1.5 WARRANTY

A. Manufacturer's Warranty:

1. Provide Manufacturer's Warranty:

a. Record 'start-up' date on warranty certificate for each unit.

PART 2 - PRODUCTS

2.1 ASSEMBLIES

A. Performance:

1. Capacities: SEER rating as defined by AHRI shall be 15 or greater.

B. Manufactured Units:

1. Compressor Units (5 Tons or Less):

a. General:

1) Units shall be operable down to 0 deg F outdoor temperature.
2) Use R-410a refrigerant.
3) Only one liquid line, one suction line, and one power connection shall be made to each compressor. Provide charging valves.

b. Condenser Coils:

1) Aluminum plate fins mechanically bonded to seamless copper tubes or 'Spine Fin' trade mark system which has aluminum fins epoxy bonded to aluminum tubes or micro-channel.
2) Provide stamped louver coil guard for unit.

c. Fans:

1) Direct driven propeller type.
2) Fan motor shall be single or two speed, thermostatically controlled, permanently lubricated, and designed with permanent protection.
3) Motors shall be resiliently mounted.
4) Each fan shall have a safety guard.

d. Compressor:

1) Each condenser unit shall have only one compressor.
2) Design with following features:

a) Externally mounted brass service valves with charging connections.
b) Crankcase heater.
c) Resilient rubber mounts.
d) Compressor motor-overload protection.
e) Single speed.

e. Controls:

1) Factory wired and located in separate enclosure.

2) Following three paragraphs may not be factory installed and will therefore have to be field installed.
3) Safety devices:

a) High and low pressure cutout.
b) Condenser fan motor-overload devices.

4) Anti-cycle timers to prevent units from starting up again for five minutes after any power interruption.
5) Head pressure type low ambient kit.

f. Casing:

1) Fully weatherproof for outdoor installation. Finish shall be weather resistant.

g. Openings shall be provided for power and refrigerant connections.
h. Panels shall be removable for servicing.
i. Approved Products:

1) Condensing Units:

a) Carrier: 24ACC6.
b) Lennox: XC14.

2.2 ACCESSORIES

A. Vibration Isolators:

1. 4 inches square by 3/4 inch thick minimum neoprene type vibration isolation pads.

B. 'Z' Clip:

1. 18 ga (0.0516 in) in width and height as shown on Contract Drawings.

C. Vibration Isolators:

1. 4 inches square by 3/4 inch thick minimum neoprene type vibration isolation pads.

PART 3 - EXECUTION

3.1 INSTALLATION

A. General:

1. Set compressor units level on concrete slab on vibration isolation pads located at each corner of unit.
2. Do not use capillary tube and piston type refrigerant metering devices.

3.2 INSTALLATION

A. General:

1. Coordinate with other trades affected by the Work of this section.

B. Condensing Units:

1. Set compressor units level on vibration isolation pads located at each corner of unit.
2. Attach compressor units to 'compressor unit curb' with 'Z' clips and attachment screws post drilled into concrete inside 'curb body' at all four (4) sides.
3. Do not use capillary tube and piston type refrigerant metering devices.

3.3 FIELD QUALITY CONTROL

A. Manufacturer Services:

1. Condensing units shall be started up, checked out, and adjusted by Installer.
2. Use equipment checkout sheet provided by Manufacturer:

    a. Complete and sign all items on sheet.

END OF SECTION 23 6213

DIVISION 26 – ELECTRICAL

26 0500	Basic Electrical Materials and Methods
26 0519	Wires and Cables
26 0526	Grounding and Bonding
26 0533	Raceways
26 0923	Lighting Controls
26 0925	Occupancy Sensed Lighting Control
26 2413	Switchboards 600 Volts and Below
26 2416	Panelboards
26 2726	Switches and Receptacles
26 3100	Electric Heat Trace Systems
26 4300	Surge Protective Devices
26 5100	Lighting

SECTION 26 0500 – BASIC ELECTRICAL MATERIALS AND METHODS

PART 1 - GENERAL

1.1 WORK INCLUDED:

A. Provide all items, articles, materials, equipment, operations and/or methods listed, mentioned, shown and/or scheduled on the drawings and/or in these specifications, including all labor, services, permits, fees, utility charges, and incidentals necessary and required to perform and complete the electrical work described in this Division. Apply for all permits early in the project to avoid problems due to code revisions.

B. See the contract conditions (general and supplementary) and Division 1 for requirements concerning this Division including, but not limited to, submittals, shop drawings, substitution requests, change orders, maintenance manuals, record drawings, coordination, permits, record documents and guarantees.

C. Division 26 Contractor shall be responsible for all work indicated by divisions 26, 27, 28, and the electrical portions of 33 within the drawings and specifications. Any work indicated by Division 16 shall be provided and installed by the Division 26 Contractor.

1.3 RELATED WORK SPECIFIED ELSEWHERE:

A. Mechanical equipment motors to be furnished under another Division but connected under this Division. Starters to be mounted and connected by this Division, but furnished by another Division unless otherwise noted on the electrical drawings. Motor control centers shall be furnished and installed under this Division of the work. Verify and coordinate all equipment locations and electrical characteristics with other trades involved in the work. Coordination shall be done prior to rough-in or ordering equipment.

B. Control wiring for mechanical equipment beyond provisions shown on the Electrical Drawings shall be performed under another Division of the work.

1.4 QUALITY ASSURANCE:

A. Do all work in accordance with regulations and requirements of serving electric utility, telephone utility, cable TV utility, National Electrical Code, state and local codes and amendments, National Fire Codes, and all other applicable codes. Coordinate with local utility services prior to work and product release. Where Owners Design Standards have been incorporated into the design, the contractor shall refer to these Standards for additional clarification.

1.5 PROJECT CONDITIONS:

A. The Contractor shall inspect the job site prior to bidding and familiarize himself with existing conditions which will affect the work. Prior to start of work, obtain "As built", "Record", or other Drawings showing existing underground utilities.

B. Electrical drawings are diagrammatic indicating approximate location of outlets, lighting fixtures, electrical equipment, etc. Consult the Architectural, Structural, and Mechanical Drawings to avoid conflicts with equipment, structural members, etc. When required make all deviations from Drawings to make the work conform to the building as constructed, and to related work of others. Minor relocations ordered prior to installation may be made without added cost to Owner.

C. Call to the attention of the Architect any error, omission, conflict or discrepancy in Drawings and/or Specifications. Do not proceed with any questionable items of work until clarification of same has been made.

D. Under no conditions are beams, girders, footings or columns to be cut for electrical items unless so shown on Drawings or written approval obtained from the Architect.

E. Verify the physical dimensions of each item of electrical equipment to fit the available space and promptly notify the Architect prior to roughing-in if conflicts appear. Coordination of equipment to the available space and to the access routes through the construction shall be the Contractor's responsibility.

1.6 SHOP DRAWINGS:

A. Prior to ordering equipment, and prior to Contractor's first application for payment, the Contractor shall, within 14 days after award of this work, submit complete shop drawings, electronic PDF copy with PDF index tabs, or six (6) hard copies neatly bound in 3-ring binder form, with indexed tabs, to the Architect, of materials and equipment he proposes to furnish. It is preferred that all sections be submitted at once, however, in the event that one or more sections need approvals quickly and others are not prepared yet, the Engineer will agree to review the individual section submittals needing immediate approval. However, each individual submittal section must be complete and remaining submittals that are not a rush shall be submitted all in one package as quickly as possible. Submitting individual sections over many weeks/months will not be tolerated.

B. List shall bear Contractor's stamp, signature or other means to show that he has inspected same and certified that submitted material is correct in regard to quantity, size, dimension, quality and is coordinated with the Contract Documents.

C. See individual sections within this Division for products requiring submittal.

D. Each shop drawing submittal shall be prepared by the manufacturer, and shall clearly show manufacturer's name, catalog numbers, pictures, details, layout, type, size, rating, style, and all options identified in a permanent fashion. Specific items or options shall be permanently marked on sheets containing more than one option – do not rely on the Engineer to mark options. Yellow highlight will not be an acceptable means of marking.

E. Large equipment drawings such as UPS systems, generators, transformers, switchboards, and similar large equipment shall include the size, weight, seismic rating, emissions data, elevation, and wiring diagrams in addition to the product data.

F. Some sections of this Division may require shop drawings prepared on full size floor plans in AutoCAD or other CAD software. Where required, contact the Architect for the latest version of the electronic plans and match the size and scale of the construction drawings. Drawings delivered to the contractor from the Architect/Engineer may not include addenda changes. Contractor shall only use electronic plans for purposes of the construction on this job, and not for any other use or reuse. Add any required addenda items prior to finishing shop drawings and submittals.

G. Provide complete materials (all materials) list at the beginning of each tabbed section showing "Submittal Number", "Specification Section", "Material Item", "Manufacturer's Name and Catalog Number", and all pertinent data.

H. Provide samples where required in individual sections of this Division.

I. Contractor agrees that Shop Drawing Submittals processed by the Architect are not Change Orders; that the purpose of Shop Drawing Submittals by the Contractor is to demonstrate to the Architect that the Contractor understands the design concept, that they demonstrate their understanding by indicating which equipment and material they intend to furnish and install and by detailing the fabrication and installation methods they intend to use.

J. Contractor further agrees that if deviations, discrepancies or conflicts between Shop Drawings and Specifications are discovered either prior to or after Shop Drawing Submittals are processed by the Architect/Engineer, the design Drawings and Specifications shall control and shall be followed.

PART 2 - PRODUCTS

2.1 MATERIALS:

A. All materials shall be new and bear manufacturer's name, model number, electrical characteristics and other identification. All equipment to be U.L. approved or listed by another testing agency approved by authorities having jurisdiction.

B. Material and equipment shall be standard product of manufacturer regularly engaged in production of similar material for at least five years (unless specifically exempted) and shall be manufacturer's latest design.

C. If the description of a product is in conflict with the product as specified in the catalog number, the description shall generally take precedence. Contact the Architect for clarification if this occurs.

D. All equipment must be rated and certified for the appropriate seismic design category or seismic use group for the installed geographical location. For essential or life safety equipment, provide an additional seismic factor of 1.5.

2.2 DISCONNECTS:

A. Safety and disconnect switches to be General duty quick-make, quick-break, dual rated, lockable, and of such electrical characteristics as required for the load served. Switches to have defeatable cover interlock.

B. Fuse clips shall accept Class R or Class L fuses if required. Motor rated toggle switches equal to Square D Class 2510, type F with thermal overloads may be used as motor disconnects in dry locations.

C. Disconnect switches required by code shall be installed whether or not specifically shown on the Drawings.

D. Disconnect switches for refrigeration equipment and multiple motor HVAC equipment shall be fusible type.

E. Safety and disconnect switches (fuse, non-fuse or circuit-breaker type) to be of same manufacturer as switchgear and panelboards.

2.3 FUSES:

A. Provide fuses as indicated on the drawings, sized per NEC, or as required by the equipment manufacturer, whichever provides maximum protection, for a fully operational system.

B. All fuses shall be furnished of the same manufacturer.

C. All fuses shall be installed by the electrical contractor at job-site and only when equipment is to be energized. Fuses shall not be installed during shipment.

D. All fuses to be 200,000 AIC, Current-limiting, U.L., Time Delay, Dual-element Type as follows:

For feeders 601 Amps to 6000 Amps:

Class L, KRP-C, KLPC, & A4BQ

For feeders 600 Amps and less:

Class RKk-1 for 600 volt; LPS-RK, LLS-RK, & A6D-R
Class RK-1 for 250 volt; LPN-RK, LLN-RK, & A2D-R
Class J; JHC, JTD, & AJT

For motor circuits beyond the main and sub distribution boards, 600 volt and below:

Class RK-5 for 600 volt; FRS-R, FLS-R, & TRS-R
Class RK-5 for 250 volt; FRN-R, FLN-R, & TR-R

E. SPARE PARTS: Provide 10% spare fuses, but not less than 3 of any one size and type.

F. Provide Spare Fuse Cabinet(s), #SFC, #LSFC, & ATFC as required. Install cabinet(s) in Main Electrical Room.

G. Approved Manufacturers, with catalog numbers listed in order: Bussman, Littelfuse, Ferraz Shawmut.

H. If the electrical contractor wishes to furnish materials other than those specified, a written request, along with a complete short circuit and selective coordination study, shall be submitted to the engineer for evaluation at least 8 days prior to the bid date. If the engineer's evaluation indicates acceptance, a written addendum will be issued listing the other acceptable manufacturer.

2.4 BOXES:

A. Outlet and junction boxes shall be sized in accordance with code requirements or as noted on the drawings.

B. Unless otherwise specified or shown on the drawings, all outlet boxes for new work shall be galvanized steel knockout, outlet boxes. Gangable boxes are not acceptable. Outlet boxes shall not be smaller than 4" square and 1-1/2 inches in depth, unless otherwise noted. All outlet box covers, rings, or other fittings shall be galvanized. Boxes which are exposed to the weather shall be cast metal. Outlet boxes for phone and data outlets shall be 2.5" deep boxes.

C. Outlet boxes shall be designed for the intended use, and shall be installed flush with finish surface lines or not more than 1/8 inch back and shall be level and plumb. Long screws with spaces or shims for mounting devices are not acceptable. No combustible materials shall be exposed to wiring at outlets.

D. Outlet boxes on opposite sides of fire or sound isolating partitions shall have a minimum horizontal separation of 24". Back to back boxes are not permitted in any walls.

E. Unless indicated otherwise on the drawings, floor boxes in shall be equal to Legrand RFB Series. Tile areas to have FPBTCxx blank cover assembly flush access hatch with hinge and latch and self-closing recessed handle. Carpeted areas to have FPCTCxx cutout cover assembly. Provide cast iron for on grade applications, and stamped steel for above grade applications. Provide shallow stamped still if suspended slab thickness is less than 5-1/2 inches. Provide plates for mounting of duplex receptacles and RF-45 communications outlets. If the number of communications outlets exceeds the quantity which fits in a standard plate, provide a custom plate to accommodate the increased quantity.

F. Floor boxes which feed landscape furniture partitions shall have a RFBX-FPFFT cover plate for power and signal feeds. Provide a sealtite flex with #12 conductors between the floor box and the landscape partitions. Voice and data conductors will terminate in the partitions, not in the floor box.

G. Floor boxes which contain voice and data cable often are shown with an empty conduit running up a wall and stubbing into the ceiling. Where no conduit is shown, stub a 1" conduit out the bottom of the low voltage section of the box and into the ceiling space of the floor below.

PART 3 - EXECUTION

3.1 GENERAL INSTALLATION METHODS:

A. All items, articles, materials, and equipment specified under this Division shall be installed per the manufacturer's installation instructions. Where the manufacturer's instructions are in conflict with the directions provided elsewhere in this Contract, the Engineer shall be notified prior to beginning rough-in.

B. Cutting or notching shall be kept to an absolute minimum and done when, and in a method approved by the Architect. Patch and correct finished surfaces damaged by electrical work.

C. Relays, panels, cabinets and equipment shall be level and plumb and installed parallel with structural building lines. All equipment and enclosures shall fit neatly without gaps, openings, or distortions. Provide approved devices for closing all unused openings.

D. Arrange circuit wiring as shown on the Drawings and do not alter or combine runs or homeruns without the specific approval of the Architect. Feeder runs shall not be recombined or altered.

E. Contactors, transformers, starters and similar noise producing devices shall not be placed on walls which are common to occupied space.

F. Ballasts, contactors, starters, transformers and like equipment which are found to be noticeably noisier than other similar equipment on the project will be deemed defective and shall be replaced.

G. In general, the mounting heights shall be as noted on the Drawings, or as listed below, the Architectural Interior Elevations and drawing notes taking precedence. Where no heights are indicated, request clarification from the Architect. Consult the Architectural, Mechanical and Structural drawings to avoid conflicts prior to roughing-in and for exact locations. All dimensions are to the top of the back box or device whichever is higher. Lighting dimensions are to the bottom of suspended fixtures and center of wall mounted fixtures unless otherwise noted.

Light Switches	48 inches to center
Convenience Receptacles	18 inches to center
Data/Telephone Outlets	18 inches to center
Receptacles and Outlets Over Counters	10 inches above counter or 5 inches above Backsplash to top, whichever is greater.
Panelboard	72 inches to top
Disconnects and Motor Controllers	72 inches to top
FACP and NAC panels	72 inches to top
Fire Alarm Signals	96 inches to top (but at least 6" below ceiling)
Fire Call Stations	48 inches center
Fire Alarm Annunciator	66 inches to top

H. Where raceways penetrate floors, ceilings, ducts, chases, and fire walls, provide fire stopping to maintain integrity of the fire assembly. Firestopping method shall be approved by the Code Authority having jurisdiction.

I. All materials and equipment installed under this work shall be properly and adequately supported from the building structure except where ceiling construction or other provisions are specifically designed to support them. Support systems shall provide a safety factor of four. This shall apply to chains, hangers, anchors, clamps, screws, structural iron, and all other hardware and appurtenances associated with the support system.

J. Rough-in for communications outlets for phone and data systems shall consist of a 4" square deep (4SD) box with a single gang mud ring. Provide a .75" conduit for wall phones and a 1" conduit for combination voice and data outlets to an accessible ceiling space. Conduit shall be terminated above the ceiling in a bushing and a pull string installed.

K. Maintain the following minimum separations from voice and data cables. Power conduit - 12", transformers and motors - 40", fluorescent lighting - 12". Coordinate with the voice and data installer to assure these separations are met.

3.2 LOW VOLTAGE WIRING METHODS:

A. Unless stated otherwise in these specifications, or on the drawings, raceways for low voltage wiring of Occupancy Sensors, Paging, Intercom, TV Cabling, Computer, and Telephone systems utilizing N.E.C. class II current limitation methods will be required only in walls, inaccessible ceilings, and areas where conductors might be exposed to physical damage. Security CCTV, Intrusion Detection Systems, and Card Access Systems shall be installed in conduit for entire length of homeruns.

B. Where cables pass through air plenums, the cables shall be either in conduit, or be plenum rated. The ceiling spaces in this project generally serve as air plenums and will require either conduit or plenum rated cable.

C. Conductors shall be concealed in all finished spaces and shall be run parallel to structural lines and supported at minimum 5' intervals from structure.

D. All low voltage cable must be suitable for the conditions in which it will be used. Prior to purchasing or installing any cable, confirm with the Mechanical Contractor which areas, if any, require plenum rated cable.

E. Provide a box, plaster ring, and conduit with insulated bushing from each wall or floor outlet to an accessible ceiling or crawl space. Conduit shall be minimum 1" for telephone, minimum 1" combined voice and data outlets, and sized as needed for other systems. Drawings notes shall take precedence. Raceways for phone and data cable shall be sized based on the number of cables with an O.D. of 0.244 and in accordance with the following guidelines.

1" conduit:	max 6 cables
1.25" conduit:	max 10 cables
1.5" conduit:	max 15 cables
2" conduit:	max 27 cables
2.5" conduit:	max 42 cables
3" conduit:	max 60 cables
3.5" conduit:	max 82 cables
4" conduit:	max 107 cables

F. Furnish and install all necessary sleeves and raceways to permit the installation of signal cables (specific attention is called to non-contiguous ceiling spaces) to the appropriate equipment termination point. Provide sleeves through all fire-rated walls and partitions. No outlets of any type shall be left without a raceway system or accessible ceiling path to their termination point. Verify that raceway sizes and quantities are appropriate and will have at least 50% spare capacity after all cables are initially installed. Provide at least one empty spare conduit to each area, sized to handle future needs.

3.3 LABELING:

A. Clearly and properly label the complete electrical system to indicate the loads served or the function of each item of equipment provided under this work.

B. Permanent Engraved nameplates: shall be 1/16 inch thick, laminated three-ply plastic, center-ply white, outer-ply black (for normal power) or red (for emergency power) or orange (for UPS power) "Lamicoid" or equal. Letters shall be formed by engraving outer colored ply, exposing white center-ply, and shall be a minimum of 5/8 inch high. Nameplates shall be secured with screws or pop rivets.

C. Provide permanent engraved nameplates for the equipment listed below as well as all other similar equipment; refer to each section for specific labeling requirements:

1. Service Equipment, including the maximum available fault current and date calculated as provided by Engineer
2. Switchboards and Panelboards
3. Transformers, UPS's, and Surge Protection Devices
4. Motor Control Centers (MCC), Motor Controllers, Variable Frequency Drives (VFD), Safety Disconnects
5. Electrical Contactors and Relays
6. Lighting Control Panels, Lighting Contactor Panels, Dimming Panels, and Timeclocks
7. Fire Alarm Control Panels (FACP) and Fire Alarm Notification Appliance Circuit Panels (NAC)
8. Other similar electrical devices and equipment

D. Self-Adhesive Labels: shall have self-adhesive "P-Touch" or equivalent sticky backs, black lettering with a clear (see through) background.

E. Provide self-adhesive labels for the devices and equipment listed below as well as all other similar equipment; each label shall list the applicable circuit number feeding the device and devices fed from Emergency or UPS power shall also list "EMERGENCY" or "UPS" as applicable next to the circuit number (for example, a receptacle fed from circuit 2 in panel 1P1 would read "1P1-2" on the label):

1. Thermal Switches and Manual Starters
2. Power outlet receptacles
3. Light Switches, Wall Mount Occupancy Sensors, and Wall Mount timeswitches
4. Dimming Switches and Wall Mount Dimming controllers
5. Fire alarm initiation devices (smoke detectors, heat detectors, pull stations, etc.)
6. Fire alarm notification devices (horn/strobes, etc.)

F. For Service switchboards, panelboards, and/or disconnecting means, provide a permanent engraved label indicating maximum available fault current as calculated by the Engineer. Include the date calculation was made.

G. Where existing service entrance components are modified, including where conductors are increased in size, or the service transformer or service disconnecting means is replaced or increased in size, provide a new permanent engraved label on each service switchboard, panelboard, and/or disconnecting means with required information as indicated by the National Electrical Code.

H. Provide neat and clearly legible handwritten labeling using a permanent "Sharpie" or equivalent chisel tip black marker for all junction boxes containing power and fire alarm wiring. Label each junction box with the applicable circuit number(s) for the cables contained within each junction box in a location and large enough to be clearly visible from the floor.

I.Provide a laminated copy of the electrical one line diagram(s), size of sheets as required to be clearly visible. Permanently mount within main electrical room, coordinate final location with architect.

J. Where changes are made in existing panels, distribution boards, etc., provide new labeling and schedules to accurately reflect the changes.

3.4 SAFETY:

A. The Engineer has not been retained or compensated to provide design and construction review services relating to the Contractor's safety precautions or to means, methods, techniques, sequences or procedures required for the contractor to perform the work.

3.5 TVSS (Transient Voltage Surge Suppression) INSTALLATIONS

A. When TVSS units are specified, they are to be shipped with complete installation instructions which are to be followed in detail. The manufacturer's representative is always to be contacted and is to supervise the TVSS installation.

B. Supplemental installation information is as follows:

1. Use the breaker space closest to the neutral bus. Nipple the suppressor to the panel where the suppressor can be installed so as to keep both the hot leads and the neutral lead as short and straight as possible from the suppressor to the breakers and the neutral bus.
2. The best performance is achieved with the shortest leads and neutral. All efforts within the code should be used to minimize the lead lengths. Ideally the leads should be less than eight inches long. Each inch of lead above six inches will add approximately 20 volts to the quoted let-through voltage. Cut the leads down to the shortest size that will allow installation.
3. If the neutral bus is out of reach of the leads, then a #4 AWG conductor is to be run from the remote neutral bus to a lug near the suppressor, and the lead from the suppressor should be cut as short as possible.
4. The ground is to be connected to the case of the panel (equipment ground only). Do not connect the suppressor ground wire to an isolated ground (IG) bus.

3.6 EQUIPMENT CONNECTIONS:

A. The location and method for connecting to each item of equipment shall be verified prior to roughing-in. The voltage and phase of each item of equipment shall be checked before connecting. Motor rotations shall be made in the proper direction. Pump motors are not to be test run until liquid is in the system and proper lubrication to all bearings in unit is checked.

B. Conduit, wire and circuit breaker sizes for mechanical, elevator and similar equipment are based on the equipment ratings of one manufacturer. The equipment actually furnished may have entirely different electrical characteristics. Conduit, wire, circuit breakers, disconnects, etc. shall not be ordered or installed until exact electrical requirements are obtained. Responsibility for this coordination rests with the Contractor.

3.7 SEISMIC BRACING:

A. Furnish and install all seismic bracing of equipment, feeders, lighting fixtures, and other electrical items in accordance with prevailing codes. Refer to ASCE 7-10, section 13.3 and 13.6 for calculation methods. Provide and submit the required designs, calculations, certifications, and stamped drawings to the authority having jurisdiction and obtain their approval prior to installation or fabrication.

B. Where conduit, cable trays, or busducts are attached to structures where they cross a seismic isolation interface, the electrical components shall be designed to accommodate the seismic relative displacement.

3.8 PAINTING:

A. All electrical equipment and conduit exposed in finished areas and on exterior walls are to be painted to match surrounding surfaces.

B. Contractor shall coordinate the timing of painting requirements.

C. Refer to Architectural specifications for methods and materials.

3.9 PROJECT RECORD DOCUMENTS:

A. Maintenance of Documents:

1. Maintain at Jobsite, One Record Copy of: Contract Drawings, Specifications, Addenda, Reviewed Shop Drawings, Change Orders, Other Modifications to Contract and Field Test Records.
2. Keep apart from documents used for construction.
3. Keep documents available at all times for inspection by Architect.

B. Recording:

1. Label each document "PROJECT RECORD."
2. Keep record documents current. Do not permanently conceal any work until required information has been recorded.
3. Contract Drawings, legibly mark to record actual construction; including but not limited to the following:

    a. Depths of various elements; locations of underground items, with dimensions to building walls and corners; changes of dimensions and details; changes made by Addendum, Field Orders or Change Order.
    b. Specifications and Addenda; legibly mark each Section to record changes made by Addendum, Field Order or Change Order.

C. As-Built Submittals:

1. At completion of project, transfer changes, addenda items, variations from drawings, exact routes of all feeders and service conduits, and locations of stubbed conduits to clean new prints and specifications which will be supplied by the Architect and deliver to the Architect as "As-reported Record" drawings. Include dimensions to all buried or concealed conduits to permanent structures.

D. Operation and Maintenance Manuals

1. At completion of project, prepare Operation and Maintenance Manuals with operation and Maintenance Data, contractors warranties, and copies of approved electrical permits. Include corrected copies of original submittals and shop drawings.
2. See Division 1 for additional requirements.

3.10 WARRANTIES:

A. Provide a minimum 1 year warranty on all electrical equipment, devices, labor, and work by Division 26 whether specified or not.

B. Provide warranties greater than 1 year as specified in other sections where stated. The warranty requirement most stringent shall be used where conflicts arise.

C. The systems listed below require warranties exceeding the minimum warranty:

1. Occupancy Sensed Lighting Control; 5 years refer to Section – 26 09 25
2. Electric Heat Trace Systems; 5 years refer to Section – 26 31 00
3. Surge Protective Devices (TVSS); 10 years refer to Section – 26 43 00
4. Lighting; 5 years for ballasts refer to Section – 26 51 00
5. Fire Alarm Systems; 2 years refer to Section – 28 31 00

D. Provide copies of all warranties to the owner upon completion of the project.

3.11 COMPLETION:

A. Complete each system as shown or specified herein and place in operation except where only roughing-in or partial systems are called for. Each system shall be tested and left in proper operation free of faults, shorts or unintentional grounds. Demonstrate system in the presence of the Architect, the Owner or their representative when requested.

3.12 FINAL OBSERVATION:

A. Contractor shall submit written certification that:

1. Contract Documents have been reviewed.
2. Contractor has inspected Project for compliance with Contract Documents.
3. Work has been completed in accordance with Contract Documents.
4. Equipment and Systems have been tested and are operational.
5. Project is completed and ready for final inspection.

B. Architect will make final inspection as soon as possible after receipt of Certification.

C. Should Architect consider that work is finally complete in accordance with Contract Document requirements, Contractor shall make Contract Closeout submittals.

D. Should Architect consider that work is not finally complete:

1. He will so notify Contractor, stating reasons.
2. Contractor shall take immediate steps to remedy deficiencies, and send second written notice to Architect certifying that work is complete.

3. Architect will re-inspect work.

E. The Architect will make two final inspections. The first will determine deficiencies and errors in the work and the second will determine whether or not the noted deficiencies and errors have been satisfactorily corrected.

F. If additional inspections are required because of the Contractor's failure to complete the deficiencies and errors prior to the second inspection, costs for the successive inspections will be back-charged to the Contractor by the Owner, who, in turn, will reimburse the Architect. Charges will be based as follows:

1. Architect time at current billing rates.
2. Travel time, and all other expenses incurred in making inspections.

G. Contractor to provide one (1) journeyman, tools, meters, instruments and other test equipment required by Architect. Contractor to remove and replace trims, covers, fixtures, etc., for Architect to review and test materials, systems, methods and workmanship. (Example: Removing switchboard and panel covers to take voltage/amp readings, review connections and wire size, etc.)

END OF SECTION 26 0500

SECTION 26 0519 – WIRES & CABLES (600V)

PART 1 - GENERAL

1.1 WORK INCLUDED:

A. Provide all wires and cables as herein specified and shown on the associated drawings for service conductors, feeder conductors and branch circuit conductors.

1.2 RELATED WORK SPECIFIED ELSEWHERE:

A. Basic Material & Methods – Section 26 05 00.

B. Raceways – Section 26 05 33.

1.3 QUALITY ASSURANCE:

A. All wire and cable shall meet or exceed the following standards:

1. ASTM-B series specifications
2. ICEA S-61-402/NEMA WC 5 - Thermoplastic insulated cables 0-2000 volt
3. UL Standard 62 and 83 – Thermoplastic insulated cable
4. UL VW-1 Flame Test for sizes #12 through #1
5. National Electric Code (NFPA 70) – Latest edition

B. Manufacturer's shall be engaged in the manufacturing of industry accepted quality wires and cables for a period of no less than 5 years for all types and sizes required.

1.4 SUBMITTALS:

A. None required.

PART 2 – PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS:

A. Provide products of Southwire, Houston Wire, Rome Cable, or similar manufacturer located within the continental North American market. Cables made in Europe, Asia, South America, Africa, or other overseas markets are not acceptable.

B. Substitutions: Equivalent manufacturers are allowed at contractors option, no submittals or prior approvals are necessary if cable meets specifications.

2.2 MATERIALS:

A. Application: For use in general wiring applications for lighting and power in ducts, conduits, wireways and other approved raceways with a maximum conductor temperature of 90 degrees C in dry locations and 75 degrees C in wet locations.

B. Provide wires and cables that are chemical, gasoline, and oil resistant. Provide wires and cables that are sunlight resistant.

C. Minimum conductor size shall be No. 12 AWG unless otherwise noted.

D. Where adverse conductor exposure exists, code approved insulation suitable for the conditions encountered shall be used unless shown otherwise on the Drawings.

E. Wire and cable shall be new, shall have grade of insulation, voltage and manufacturer's name permanently marked on outer covering at regular intervals and shall be delivered in complete coils or reels with identifying size and insulation tags.

2.3 COPPER CONDUCTORS:

A. For No. 10 AWG and smaller provide soft drawn stranded copper conductors with type THHN/THWN insulation.

B. For No. 8 AWG and larger provide soft drawn stranded, Class B stranded copper conductors with type THHN/THWN insulation.

2.4 ALUMINUM AND/OR METAL CLAD (MC) CABLING OPTIONS:

A. Aluminum Cabling is not acceptable – Provide copper only conductors.

B. MC Cable is not acceptable.

2.5 COLOR CODE:

A. All wires shall be fully colored in sizes 12 through 6 AWG, and color banded at each end with colored tape at all terminations, panels, equipment, junction boxes, and pull boxes for sizes 4 AWG and larger.

C. Color Code throughout the project shall be:

1. 208Y/120V System

Phase A	Black
Phase B	Red
Phase C	Blue
Neutral	White
Neutral A (dedicated)	White w/black stripe #12 & #10
Neutral B (dedicated)	White w/red stripe #12 & #10
Neutral C (dedicated)	White w/blue stripe #12 & #10
Equipment Ground	Green

C. Provide a permanent, plastic engraved label on the inside of each branch-circuit panelboard throughout the project identifying the Color Code used throughout the project. Refer to NEC 200.6 (D).

2.6 SPLICES AND TERMINATIONS:

A. Splices shall utilize Scotch "Hyflex" or "Ideal" wing nut connector installed properly. Crimp on splices designed to be used without wire stripping are not acceptable.

B. Splices for No. 8 and larger wires shall be made with mechanically applied pressure type connectors.

C. All taped joints shall be with "Scotch 33+" or equal, applied in half-lap layers without stretching to deform.

D. Where splice box is subject to rain, weather, or moisture, provide "Rain Tight" termination device.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Inspect exposed cables for physical damage and remove as length allows.

B. Utilize pulling compound on long pulls. Ensure that cable reels and pulling apparatus are firmly secured prior to pulling. Use pulling attachments and materials including approved swivel connections, pulling eyes, and/or friction tape as applicable. Carefully follow all applicable safety requirements when pulling cables.

C. Do not exceed manufacturers recommendations for maximum allowable tension, or side wall pressure. In all cases, pulling tension applied to the conductors shall be limited to 0.008 lbs. per circular mil of conductor cross-section area.

D. Do not exceed manufacturers recommendations for minimum allowable bending radius. For training of cables, minimum bend radius to inner surfaces of cable shall be 12 times cable diameter. Where cable is pulled under tension over sheaves, conduit bends, or other curved surfaces, make minimum bend radius 50% greater than specified above for training.

E. Provide dedicated neutrals on all branch power receptacle circuits of 120/208 volt.

3.2 BRANCH CIRCUIT GROUNDED CONDUCTOR (NEUTRAL) WIRING METHODS:

A. Dedicated (separate) neutral wiring methods

1. Provide dedicated (separate) neutral for each branch circuit; shared/common neutral wiring is not allowed.

2. For dedicated neutral branch wiring, there shall be no more than six (6) current carrying conductors allowed within a single raceway unless specifically allowed otherwise in the drawings. All neutral conductors shall be considered current carrying. Provide all required wire size increases to account for the applicable NEC wire ampacity deratings.

3. Provide dedicated neutral cables with colored stripe as required in wire color coding section for identification.

3.3 PARALLELED CONDUCTORS:

A. Under no condition shall conductors less than #1/0 AWG copper be run in parallel. Where paralleled runs are used, the contractor must cut to exact length on each phase leg. Where parallel conductors are run in parallel conduits, each conduit shall carry all phase legs as well as neutral, equipment ground, and/or isolated ground conductor as applicable.

B. Size parallel ground conductors as per NEC 250.

3.4 SPLICES AND TERMINATIONS:

A. Splices are to be made up complete promptly after wire installation.

B. Single wire pigtails shall be provided for fixture and device connections. Wirenuts may be used for fixture wire connections to single wire circuit conductor pigtails.

C. Install wing nut connector properly, according to manufacturers written instructions. Crimp on splices designed to be used without wire stripping are not acceptable.

D. Torque bolted connections to manufacturers recommendations. Torque both ends of the cable, or parallel cables, to the same Torque level.

E. Insulation shall be removed with a stripping tool designed specifically for that purpose. A pocket knife is not an acceptable tool. All conductors shall be left nick-free.

F. Thermoplastic insulated wire and cable shall not be installed or handled in temperatures below +14 degrees F (-10 C). Cross-linked polyethylene insulated wire and cable may be installed to -40 degrees F (-40 C).

3.5 LABELING:

A. Service Cables - Provide an engraved laminated 3-ply plastic "Lamicoid" or equal label which designated as "SERVICE CABLE(S)" attached with a nylon wire tie to the cables at each entry and exit from pullboxes, wireways and any other similar locations.

B. Feeders – Provide an engraved laminated 3-ply plastic "Lamicoid" or equal label with feeder name attached with a nylon wire tie to the feeder at each entry and exit from pullboxes, wireways and any other similar locations.

C. Branch Circuits – Clearly mark and identify the circuit number(s) at each junction box and similar location with a permanent black marker or equivalent that is clearly visible. For concealed junction boxes the marking shall be made on the outside coverplate; for exposed boxes or boxes with finished coverplates marking shall be made on the interior of the box where visible when removing the coverplate.

END OF SECTION 26 0519

SECTION 26 0526 – GROUNDING AND BONDING

PART 1 - GENERAL

1.1 WORK INCLUDED:

A. Provide all grounding and bonding as code required and as herein specified and shown on the associated drawings.

1.2 APPLICATION:

A. All grounding and bonding shall be by copper only connectors, copper cable and wire, and/or copper braids.

1.3 RELATED WORK SPECIFIED ELSEWHERE:

A. Basic Material & Methods – Section 26 05 00.

B. Wires & Cables – Section 26 05 19.

1.4 QUALITY ASSURANCE:

A. All installation of grounding and bonding conductors shall meet or exceed the following standards:

1. ANSI/IEEE 142 for service ground electrode resistance (5 ohms).
2. ASTM B 8 stranded conductors
3. ICEA S-61-402/NEMA WC 5 - Thermoplastic insulated cables 0-2000 volt
4. UL Standard 62 and 83 – Thermoplastic insulated cable
5. UL VW-1 Flame Test for sizes #12 through #1
6. National Electric Code (NFPA 70) – Latest edition
7. UL listing is required

B. Manufacturers shall be engaged in the manufacturing of industry accepted quality grounding connectors for a period of no less than 5 years for all types and sizes required.

1.5 SUBMITTALS:

A. None required.

PART 2 - PRODUCTS

2.1 GROUNDING CONNECTORS AND GROUND RODS:

A. ACCEPTABLE MANUFACTURERS: Subject to compliance with all requirements, provide products of one of the following manufacturers for grounding connectors or ground rods:

1. Chance/Hubbell
2. Copperweld Corporation
3. Erico Inc., Electrical Products Group
4. Burndy Electrical
5. Kearney/Cooper Power Systems
6. O-Z/Gedney Co
7. Raco/Hubbell
8. Thomas & Betts Electrical

B. Provide products of a quality manufacturer located within the continental North American market. Grounding connectors made in Europe, Asia, South America, Africa, or other overseas markets are not acceptable.

C. Provide products that are listed and labeled by UL for all applications used, and for specific types, sizes and combinations of conductors and other items connected.

D. For buried connections, provide crimp style connections or welded type connections. For accessible connections, provide bolted pressure-type, torque as per manufacturers recommendations.

E. Substitutions: Equivalent manufacturers are allowed at contractor's option, no submittals or prior approvals are necessary if ground connectors and rods meet specifications.

2.2 CONDUCTORS:

A. Provide copper or tinned-copper wire and cable insulated for 600 volt unless otherwise required by applicable code or authorities with jurisdiction.

B. Provide minimum of #6 AWG copper stranded grounding electrode conductor for the portion of the conductor which is the sole connection to the ground rod grounding electrode. Where this conductor is not the sole connection to a single ground rod (for example if the conductor connects multiple grounding electrodes in series), then the minimum conductor size shall comply with NEC table 250.66.

C. Provide minimum of #4 AWG copper stranded grounding electrode conductor for the portion of the conductor which is the sole connection to the concrete encased (UFER) grounding electrode. Where this conductor is not the sole connection to the concrete encased grounding electrode only (for example if the conductor connects multiple grounding electrodes in series), then the minimum conductor size shall comply with NEC table 250.66.

D. The grounding electrode conductor for the portion of the conductor which is the sole connection to a ground ring grounding electrode shall be no smaller than the conductor used for the ground ring. Where this conductor is not the sole connection to the ground ring grounding electrode only (for example if the conductor connects multiple grounding electrodes in series), then the minimum conductor size shall comply with NEC table 250.66.

E. Provide No. 4 and/or No. 6 AWG stranded conductor for bonding conductors.

F. Bonding Jumper: Provide copper tape, braided copper conductors, terminated with copper ferrules, 1-5/8 inches wide and 1/16 inch thick.

G. Where specified for lightning protection systems, provide listed conductors as specified in the Lightning Protection specification.

PART 3 - EXECUTION

3.1 GROUNDING INSTALLATION:

A. Ground all electric equipment, raceways and enclosures in accordance with code rules and established safety practices. All grounding systems inside the building must be bonded to the main power service ground, including telecomm closets, TV cabling entrances, lightning protection systems, and computer data center grounds.

B. Install insulated equipment grounding conductors in all types of raceways for all power feeders and branch circuits

C. Route grounding electrode conductors along the shortest and straightest paths possible, unless otherwise indicated. Avoid obstructing access or placing conductors where they may be subject to strain, impact, or damage.

D. Grounding electrode conductors and bonding jumper connections to grounding electrodes shall be accessible (unless allowed by NEC 250.68(A) exceptions) and provide a continuous effective grounding path.

E. Where ground connections are made underground or in inaccessible locations, they shall be made using an exothermic weld process, Cadweld or equivalent, or Ampact pressure connectors.

F. Install main grounding electrode conductors in approved metallic raceways unless specifically shown or specified otherwise. Bond at each end and at all intervening boxes and enclosures between the service equipment and grounding electrode.

G. No. 8 and smaller grounding conductors shall have green insulation. No. 6 and larger shall be marked with green colored tape at each end and at every box, panel, switchboard, or point where conductor is accessible.

H. Provide bonding jumpers to steel structure as indicated on the plans. Use exothermic welded connectors for steel connections below slab, and/or bolted clamp connections where accessible above slab.

I. For equipment subject to vibration, install bonding jumper so that vibration is not transmitted through the grounding connection.

3.2 PERIMETER GROUNDING ELECTRODE:

A. Bond to perimeter grounding electrode as shown on the drawings. Bare Copper conductors shall be placed feet underground. There shall be no plastic sheeting or other insulating material placed between the copper conductor and earth.

B. Bond Perimeter ground to all other grounding conductors in the area.

3.3 GROUND RODS

A. Grounds rods shall be installed where accessible for future inspection and servicing, located in a "ground rod well" where located exterior. Install Ground rod well flush with grade.

B. Where ground rods are driven inside manhole or tunnel structures, leave 4 inches of exposed ground rod above the concrete floor.

3.4. CONNECTIONS

A. For equipment grounding connections #10 and smaller, grounding conductors may be terminated with appropriate winged pressure type connectors (wirenuts). For #8 and larger, use pressure-type grounding lugs.

B. For Service metal conduits, and where metallic raceways terminate at metal housings without appropriate electrical connection to housing, terminate each conduit with an insulated throat grounding bushing. Connect grounding bushing with a bare copper grounding conductor to grounding bus and/or grounding terminal electrically bonded to housing.

C. For all main telephone/data conduits and sleeves exceeding 1-1/2 inches, where serving telephone/data closets and data rooms, provide insulated throat grounding bushings. Connect grounding bushing with a bare copper grounding conductor to grounding bus inside telecomm room. Where sleeves go from closet to closet, only the lowest closet penetration needs to be bonded.

D. For cable trays entering telephone/data closets and data rooms, provide bonding jumper from the tray to the grounding bus inside the telecomm room. Bond sections of the tray that are not electrically contiguous together to provide a complete low impedance grounding path.

E. Tighten screws and bolts for grounding and bonding connectors and terminals according to manufacturers published torque-tightening values. If manufacturers data is not available, tighten according to UL468A.

F. For compression type connections, use hydraulic compression tools and dies to provide the correct circumferential pressure for all connectors. Use only tools and dies as recommended by the connector manufacturer. Provide embossing die code or other standard method to make a visible, permanent indication that a connector has been adequately compressed onto the grounding conductor.

3.5 ISOLATED GROUND SYSTEMS

A. Provide isolated ground for all 120/208 feeders as required as shown on the drawings. Provide appropriate isolated bus on standoffs in all panelboards and switchboards.

B. All isolated ground buses shall be used only for conductors from isolated ground receptacles. Do not bond conduit or enclosures to isolated ground buses.

C. All isolated ground conductors shall be run back to the main ground point for the separately derived system which serves them.

D. Where specified, the isolated ground is in addition to an equipment ground conductor. Do not use conduit ground for equipment ground conductor.

E. For branch circuits, provide an isolated ground conductor in addition to an equipment grounding conductor system on all security, fire alarm and sound/intercom circuits.

F. Where isolated ground receptacles are specified, provide isolating type receptacles tied to the isolated ground bus. Identify the receptacles as isolated ground with color or symbol as specified.

END OF SECTION 26 0526

SECTION 26 0533 - RACEWAYS

PART 1 - GENERAL

1.1 WORK INCLUDED:

A. Provide all raceways, wireways, and associated fittings as herein specified and shown on the associated drawings.

1.2 APPLICATION:

A. Electric metallic tubing (EMT), galvanized rigid conduit (GRC), intermediate metal conduit (IMC), flexible metal conduit, and PVC conduit may be used.

B. Schedule 40 PVC conduit may only be used below grade and below slabs on grade. PVC shall not be used above grade. PVC shall not be used in masonry walls and shall not be used in suspended slabs. Conduits larger than 1 inch may be run below the slab. Type EB and DB utility duct shall not be substituted for Schedule 40 PVC.

C. GRC and IMC shall be used in locations subject to mechanical injury, for penetrations of building and manhole walls, and for service conduit under concrete slabs. GRC and IMC may be used: outside, where exposed to weather, in wet locations, in hazardous locations (as approved by code). Schedule 80 PVC may not be substituted for GRC and IMC.

D. EMT may be used only in dry and protected locations and in suspended slabs. EMT may not be used: outside, where exposed to weather, in hazardous locations or where subject to mechanical injury.

E. Flexible metal conduit (FMC) will be permitted only where flexibility is necessary. FMC may be used only where flexibility is necessary in dry protected locations, such as: connections to recessed light fixtures, work fished into existing concealed dry locations, wood frame construction. Flexible metal conduit shall be used for connection to all equipment subject to movement or vibration such as motors and transformers. Length shall not exceed 6 feet unless fishing in existing construction.

F. Liquid-Tight Flexible Metal Conduit (LFMC) shall substitute only in those locations where flexible metal conduit is required and additional moisture protection is desired or needed. LFMC may be used: for connections to motors or fixed equipment where subject to moisture or weather and subject to movement or vibration. Length shall not exceed 6 feet unless specified otherwise.

G. Drawing notes requiring a specific type of raceway shall take precedence over the specifications.

H. Surface metal or Plastic raceways (Wiremold) shall not be used unless approved by the Architect where fishing is not possible.

I. Electrical wiring shall be in U.L. approved raceways and enclosures throughout.

J. 4" and larger conduits intended for use on primary services and communications services shall have minimum 48" radius sweep on all bends.

1.3 RELATED WORK SPECIFIED ELSEWHERE:

A. Basic Material & Methods – Section 26 05 00.

B. Wires and cables (600V) – Section 26 05 19.

C. Ductbanks – Section 26 05 39

1.4 QUALITY ASSURANCE:

A. All installation of conduits and raceways shall meet or exceed the following standards:

1. Polyvinyl Chloride (PVC): in accordance with ANSI C80.1 and NEMA Std. Pub. No. RN 1.
2. Rigid Metal Conduit (RMC): in accordance with ANSI C80.1.
3. Electric Metallic Tubing (EMT): in accordance with ANSI C80.3.
4. Seismic Bracing: ASCE 7-10, Section 13.6, latest edition
5. National Electric Code (NFPA 70) – Latest edition
6. UL listing is required

B. Manufacturer's shall be engaged in the manufacturing of industry accepted quality raceway for a period of no less than 5 years for all types and sizes required.

1.5 SUBMITTALS:

A. Not required.

PART 2 – PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS:

A. Provide products of a quality manufacturer located within the continental North American market. Conduit and Raceways made in Europe, Asia, South America, Africa, or other overseas markets are not acceptable.

B. Substitutions: Equivalent manufacturers are allowed at contractor's option no submittals or prior approvals are necessary if conduit and fittings meet specifications.

2.2 RACEWAYS:

A. Galvanized Rigid Metal Conduit (GRC): Provide zinc-coated, hot-dipped galvanized, rigid metallic conduit in sizes indicated on the drawings. Provide RMC in ¾ inch minimum size.

1. Intermediate Metal Conduit (IMC): Provide hot-dipped galvanized, intermediate metal conduit in sizes indicated on the drawings. Provide IMC in ¾ inch minimum size.

B. Electric Metallic Tubing (EMT): Provide electric metal tubing in sizes indicated on the drawings.

1. Provide EMT in ¾ inch minimum size; EMT in ½" inch minimum size may be used for fire alarm and low voltage (< 30 volts) control wiring only.
2. Provide EMT in 1" minimum size for all data cable installations.

C. Liquid-Tight Flexible Metal Conduit: Provide liquid-tight, flexible metal conduit, constructed of single strip, flexible continuous, interlocked, and double-wrapped steel, galvanized inside and outside, coated with liquid-tight jacket of flexible Polyvinyl Chloride (PVC). Provide Liquid-Tight Flexible conduit in ¾ inch minimum size.

D. Provide Schedule 40 PVC conduit (where installed below grade or below slab on grade) in one inch minimum size.

E. Surface metal raceways equal to Wiremold (700 series unless noted otherwise) may be used only where specifically called for on the drawings or in the specifications. Such installation shall be directed and approved by the Architect prior to ordering raceway.

F. Surface plastic raceways are not acceptable.

G. Aluminum conduit is not acceptable.

H. Provide PVC conduit in one inch minimum size.

2.3 FITTINGS:

A. EMT Connectors and couplings shall be steel concrete tight set screw type with insulated throats on connectors. Die-cast fittings or fittings made from pot metal shall not be allowed. Indenter type fittings are not acceptable

B. Connectors larger than 1-1/4 inch shall utilize equivalent of O-Z/Gedney type SBT/SB insulated bushings.

C. GRC and IMC shall be coupled and terminated with threaded fittings. Provide fully-threaded, malleable steel fittings, rain-tight and concrete-tight as applicable. Provide double locknuts and metal bushings at all conduit terminations. Ends shall be bushed with insulating bushings (OZ Gedney type B or equal).

D. PVC shall be provided with matching schedule 40 fittings.

E. FMC and LFMC fittings shall be in accordance to industry standards.

F. Sealing bushings are to be provided equal to O-Z/Gedney Type FSK, WSK or CSMI as required by application. Provide equal to O-Z/Gedney Type CSB for internal sealing busings.

G. Expansion fittings shall be equal to O-Z/Gedey AXDX.

H. Cable Supports: Provide OZ Gedney, or equivalent cable supports for vertical risers, type as required by application.

I.Aluminum conduit fittings are not acceptable.

2.4 SEISMIC BRACING COMPONENTS

A. Provide the following components for vertical support and lateral/longitudinal seismic bracing:

1. Strut: Unistrut (or equal) P1000 Metal Framing Channel
2. Allthread: Stainless Steel, 3/8 minimum size
3. Angles/Hinges: Bline B335-2 or Mason Industries SCB Swivel Anchor
4. Expansion anchors: Hilti Kwik Bolt II (or equal) minimum 3/8 inch x 2-1/4 inch depth
5. Hardware: Miscellaneous cap screw/spring nuts and other hardware required for a complete system.

2.5 BOXES

A. Refer to section 26 05 00 for appropriate boxes.

PART 3 - EXECUTION

3.1 INSTALLATION:

A. Provide pull boxes where shown or required to limit the number of bends in any run to not more than three 90 degree bends. Use code gauge galvanized sheet steel boxes of code required size with removable covers, installed so that covers will be accessible after work is completed. Verify with the Architect any locations in finished areas.

B. Exposed raceways shall be parallel to structural lines and location must be approved by Architect/Engineer prior to installation. Where exiting from masonry walls in exposed rooms, particular attention and detail should be taken to exit in a neat and orderly fashion, at the correct elevation to hit structural steel roof supports.

C. Avoid placing conduits within 1-1/2 inches of the upper flutes of roof decking.

D. Maintain a minimum of 6 inches spacing from Hot water and/or steam lines, and 2 inches from Chilled Water and Culinary Water lines. Do not support conduit from other utility services.

E. 4" and larger conduits intended for use on primary services and communications services shall have minimum 48" radius sweep on all bends.

F. Conceal all raceways and wiring in finished spaces.

G. All conduit leaving building envelope (e.g. site lighting, roof mounted HVAC requirement, etc.) to be 0.75" minimum.

H. Field bends and offsets shall be made without flattening, kinking, rippling or destroying the smooth internal bore or surface of the conduit and to not less than NEC minimum radius. Conduit that shows signs of rippling or kinking shall not be installed. Any conduits installed with wrinkles or kinks or otherwise in an unworkmanlike manner shall be replaced at no additional cost to owner.

I. Precaution shall be exercised to prevent accumulation of water, dirt, concrete, or other foreign matter in the conduits during the execution of the project. Conduits in which water or foreign matter has been permitted to accumulate shall be thoroughly cleaned or the conduits runs replaced where such accumulation cannot be removed by methods approved the engineer.

J. Permanently cap all spare conduits. Cap or plug conduit ends during construction to prevent entrance of foreign material.

K. For metal conduit systems, provide electrically continuous conduit systems throughout.

L. Conduit stubbed from a concrete slab or wall to serve an outlet under a table or to supply a machine shall have a rigid conduit coupling flush with the surface of the slab. Provide plug where conduit is to be used in future.

M. Conduits in above grade suspended slabs, where written approval is obtained from the Structural Engineer of Record, shall be located in the middle of the slab and spaced according to the minimum recommendations of the ACSE 9-91. There shall be no crossovers, and conduit must be spaced a minimum of 18 inches on center. Conduits larger than one inch shall not be run in suspended slabs.

N. If work in suspended slabs is approved, EMT must be placed on stands and tied down to prevent floating prior to concrete pour. A minimum of 1-1/2 inch of concrete cover below the conduit and above the conduit is required. The Architect/Engineer must be invited to review and approve the installation prior to the concrete pour. Contractor shall rework any conduit rough that is disapproved.

O. Where drilling through existing floors or walls, use x-ray or penetrating location device to identify steel elements prior to drilling. Avoid cutting existing reinforcing bars. If nicked or damaged, consult with a licensed structural engineer for repair and support methods and provide required materials and repair.

P. Avoid placing conduits in pre or post tensioned slabs. The maximum size, spacing, and location of conduits in pre or post-tensioned slabs shall be subject to approval by the Structural Engineer.

Q. Provide ground wire within all conduits sized per NEC code.

3.2 SUPPORT AND SEISMIC BRACING INSTALLATION:

A. Conduit racks shall be adequately braced for Seismic Restraint, as required per ASCE 7-10, section 13.3, latest edition.

B. For 3 or more conduits install conduit racks with trapeze style hanging system, with stainless steel 3/8 inch all-threads hanging down to a Galvanized steel strut assembly. Provide conduit clips to rigidly clip conduit to strut.

C. Provide a diagonal lateral seismic restraint braces at maximum 10 foot intervals (alternating directions), and a longitudinal brace (alternating directions) at maximum 30 foot intervals. Braces must be made of strut or similar rigid material, and will be tied directly to trapeze strut with hinges or rigid angles. Wire ties for bracing will not be acceptable. All hardware made for bracing shall be seismically rated.

D. If a large number of suspended conduit feeders (more than 12 each exceeding 2-1/2 inches in size) are grouped together, the contractor shall review the layout with the structural engineer, provide estimated weights, and obtain approval for the proposed layout.

E. Hanger rods shall be fastened to structure in an approved manner. Pullout resistance shall have a safety factor of 4.

F. Support individual suspended feeder conduits by metal ring or trapeze hangers with threaded steel rods

G. Support spacing shall be in accordance with the following table, in addition to these maximum spacing requirements the seismic support and bracing may require additional support and/or spacing supports less than the maximum distance indicated below; the most stringent requirement and shortest spacing distances shall be enforced.

Conduit Type:	Conduit Size:	Maximum Distance Between Conduit Supports:	Maximum Distance From outlet box, junction box, cabinet, fitting, conduit termination or bends larger than 22 degrees.
IMC/GRC	½" to ¾" 1" 1.25" to 1.5" 2" to 2.5" 3" and larger	10 feet 12 feet 14 feet 16 feet 20 feet	3 feet for all sizes
EMT	All Sizes	10 feet	3 feet
FMC	All Sizes	4.5 feet	1 foot
LFMC	All Sizes	4.5 feet	1 foot

3.3 FIELD CUTS AND THREADS:

A. Cut all conduits perpendicular and square. Remove all sharp or rough edges and ream all burrs, inside and outside.

B. Provide clean sharp threads on RMC and IMC. Engage at least five full threads on all RMC and IMC fittings.

C. Before couplings or fittings are attached, apply one coat of red lead or zinc chromate to male threads of RMC or IMC.

D. Apply coat of red lead, zinc chromate or special compound recommended by manufacture to conduit where conduit protective coating is damaged.

3.4 EXPANSION AND SEISMIC JOINTS

A. Expansion Joints:

1. All conduits crossing expansion joints where cast in concrete shall be provided with expansion-deflection fittings, equivalent to O-Z/Gedney AXDX, installed per manufacturers recommendations.
2. All conduits three inches and larger where not cast in concrete shall be rigidly secured to the building structure on opposite sides of a building expansion joint with an expansion-deflection fitting across the joint, equivalent to O-Z/Gedney AXDX, installed per manufacturer's recommendations.
3. All conduits less than three inches where not cast in concrete shall be provided with junction boxes securely fastened on both sides of the expansion joint, connected together with 15 inches of slack (a minimum of 15 inches longer than the straight line length) flexible conduit and copper green ground bonding jumper. In lieu of this flexible conduit, an expansion-deflection fitting, as indicated for conduits three inch and larger, may be installed.

B. Seismic Joints:

1. No conduits cast in concrete shall be allowed to cross a seismic joint.

2. All conduits shall be provided with junction boxes securely fastened on both sides of the seismic joint, connected together with 15 inches of slack (a minimum of 15 inches longer than the straight line length) flexible conduit and copper green ground bonding jumper. Prior to installation, verify with Architect that the 15 inches is adequate for the designed movement, and if not, increase this length as required.

3.5 CONDUITS BURIED BELOW GRADE (SINGLE CONDUITS LESS THAN 3 INCHES)

A. Refer to Ductbanks section 26 05 34 where concrete encasement is called out. All multi-conduit medium voltage campus power distribution and all multi-conduit campus telecommunications distribution must be concrete encased. Encasement is also required for building service entrance. Elsewhere on site, provide concrete encasement for single conduits where size is 3 inches and larger.

B. Where PVC conduit is below building slab on grade, conduit must be installed to be at least 2 inches below the slab. Provide 2 inches of sand or pea sized gravel to cover conduit. Protect conduit from vehicle traffic and construction traffic prior to concrete pour. Conduit poured inside the slab for slab on grade construction is not acceptable.

C. Elbows larger than 30 degrees and one inch shall be galvanized rigid conduit, wrapped with PVC tape.

D. Provide a ground wire sized per code in all PVC conduits intended for power circuits when pulling wire. Conductor quantities indicated in conduits do not include ground wires unless otherwise noted.

E. Provide trenching, backfilling, compaction, re-paving or other site restoration as required by the work done in this division. Minimum trench depth shall be as required to install conduit at 24" below grade to top of conduit unless otherwise noted.

H. Install a detectable 6 inch wide yellow vinyl tape with letter "Caution: Buried Electrical Line Below" 12 inches above all buried service conduit and wire not under structures.

I. Backfill material for all trenches under paved areas shall be coarse sand or crushed rock, installed in layers not to exceed eight inches and compacted to 96% of maximum density at optimum moisture content to preclude subsequent settlement. Compaction by water method is not allowed.

J. The top 18 inches of trenches in landscaped or grassed areas shall be backfilled with native soil and tamped.

K. Conduits piercing a building waterproof membrane shall be provided with flanges, using two neoprene washers, one washer on each side of membrane, between each flange and membrane.

L. All underground conduits which enter the building shall be sloped to drain away from the building and shall be water sealed to prevent moisture from passing through the conduit into the building. All joints to be threaded and taped or glued to prevent entry of water into the conduits.

M. All underground conduits entering the building shall be poured-in-place, or provided with watertight conduit sleeves and rubber seals, Link-seal system by Thunderline Corporation or equivalent.

3.6 CLEANING:

A. Pull a mandril and swab through all conduits before installing conductors. Raceways shall be left clean and free of debris.

B. Provide a pull string in all empty conduits.

END OF SECTION 26 0533

SECTION 26 0923 – LIGHTING CONTROL

PART 1 - GENERAL

1.1 WORK INCLUDED:

A. Provide programmable relay panels, override low voltage switches, photocells, and scheduling capability via an integral programmable astronomical timeclock. Provide networking between all lighting relay panels in the project. Provide one low voltage relay for each 120 or 277 volt, 20 amp, 1 pole lighting branch circuit except for exit and pathway lighting circuits. Mount relays in cabinets and locate relay cabinets adjacent to the lighting branch circuit panels in a surface mounted enclosure. Provide master on/off control of relay groups in addition to individual switch override of individual relays. Outdoor controller shall have outputs for on and off control of three separate functions such as signage, parking lot lighting, and exterior building lighting. Provide software, licensed in Owner's name, if required, to field adjust programming.

1.2 RELATED WORK:

A. Section 26 0500: Basic Electrical Materials and Methods

B. Section 26 0533: Raceways

C. Section 26 0519 Wires and Cables

D. Section 26 2726: Switches and Receptacles.

1.3 SUBMITTALS:

A. Submit catalog data of relays and cabinets. Submit shop drawings showing typical wiring diagrams of all external components. All equipment must be UL listed.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS:

A. Relays and cabinets, low voltage switches: All components must be of the same manufacture; acceptable manufacturers are: General Electric, or approved substitute.

1. Acuity Brands
2. LC&D
3. Douglas Controls
4. GE Total Lighting Control
5. Cooper Wavelinx
6. Greengate Lighting Control
7. Watt Stopper Lighting Control Solutions.
8. Lutron
9. Hubbell Building Automation

B. Relays: Electrically operated, mechanically held; 20 amp, 277 volt or 120 volt contact rating. Momentary switching voltage: 24 VAC. GE No. RR-7. Provide quantity of relays as shown plus 2 spare relays per cabinet.

C. Cabinet: Flush mounted metal enclosure with screw on cover, rust proofed and painted to match branch circuit panels; barrier between line and low voltage section with knockouts for mounting up to 12 relays minimum; barrier to be vibration isolated from box. Each box to be assembled and provided with low voltage, line voltage terminal strips and relays only; all terminal strips shall be numbered.

D. Low voltage switches: Shall match standard toggle switch type and color; momentary contact switch with side wired terminals, with standard switch plate, SPDT normally open. GE 5935 series.

E. Low voltage wiring shall be Class 2 or Class 2P where run through plenum spaces.

F. Provide exterior mounted photo sensor with a footcandle range between 1 and 10 footcandles.

PART 3 - EXECUTON

3.1 INSTALLATION:

A. Label all relays and terminal strips with numbers to match panel branch circuit numbers. Provide relay directory on inside of cabinet identifying each relay and associated branch circuit.

B. Provide all line voltage wiring from panel to relays and from relays to loads. Provide all low voltage wiring from relays to terminal strips in relay cabinet.

C. Provide factory trained technician to test, program, and train the Owner.

3.2 LABELING:

A. Provide permanent engraved nameplates for all lighting control cabinets, lighting control panels, and lighting contactor panels in compliance with Part 3.3 of Section 26 0500.

B. Provide self adhesive labels for all low-voltage switches in compliance with Part 3.3 of Section 26 0500.

END OF SECTION 26 0923

SECTION 26 0925 – OCCUPANCY SENSED LIGHTING CONTROL

PART 1 - GENERAL

1.1 WORK INCLUDED:

A. The Contractor shall provide all labor, materials, tools, appliances, control hardware, sensor, wire, junction boxes and equipment necessary for and incidental to the delivery, installation and furnishing of a completely operational occupancy sensor lighting control system, as described herein.

B. The Contractor shall examine all general specification provisions and drawings for related electrical work required as work under Division 26.

1.2 SUBMITTALS:

A. Submit complete and descriptive shop drawings including floor plans, layouts, catalog cuts and other descriptive data indicating compliance with the specifications herein. Submit data sheets on sensors, control units and all junction boxes and mounting accessories, including all wiring diagrams. Submit in accordance with Division 01.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS:

A. Acuity Brands, LC&D, The Watt Stopper, Inc., Hubbell Building Automation, Lutron, Cooper Controls

B. Requests for substitution of other products will be considered if submitted in accordance with the general conditions and Division 1.

2.3 CEILING MOUNT DUAL-TECHNOLOGY TYPE (For Rooms up to 1200 SF)

Low Profile, ceiling mount, 360 degree coverage:	Watt Stopper Model DT-300
Adjustable arm, wall mount, 180 degree coverage:	WattStopper Model DT-200

A. The Occupancy Sensors shall be capable of detecting presence in the floor area to be controlled, by detecting Doppler shifts in transmitted ultrasound and passive infrared heat changes (dual technology). Sensors that utilize microphonics are not approved.

B. Upon entering a space, motion from both technologies must be sensed before lighting will be turned on. After this has occurred, detection in either technology will hold lighting on for the set time period. Sensors will have a retrigger time delay where only one motion is necessary to turn on the lights within 5 seconds after turning off.

C. Ultrasonic sensors will be volumetric in coverage. Up to 10 different passive infrared patterns will be available by lens selection. Detection shall be maintained when a person of average size and weight moves only within or a maximum distance of twelve inches either in a horizontal or vertical manner at the approximate speed of 12 inches per second. The sum of this distance, volume and speed represent the average condition an Occupancy Sensor must meet in order that the lights will not go off when a person is reading or writing while seated at a desk.

D. Sensors will cover a minimum of 1500 square feet when mounted at 12 feet.

E. The sensors are designed to be ceiling mounted and not protrude more than 2 inches and should blend in aesthetically with the space.

F. Each sensing technology shall have independent sensitivity adjustments and LED display.

G. Time Delay range shall be adjustable from 15 seconds to 15 minutes.

H. Sensors shall operate on 24 volts, 25 milliamps DC.

I. Sensor shall have an additional single pole, double throw isolated relay with Normally Open, Normally Closed and Common outputs rated at 1 amp for 24 VDC. The isolated relay is for use with HVAC control, Data Logging, and other control options.

J. Ultrasonic circuit shall be solid state, crystal controlled with signal processing filtering.

K. Ultrasonic receivers shall be temperature and humidity resistant with less than a 6dB shift in the humidity range of 10% to 90% and less than a 6dB shift in the temperature range of -20o to 60o C.

L. The ultrasonic frequency shall be 40 kHz + .006%.

M. Ceiling mount sensors shall provide a minor motion coverage range of 250 to 1300 square feet with an overall 1/2 step coverage range from 500 to 2000 square feet.

N. All sensors shall be capable of operating normally with electronic ballast and PL lamp systems.

O. All sensors shall be self-contained, crystal controlled ultrasonic or infrared occupancy sensors located to provide coverage of 90 to 100% of the controlled area.

P. Coverage of sensors shall remain constant after sensitivity control has been set. No automatic reduction shall occur in coverage due to the cycling of air conditioner or heating fans.

Q. All sensors shall have readily accessible, user adjustable controls for time delay and sensitivity. Controls shall be recessed in the sensor to limit tampering.

R. In the event of failure, a bypass manual "override on" shall be provided on each sensor. When bypass is utilized, lighting shall remain on constantly or control shall divert to a wall switch until sensor is replaced. This control shall be recessed in the sensor to prevent tampering.

S. Ultrasonic operating frequency shall be crystal controlled to within plus or minus 0.005% tolerance to assure reliable performance.

T. Ultrasonic microphone receiver frequency shall be 25 KHz or greater and shall be temperature and humidity resistant.

1. All sensors shall provide a red LED indication light to verify that motion is being detected and that the unit is working.

U. All ultrasonic sensors shall comply with the State of California Safety and Health Requirements. Decibel levels for ultrasonic sensors shall comply with the following California Energy Commission criteria:

Midfrequency of Sound Pressure Third Octave Band (KHz)	Minimum dB level within Third Octave Band (in dB reference 20 micropascals)
Less than 20	80
20 or more to less than 25	105
25 or more to less than 31.5	110
31.5 or more	115

The Contractor shall certify in writing that installed sensors comply with the specified California Energy Commission criteria for ultrasonic sound.

V. All sensors shall have no leakage current in OFF mode and shall have voltage drop protection.

W. Sensors shall be suitable for N.E.C. 725 Class 2 wiring and use plenum cable where approved. Where plenum cable is not approved, provide conduit to within 6 inches of sensor location.

2.4 POWER PACKS:

A. Power Packs shall be mounted on external J boxes and be an integrated self-contained unit consisting of a load switching relay and a transformer.

B. Relay Contacts shall have ratings of:

10A - 120 VAC Tungsten
20A - 120 VAC Ballast
15A - 277 VAC Ballast

C. Relay contacts shall be isolated.

D. Power Packs: Wattstopper BZ-50, BZ-150

E. Between sensors and controls units shall be three (3) conductors, 18 AWG, stranded U.L. Classified, PVC insulated or TEFLON jacketed cable approved for use in plenums. One sensor shall be capable of driving four Power Packs.

F. Enclosures for Power Packs shall be NEMA I construction with mounting and barriers to provide separation between line and low voltage wiring or a standard four (4") inch junction box with control unit mounting to cover plate with ½ inch knockout. Boxes not located above accessible ceilings shall be painted to match finish color of mounting surface.

G. Occupancy sensors shall have calibration at the occupancy sensor head, not at the power pack above the ceiling.

PART 3 - EXECUTION

3.1 PERFORMANCE:

A. The objective of this section is to ensure the proper design and installation of the occupancy sensor based fluorescent lighting control system in rooms designated on the drawings so that lighting is turned off automatically after reasonable time delay when a room or area is vacated by the last person to occupy said room or area.

B. The occupancy sensor based lighting control shall accommodate all conditions of space utilization and all irregular work hours and habits.

3.2 INSTALLATION:

A. It shall be the contractor's responsibility to contact the Manufacturers Representative and, with their assistance, aim and locate sensors correctly as required for complete and proper volumetric coverage within the range of coverage(s) of controlled areas. Rooms shall have ninety (90) to one hundred (100) percent coverage to adequately cover the controlled area to accommodate all occupancy habits of single or multiple occupants at any location within the rooms(s). The sensor symbols shown on the drawings are diagrammatic and indicate only rooms which are to be provided with sensors. The contractor shall provide sensors as required to properly and completely cover the respective room. Proper judgment must be exercised in executing the work so as to ensure the best possible installation in the available space and to overcome local difficulties due to space limitations or interference of structural components. Sensors in small offices should be located to avoid false operation caused by persons walking by the door and outside the office.

B. Mount occupancy sensors a minimum of 8 feet away from HVAC diffusers. Ultrasonic sensors shall be mounted on vibration free, stable surfaces and shall not be used in areas of heavy air flow, moving objects, or on ceilings over 14 feet high.

C. Where "override-OFF" switch is required, switch is to be connected on the load side of the Power Pack Relay.

D. Contractor shall be responsible to make all required adjustments to the occupancy sensor system for a period of 3 months after Owner occupancy at no additional charge to the Owner to ensure the system is working properly after occupancy.

3.3 LABELING:

A. Provide self-adhesive labeling for all wall mounted occupancy sensors in compliance with Part 3.3 of Section 26 0500.

B. Provide hand written permanent marker circuit number labeling on the power pack junction box in compliance with Part 3.3 of Section 26 0500.

3.4 WARRANTY:

A. Contractor shall warrant the system including all equipment furnished in accordance to this specification to be undamaged, free of defects in materials and workmanship, and in conformance with the specifications. The suppliers obligation shall include repair or replacement, and testing without charge to the owner, all or any parts of equipment which are found to be damaged, defective or non-conforming and returned to the supplier. Warranty on sensors and controls units will be for a period of five (5) years. The warranty shall commence upon the owner's acceptance of the project. Warranty on labor shall be for a minimum period of one (1) year.

3.5 OWNER TRAINING:

A. Upon completion of the system fine tuning and required adjustments, the factory authorized technician shall provide the necessary training at the Owner's facility to familiarize the owner's personnel with the operation, use, adjustment, maintenance, and trouble shooting diagnosis of the occupancy sensing devices and system.

END OF SECTION 26 0925

SECTION 26 2413 – SWITCHBOARDS 600 VOLTS & BELOW

PART 1 - GENERAL

1.1 WORK INCLUDED:

A. Furnish and install the service entrance switchboard and distribution switchboards as herein specified and shown on the associated electrical drawings.

1.2 SUBMITTALS:

A. Submit complete descriptive shop drawings indicating bus arrangement, overcurrent devices, labeling, dimensions, ratings and other pertinent data.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS:

A. Square D, General Electric, Siemens, Cutler-Hammer/Westinghouse

B. Requests for substitution of other products will be considered if submitted in accordance with the General Conditions, Division 1, and Section 26 0500.

2.2 EQUIPMENT:

A. Each distribution board section shall be free standing and have an open bottom. Top and bottom conduit area is to be clearly shown and dimensioned on the shop drawings. All front plates used for mounting meters, selector switches or other front mounted devices shall be hinged with all wiring installed and laced with flexibility at the hinged side. All closure plates shall be screw removable and small enough for easy handling by one man. The paint finish shall be gray enamel over a rust-inhibiting phosphate primer.

B. Overcurrent devices shall be of size and type as indicated on the drawings. Series rated equipment will not be permitted as a substitute for the interrupting capacities stated on the one line diagram.

C. Main lugs shall be tool applied compression type if aluminum wire is used. The bus bars shall be rigidly braced for 100,000 amps and sized as indicated on the drawings.

D. The bus bars shall be Copper only.

E. The end section is to have bus bar provisions for future addition of a switchboard section. The provisions shall include the bus bars installed to the extreme side of the switchboard and prepunched to facilitate future bolted splice plates.

F. Where fusible switches are indicated, they shall have Class R or L fuse clips. Fusible switches shall be of the positive, quick-make, quick-break type and external operating handle shall be suitable for padlocking in the "OFF" position. All units shall be dead front. Provide a spare fuse cabinet.

G. Operating handles shall be mounted on the unit doors and interlocked with the overcurrent device to prevent opening of the door when the switch is "ON". A concealed "defeater" shall be provided so that authorized personnel may open door without interrupting power.

H. All extra space in distribution boards shall be bussed for future use.

I. Prior to bidding, confirm that equipment will fit within the physical space allocated on the drawings for switchgear. Do not attempt to use equipment which does not fit within the space allotted. Do not use space identified for future use.

J. Provide ground-fault protection integral with each circuit breaker rated 1000 amps or more and operating above 150 volts phase-to-ground but below 600 volts phase-to-phase regardless of what is shown on the drawings.

PART 3 - EXECUTION

3.1 INSTALLATION:

A. Distribution boards shall be free from surface and finish defects and cleaned of dust and construction debris.

B. All nameplates, labels, screws, bolts, or other hardware shall be in place prior to acceptance.

C. Prior to installation of switchgear and transformers, layout the electrical rooms and obtain approval of the layout from the code authority having jurisdiction.

D. Switchboards shall not be installed under piping or ductwork. Meet all requirements of NEC article 110 for Dedicated Electrical Space and Working space about equipment.

3.2 LABELING:

A. Where changes are made in existing switchboards, distribution boards, etc., provide new labeling and schedules to accurately reflect the changes; hand-written revisions will not be acceptable.

B. Provide an engraved permanent master nameplate at the main distribution to identify the project, the Engineer and the date.

C. Provide engraved nameplate for all switchboards permanently mounted on the outside face of switchboard; include the following minimum information:

1. Text stating "Main Building Disconnect" (if applicable)
2. Switchboard name
3. Source feeding switchboard
4. Voltage, Size (amps), number of phases, number of wires, and AIC rating

D. Provide engraved nameplates to clearly label each switchboard breaker to identify each load served, each spare breaker, and each space (size in amps and phase).

E. Engraved nameplates shall be have a black back ply, an inner white ply with outer colored ply as follows: Black for normal power, Red for Emergency (Legally Required or Optional Standby) power, Orange for UPS power.

F. Provide a permanent engraved label indicating the conductor insulation color for: (1) all ungrounded conductors (2) grounded conductor (3) equipment grounding conductor. This shall be documented at each switchboard in a readily visible location; refer to Wires and Cables Section 26 05 19 for conductor color coding.

END OF SECTION 26 2413

SECTION 26 2416 - PANELBOARDS

PART 1 - GENERAL

1.1 WORK INCLUDED:

A. Provide all branch circuit panelboards as herein specified and shown on the drawings.

1.2 SUBMITTALS:

A. Submit complete and descriptive shop drawings indicating dimensions and compliance with the specifications herein. Submit in accordance with the General Conditions, Division 01, and Section 26 0500.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS:

A. Square D, Siemens, General Electric, Cutler-Hammer/Westinghouse

B. Requests for substitution of other products will be considered if submitted in accordance with the General Conditions, Division 01, and Section 26 0500.

2.2 EQUIPMENT:

A. Panels shall be factory pre-assembled using bolt-on circuit breakers, equivalent to Square D NQOD series. Separate feeder lugs shall be provided for each feeder conductor.

B. Breakers in branch panelboards shall be not less than 3/4 inch on centers. Each breaker shall be securely fastened to prevent movement and trims shall fit neatly and tightly to the breaker assembly. Two and three pole breakers shall be single breaker assembly rather than two or three single pole breakers with the handles tied together externally.

C. Panel finish shall be a flat, light gray finish suitable for painting over or being left with factory finish. Flush mounted panels in finished walls shall be painted to match wall, paint and paint preparation to be as specified by Architect. Panel covers to be painted off wall, then installed over painted wall surface. Trims to be separately packed and protected from scratching and marring. Refer to labeling requirements in 26 05 00 Basic Materials and Methods.

D. Panelboard trims to have concealed trim screws and door hinges, and a flush stainless steel cylinder lock with catch and coil spring loaded door pull equivalent to Square D "Mono-Flat". All panels shall be keyed alike.

E. Where grounding conductors are shown or specified, provide each panel and distribution center with grounding bus to which the grounding conductors shall be connected, each having its own terminal or lug.

F. Where Isolated Grounding (IG) conductors are shown or specified, provide each panel and distribution center with an Isolated Grounding bus to which the IG conductors shall be connected, each having its own terminal or lug. The IG grounding system shall be fully separated and insulated from the IG receptacle to the System Grounding Electrode. Provide a second ground bus bonded to the panelboard can for termination of conduit and equipment bonding conductors.

G. Panelboards rated 400 amps or less shall not exceed 6" depth.

H. Provide Fully rated equipment greater than or equal to the interrupting capacities indicated on the drawings.

I. Provide all copper bus bars, 100% rated neutral bus, ground bus and isolated ground bus where indicated. Lugs shall be rated for copper only, CU-AL rated lugs shall not be allowed.

J. Provide breaker tie handles in 2 pole and 3 pole configurations for all grouped multiwire branch circuits to allow grouped disconnecting means. Verify quantity with contractor.

PART 3 - EXECUTION

3.1 INSTALLATION:

A. Breaker handle guards shall be provided on each circuit supplying obviously constant loads to prevent accidental shutting off. Such loads are refrigeration, contactor controlled circuits, freeze protection, etc.

B. Furnish and install three spare one inch conduits from the top of each recessed panel, to an accessible point above the ceiling.

C. Care shall be taken to terminate ground conductors from isolated ground receptacles only on the isolated ground bus in a panel. Do not terminate bonding conductors on an isolated ground bus.

D. Each multiwire branch circuit shall be provided with breaker tie handles such that all ungrounded conductors will be simultaneously disconnected as per NEC 210.4 (B). Provide 2 pole and 3 pole breaker tie handles in sufficient quantity for all grouped circuits.

E. Group the ungrounded and grounded conductors for multiwire branch circuits in at least one location inside the panelboard with wire ties or similar means per NEC 210.4 (D).

3.2 LABELING:

A. No brand labels or other marking shall be on the outside of the panels. Where changes are made in existing panels, distribution boards, etc., provide new labeling and schedules to accurately reflect the changes; hand written revisions will not be acceptable.

B. Provide engraved nameplate for all panelboards permanently mounted inside door for flush panels and on the outside face of the door for surface panels; include the following minimum information:

1. Text stating “Main Building Disconnect” (if applicable)
2. Panelboard name
3. Source feeding panel
4. Voltage, Size (amps), number of phases, number of wires, and AIC rating

C. Engraved nameplates shall be have a black back ply, an inner white ply with outer colored ply as follows: Black for normal power, Red for Emergency (Legally Required or Optional Standby) power, Orange for UPS power.

D. Provide typewritten branch panel schedules with protective clear, transparent covers accounting for every breaker installed. Use actual room designations assigned by name or number near completion of the work, and not the designations shown on drawings.

E. Provide a permanent engraved label or include with the panel schedule information indicating the conductor insulation color for: (1) all ungrounded conductors (2) grounded conductor (3) equipment grounding conductor. This shall be documented at each panelboard in a readily visible location; refer to Wires and Cables Section 26 05 19 for conductor color coding.

END OF SECTION 26 2416

SECTION 26 2726 – SWITCHES & RECEPTACLES

PART 1 - GENERAL

1.1 WORK INCLUDED:

A. Provide all switches, receptacles, and other devices as herein specified and shown on the associated drawings.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS:

A. Bryant, Arrow-Hart, Eagle, LeGrand, General Electric, Leviton, Hubbell are acceptable.

2.2 MATERIALS:

A. The following list of wiring devices covers the most commonly specified items and establishes the grade of device. Should the Drawings indicate a device other than those listed herein without reference to catalog number, such device shall be of the same grade and manufacturer as like devices.

Single Pole Switches	Hubbell #1221
Duplex Receptacles - 20 amp Where required by Code and/or indicated on drawings	Hubbell #5362
Hospital-grade Duplex Receptacle	Hubbell #8300
Safety Duplex Receptacle	Hubbell #HBLSG 63H
Duplex Receptacles-Isolated Ground	Hubbell #5362-IG, Orange
Switch with Pilot	LeGrand #20AC1
Dimmer	Lightolier, Sunrise Series Electronic 0-10V Part# SR1200ZTUNV (provide relay pack for 277 volt)

B. All wiring devices and plates to be specification grade. Receptacles shall be mounted vertically with the ground pin down unless otherwise noted.

C. Color of devices and plates to be selected by Architect. Provide nylon plates in finish areas. Wood paneled walls shall have brown devices and plates. Restrooms, and food preparation areas to have 302 stainless steel plates.

D. Flush floor receptacles to be duplex and to have brass, hinged flap lids. Provide carpet flanges in carpeted floors. (See 26 0500, 2.4, E.)

E. Wet location and/or weatherproof receptacles shall be in a weatherproof enclosure, the integrity of which is not affected when the receptacle is in use (attachment plug cap inserted), UL labeled and listed "Suitable For Wet Locations While In Use". Provide enclosure with stainless steel screws, gasket between enclosure and mounting surface and between cover and base, clear impact resistant UV stabilized polycarbonate as manufactured by TayMac Corporation or accepted equivalent.

F. Receptacles installed outdoors in a wet/damp location shall be listed weather-resistant type.

PART 3 - EXECUTION

3.1 GENERAL:

A. Provide a separate GFI type receptacle for each receptacle noted on plans as GFI. Standard receptacles fed from an up-steam GFI type receptacle are not acceptable.

B. Install outlets and switches in a neat manner.

C. Extend mudrings to flush out with surrounding wood panels and walls.

D. Faceplates, devices, and boxes shall be square with floor, and door lines.

E. Devices to be installed flush with faceplate.

3.2 LABELING:

A. Provide self-adhesive labels for all switches and receptacles in compliance with Part 3.3 of Section 26 05 00.

B. Where switches control remote lighting or power outlets, or where switches in the same outlet (two or more) serve different purposes, such as light, power, intercom, etc. or different areas, such as corridor and outside, provide self-adhesive labels clearly indicating the function of each switch or outlet.

END OF SECTION 26 2726

SECTION 26 3100 – ELECTRIC HEAT TRACE SYSTEMS

PART 1 - GENERAL

1.1 WORK INCLUDED:

A. Provide all heat trace systems as herein specified and shown on the associated drawings.

1.2 QUALITY ASSURANCE:

A. Heat trace shall be self-regulating type, from a quality manufacturer providing heat trace products for at least 3 years.

PART 2 - PRODUCTS

2.1 MANUFACTURERS:

A. Provide products of one of the following manufacturers:

1. ProLine Radiant Heating
2. Nelson Heat Trace Systems
3. Raychem
4. Warmzone Radiant Heating

2.2 AUTOMATIC CONTROLLER:

A. Freeze protection circuits with maximum exposure temperatures 150 degrees for less shall be controlled with an ambient sensing thermostat and properly sized contactor for each circuit. Circuits shall be energized when

ambient temperature drops to 40 degrees F.

The controller shall monitor each electrical heat tracing circuit for:

1. Heater continuity
2. Heater voltage (85 - 300 VAC)
3. Heater current (50 mA - 30 amp)

    a. The monitoring system shall be microprocessor based and shall continuously scan all circuits.
    b. The monitoring system shall be useable for any series or parallel heater type and any manufacturer's heater.
    c. The monitoring system shall be compatible with a standard one or two conductor heating cable. No additional monitoring wires shall be permitted.
    d. The monitoring system shall be Model CM-1 as manufactured by Nelson Electric Heat Tracing Systems or equivalent.

B. Control Panel - To actuate main contactor in a heat trace panel.

1. The control panel be microprocessor based, mounted in an enclosure rated for NEMA 3R.
2. The control panel shall be capable of receiving inputs from up to 6 remote sensors and be zoneable.

C. The control panel shall have the following features:

1. Automatic, continuous or standby switch.
2. Automatic hold-on timer adjustable from ½ hour to 10 hours, enabling user to select time period for system to operate after cessation of snowfall.
3. LED's provide indication of power, sensor status and heater operation.

4. Two floating contacts rated 120 VAC, 24 amps at 120 VAC.
5. Wall mounted.

D. Satellite Contactor - to interface with Control

1. The enclosure shall be rated NEMA 3R.
2. The Satellite Contactor shall have an integral two pole contactor able to switch 30 amps 120 VAC, single phase.
3. The Satellite Contactor shall share the host panel's adjustable hold-on timer.
4. An integral manual heater cycle control on the Satellite Contactor shall operate local heaters for a fixed one minute hold-on period for testing purposes.
5. LED's provide indication of power, heater operation and ground fault.

E. Gutter Ice sensor

1. Detects snow/ice/moisture.
2. Energizes at and below 38 degrees F.
3. Lockout prevents system startup below 15 degrees F.
4. Operates with 22 to 28 VAC power supply from control panel.
5. Able to be placed up to 2000 feet from control panel.
6. The sensor shall be Model GIT-1 as manufactured by ETI, Inc or Ray-Chem.

2.2 HEAT TRACE:

A. Roof and Gutter Snow/Ice Melting Cable

1. The self regulating heater shall consist of two 16 AWG nickel plated copper bus wires embedded in parallel in a self regulating polymer core and tinned copper braid that varies its power output to respond to temperature along its entire length. The maximum sheath temperature shall not exceed 150 degrees F.
2. The heater shall be capable of crossing over itself without overheating.
3. The heater shall be capable of being cut to length in the field and terminated in the field.
4. The heater core shall be covered with a bonded inner TPR jacket, then a TPR elastomer jacket, protected with a tinned copper overbraid for physical, as well as electrical grounding, protection. The overall covering shall be a flame retardant TPR jacket with U.V. inhibitor for corrosion and abrasion resistance.
5. The heater, and components, shall be U.L. rated as a system for this application. The heater shall be capable of being operated at 277 VAC.
6. The heater cable shall be designed for a useful life of 20 years or more with the power on continuously, based on the following useful life criteria:

    a. Retention of at least 75 percent of rated power after 20 years of operation at the maximum published maintain temperature.
    b. Retention of at least 90 percent of rated power after 1000 hours of continuous operation at the maximum published operating temperature.

PART 3 - EXECUTION

3.1 GENERAL:

A. The heater and components shall be installed in accordance with manufacturer's installation instructions and using manufacturer's approved components.

B. The system shall be installed in accordance with applicable N.E.C. requirements. Provide 30 milliamp ground fault interrupter breakers for all circuits as required.

C. Heater cable circuit lengths and circuit breaker sizing shall be in accordance with manufacturer's published literature.

D. Before and after installation, the heater cable shall be meggered at 2500 VDC for to ensure electrical integrity.

3.3 WARRANTY

A. Provide a standard manufacturer's written warranty for a minimum of 5 years.

END OF SECTION 26 3100

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SECTION 26 4300 – SURGE PROTECTIVE DEVICES

PART 1 - GENERAL

1.1 WORK INCLUDED:

A. Furnish all labor, materials, equipment and services necessary for and incidental to the installation of the surge protective device (referred to as SPD herein and/or TVSS on the drawings) components at locations shown on the plans.

1.2 QUALITY ASSURANCE:

A. The SPD shall be UL Listed as a surge protective device, category C, UL 1449 latest Edition. All UL 1449 test data shall be provided with submittal.

B. The SPD shall bear suppressed voltage rating issued by UL, and the units shall be tested in accordance with ANSI/IEEE C62.41 latest edition, Category C, 20kV/10kA, 8x20 uS and 1.2x50 uS Combination Waveform and .5uS - 100kHz Ring Wave with a minimum of 10 sequential impulses delivered directly into the SPD at a maximum of sixty second intervals for each waveform.

C. Manufacturers Qualifications: Only firms regularly engaged in the manufacture of SPD products for category C (ANSI/IEEE C62.41), and whose products have been providing satisfactory service for not less than five years, shall be considered. Manufacturer qualifications shall be provided as part of the submittal.

D. The SPD must be capable of surviving 1000 sequential surges without failure, using IEEE test procedures established in C62.45.

E. The SPD device must have MOV surge devices, installed with full rating indicated between Phase to Neutral, Phase to Ground, and Neutral to Ground, and be capable of handling a minimum surge current as follows:

Panel/Switchboard Size Equal to or greater than (A):	3000	2000	1200	800	225	100
Mode:	kA/Mode					
Line to Neutral	250	200	150	100	80	50
Line to Ground	250	200	150	100	80	50
Neutral to Ground	250	200	150	100	80	50

1.3 SUBMITTALS:

A. Submit complete and descriptive shop drawings in accordance with the General Conditions, Division 1, and Section 26 05 00.

B. Submit all related SPD Specifications and drawing information requested in this document and U.L. 1449 latest edition surge suppression ratings for the SPD. In order for a SPD system to be considered, all responses to information requested in this specification must be provided in writing. If a manufacturer cannot comply with any portion of this specification, this must be stated in the reply and the reason for non-compliance shall be provided.

C. Submit operation and maintenance data in accordance with the General Conditions, Division 1, and Section 26 05 00.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS:

A. Provide products of one of the following manufacturers:

1. Liebert
2. Current Technologies
3. United Power
4. EFI

B. Requests for substitution of other products meeting all specification requirements herein will be considered if submitted in accordance with the General Conditions, Division 1 and section 26 05 00.

2.2 SPD EQUIPMENT:

A. The SPD shall be suitable for application in category C environments as described in ANSI/IEEE C62.41. The SPD shall be of parallel design and provide protection from Line to Ground, Line to Line, Line to Neutral, and Neutral to Ground.

B. The SPD shall be compatible with the electrical system voltage, current, configuration and intended application.

C. The SPD maximum continuous operation voltage (MCOV) shall be capable of sustaining 100% of the nominal RMS voltage continuously without degradation.

D. The SPD shall only use solid state clamping components connected in parallel with the supply to limit the surge voltages. Clamping components shall be installed in 7 modes. Four mode SPD devices are not acceptable.

E. For Monitoring of SPD's Provide:

1. Visual and audible indication with disable switch for properly performing protection.
2. Provide a surge counter.

F. House in the appropriate NEMA rated enclosure.

G. SPD shall be repetitive in nature such that failure of a single component within the SPD (i.e. MOV, fuse, etc) does not leave the electrical system unprotected.

H. All SPD's installed in front of the main service disconnect(s) as indicated on the drawings shall be provided with an integral disconnect and the SPD shall be located next to the main service disconnect(s).

PART 3 - EXECUTION

3.1 INSTALLATION:

A. Ship with complete installation instructions, which are to be followed in detail. The manufacturer's representative is to be contacted and is to supervise the installation.

B. Supplemental installation information is as follows:

1. Use the breaker space closest to the neutral bus. Nipple the suppressor to the panel where the suppressor can be installed so as to keep both the hot leads and the neutral lead as short and straight as possible from the suppressor to the breakers and the neutral bus.
2. The best performance is achieved with the shortest leads and neutral. All efforts within the code should be used to minimize the lead lengths. Ideally the leads should be less than eight inches long. Each inch of lead above six inches will add approximately 20 volts to the quoted let-through voltage. Cut the leads down to the shortest size that will allow installation.
3. If the neutral bus is out of reach of the leads, then a #4 AWG conductor is to be run from the remote neutral bus to a lug near the suppressor, and the lead from the suppressor should be cut as short as possible.
4. The ground is to be connected to the case of the panel (equipment ground only). Do not connect the suppressor ground wire to an isolated ground (IG) bus.

C. Installation shall comply with all applicable State and National Electrical Codes, including NEC Articles 240, 250, 310 and 285. Utilize the panelboard/switchboard circuit breaker to provide overcurrent protection and a means to disconnect power from unit. Fuses shall not be utilized for the SPD overcurrent protection unless specifically indicated on the drawings and if utilized shall be of the Time Delay type rated for the available fault current at the location of installation.

D. Phase, neutral and ground leads of installed SPD must be grouped and twisted together up to the point of connection at the bus or overcurrent device. Lead lengths must be as short as possible, avoiding bends where possible. Lead lengths greater than sixteen inches or sharp bends in leads shall not be permitted, where lead lengths greater than sixteen inches cannot be avoided high performance low impedance cable equivalent to Current Technology "High Performance Interconnect (HPI) SPD connection system" shall be used while maintaining the shortest lead lengths possible, wire size shall be as indicated on the drawings. Lead length is measured from switchboard bus or breaker to point of connection to SPD device.

E. Mount so that suppressor indicator lights will be clearly visible after installation.

F. Circuit breaker shall be exclusively utilized for the SPD device.

G. Raceway from SPD to switchboard shall consist of rigid steel conduit with double locknuts and grounding bushings connected to switchboard ground.

H. Overcurrent protection sizing shall be as per manufacturer's instructions. Conductor sizing shall be based on NEC requirements.

3.2 LABELING:

A. Where changes are made in existing SPD's (TVSS's) provide new labeling to accurately reflect the changes; hand written revisions will not be acceptable.

B. Provide engraved nameplate for all SPD's permanently mounted on the outside face of the SPD; include the following minimum information:

1. TVSS name
2. KA/mode ratings for line to neutral, line to ground, and ground to neutral

3.3 WARRANTY:

A. Warranty shall be for full replacement without pro-rating value, for a minimum period of 10 years.

END OF SECTION 26 4300

SECTION 26 5100 - LIGHTING

PART 1 - GENERAL

1.1 WORK INCLUDED:

A. Provide light fixtures with lamps and accessories as herein specified and shown on the drawings.

1.2 QUALITY ASSURANCE:

A. If the catalog number of a specified fixture should conflict with the fixture description or the general lighting specifications, such conflicts shall be brought to the attention of the Architect prior to bidding.

B. The dimensions shown on the luminaire schedule are for general reference only. Refer to the manufacturer's shop drawings for exact dimensions prior to rough in.

1.3 SUBMITTALS:

A. Submit product data and shop drawings for fixtures, ballasts, and lamps in accordance with the General Conditions, Division 1, and Section 26 05 00.

B. Verify that fixture description matches that which is indicated by the specified catalog number.

C. All features mentioned in the fixture list shall be marked on the submitted items.

D. Submit written confirmation that dimming ballasts and dimming controls are compatible.

E. Submit Operation and Maintenance data in accordance with the General Conditions, Division 1, and Section 26 05 00.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS:

A. See Luminaire Schedule for acceptable manufacturers.

B. Requests for substitution of other products will be considered if submitted in accordance with the General Conditions, Division 1, and Section 26 0500.

C. Substitution requests for fixtures equal to those specified shall include complete construction and photometric data including, if applicable, candlepower distribution curve, spacing to mounting height ratio, table of coefficients of utilization, iso footcandle curve, ANSI beam spread classification, efficiency, etc.

D. Submittals and substitution requests for fluorescent fixtures shall include the sheet metal gauge of the housing and the lens thickness, material, and pattern.

2.2 MATERIALS:

A. Polystyrene lenses and lenses less than 0.125 inches nominal thickness shall not be permitted unless otherwise noted.

B. Provide luminaires with Area Coverage, damp, or wet label if required for the application indicated.

C. All recessed luminaires shall be free of light leaks.

2.3 BALLASTS:

A. All ballasts shall be capable of providing reliable operation of the lamps at the lowest temperature normally encountered. The contractor shall confirm that the ballasts are appropriate for the ambient conditions.

B. The contractor shall verify the ballast voltage prior to submittal.

C. Ballasts deemed excessively noisy shall be replaced without cost to the Owner.

D. Instant start ballasts shall not be used on circuits that contain occupancy sensors or daylighting sensors. All ballasts specified for these types of circuits shall be program start.

E. PREMIUM T8 BALLASTS – PROGRAM START: Premium T8 fluorescent ballasts, unless noted otherwise on Light Fixture Schedule, shall be programmed start electronic type; ballast data as follows:

UL listed and CSA certified.
Low wattage, ballast factor of 0.75 to 0.78
Similar light output with Premium lamp to standard T8 ballast and lamps.
Recognized Testing Laboratory listed, thermally protected, resetting, Class P, non-PCB, sound rated A.
Operate lamps at a frequency of 40KHz or higher with no detectable flicker.
Total Harmonic Distortion (THD) of 10% or less.
Power factor equal to or greater than 98%.
Minimum lamp starting temperature of 50 degrees F.
Meet all current Federal, State and Power Co. efficiency and efficacy standards, and rebate program requirements.
Meet all current ANSI, IEEE, and FCC regulations for EMI/RFI, harmonic distortion, and transient protection.
Provide extended lamp life as stated by lamp manufacturer.
Minimum 5 year ballast and replacement labor warranty by manufacturer.
Ballast manufacturer's data must be included with lighting fixture submittals.
Compatible with occupancy sensor switching.

Approved manufacturers: Advance (Centium or Optanium), Osram Sylvania, Magnetek, or approved.

F. DIMMING T8, T5, BIAX, and COMPACT FLUORESCENT BALLASTS – PROGRAMMED START: programmed start dimming fluorescent ballasts, unless noted otherwise on Light Fixture Schedule, shall be electronic type; ballast data as follows:

UL listed and CSA certified.
100% to 5% full range flicker free continuous dimming using 0-10 VDC signal.
Recognized Testing Laboratory listed, thermally protected, resetting, Class P, non-PCB, sound rated A.
Operate lamps at a frequency of 40KHz or higher with no detectable flicker.
Total Harmonic Distortion (THD) of 10% or less.
Power factor equal to or greater than 95%.
Lamp starting at any light output setting.
Meet all current Federal, State and Power Co. efficiency and efficacy standards, and rebate program requirements.
Meet all current ANSI, IEEE, and FCC regulations for EMI/RFI, harmonic distortion, and transient protection.
Provide normal lamp life as stated by lamp manufacturer.
Minimum 5 year ballast and replacement labor warranty by manufacturer.
Ballast manufacturer's data must be included with lighting fixture submittals.
Compatible with occupancy sensor switching.

Approved manufacturers: Advance (Mark 10), Lutron, or approved.
Coordinate dimming ballasts with dimming controls specified in separate section.

G. DIMMING DRIVER LED: Provide integral 0-10 volt dimming driver capable of continuous dimming that works with any standard 0-10V dimmer, unless noted otherwise on Luminaire Schedule:

UL listed and CSA certified.
Comply with IESNA LM-79 and LM-80 standards.
Recognized Testing Laboratory listed, thermally protected, resetting, Class P, For use in insulated ceilings.
Power factor equal to or greater than 90%.
Meet all current Federal, State and Power Co. efficiency and efficacy standards, and rebate program requirements.
Meet all current ANSI, IEEE, and FCC regulations for EMI/RFI, harmonic distortion, and transient protection.
Compatible with occupancy sensor switching.

Coordinate dimming with dimming controls specified in separate section.
Provide low voltage cable for 0-10 volt dimming per manufacturer instructions.

H. Provide emergency battery/inverter packs at fixtures indicated on plans.

1. T8 or T5 fluorescent emergency battery/inverter pack shall be capable of operating lamp(s) at a minimum of 1100 lumens, or at the lumen rating listed on the Light Fixture Schedule (whichever is greater), for a minimum of 90 minutes.
2. For compact fluorescent or incandescent sources, the emergency battery/inverter pack shall be capable of operating the lamp(s) at 100% lumen rating of the lamp(s) for a minimum of 90 minutes.
3. Emergency battery/inverter packs shall be UL listed and warranted for a minimum of 5 years for the T8 or T5 lamps and 2 years for the compact fluorescent or incandescent lamps.
4. Approved Manufacturers: Bodine, Iota, Lithonia or as listed on the fixture schedule.

I. In indoor locations other than dwellings or hazardous locations, fluorescent luminaries that utilize double-ended lamps and contain ballast(s) that can be serviced in place shall have a quick disconnecting means factory installed, internal to the luminaire, and accessible from the ballast housing. The quick disconnect shall simultaneously break all of the supply conductors to the ballast, including the neutral. The line side terminals of the disconnect shall be guarded.

2.4 LAMPS:

A. Provide Premium grade, high performance T8 lamps, low mercury TCLP complaint (green ends), 3100 lumens, 3500°K, CRI of 82.

B. T5, Biaxial, and compact fluorescent lamps shall be 3500°K type with a minimum CRI of 82, unless otherwise noted. Provide low mercury TCLP compliant lamps (green ends) where available as standard products (Philips Alto series or equal).

C. Acceptable lamp manufacturers are Venture, Osram/Sylvania, Philips, and General Electric.

D. All lamps and fixtures shall be in proper operation at the time of acceptance.

E. SPARE LAMPS: Provide ten percent spare lamps, with a minimum of two, for each size and type used.

2.5 POLES:

A. Each pole shall have adequate strength and rigidity to withstand not less than 100 mph winds without damage to the poles and attached fixtures and lamps. Pole bases shall be equipped with hand holes with matching covers, and base cover.

B. Provide concrete light pole bases. Provide 3000 psi class concrete, forming, and reinforcing as required. Provide smooth uniform finish on all concrete above grade. See Division 3, Concrete Installation.

C. Anchor bolts shall be hot-dip galvanized after fabrication and threads cleared. Nuts, washers, and other hardware and fittings shall be corrosion resistant alloy material of adequate strength. Indicated pole heights are above the top of the concrete base.

D. After the poles have been installed, shimmed and plumbed, grout the spaces between the pole bases and the concrete base with non-shrink concrete grout material.

E. Provide ground rod for poles installed on grade, attached to pole.

E. Provide fuse clips located in handhole for each fixture head circuit.

PART 3 - EXECUTION

3.1 INSTALLATION:

A. Luminaires installed under this work shall be properly and adequately supported from the building structure except where ceiling construction or other provisions are specifically designed to support the fixture units. Fixture support systems shall provide a safety factor of four. This shall apply to chains, hangers, anchors, clamps, screws, and all other hardware and appurtenances associated with the support system.

B. Fixture supports shall provide proper alignment and leveling of fixtures, and shall be arranged to maintain the alignment at all times. The final decision as to adequacy of alignment shall be given by the Architect.

C. All light outlets shall be supplied with a fixture. Outlet symbols on the drawings without a type designation shall have a fixture the same as those used in similar or like locations.

D. Fixture stem or chain lengths for industrial reflector or bare lamp strip fixtures shall be appropriate for the space and for coordination with other work such as ducts and piping. Provide swivel hangers for stem-hung fixtures.

E. Fixtures shall be left clean at the time of acceptance of the work and every lamp shall be in operation. The responsibility for cleaning or protecting fixtures from dirt, dust, paint, debris, etc. shall rest with the Contractor performing this division of work.

F. Prior to the purchase of any luminaire, the finish shall be verified with the Architect and the voltage shall be verified based on the panelboard voltage.

G. Fixtures of a given description may be used in more than one type of ceiling. Consult the Architectural Reflected Ceiling plan to obtain this information. Some ceiling types may have changed immediately prior to bidding or by addenda or change order and the changes may not be reflected in the fixture list or fixture designations as shown on the plans. The contractor shall compare the electrical plans with the reflected ceiling plan and confirm that the specified fixtures are compatible with the ceiling system prior to ordering.

H. Provide seismic support wires for all recessed fixtures where ceiling framing is not designed for fixture support.

I. Provide all recessed lay-in fixtures a flexible power whip of at least 48 inches but not exceeding 72 inches. Where using modular wiring systems, wiring shall be supported from structure, not laying on ceiling tiles.

J. Where fixtures are mounted under cabinets, in soffits, coves, or other physically restricting spaces, the contractor shall verify that the fixtures will fit the space prior to ordering.

K. Undercabinet and similar fixtures are to be hard wired. Flexible cords similar to SO cord are not acceptable.

L. Air supply fixtures shall be supplied with pattern control vanes.

M. See Architectural plans for fire rated ceilings and coordinate fixture installation with general contractor to assure continuity of fire rating.

N. Do not mount fluorescent or H.I.D. fixtures within 12" of any cable tray or telecommunications cable.

O. Where dimming systems are specified, contractor shall operate fixtures at full intensity for a minimum of 100 hours prior to testing. Lamps shall not be dimmed until the 100 hours is complete.

3.3 WARRANTY:

A. Provide a 5 year complete parts and replacement labor by manufacturer for all linear and compact fluorescent ballasts.

END OF SECTION 26 5100

DIVISION 26 – TECHNOLOGY

27 0500 Voice and Data Wiring

SECTION 27 0500 – VOICE AND DATA WIRING

PART 1-GENERAL

1.1 WORK INCLUDED:

A. Furnish and install all labor and materials required for the installation of a complete voice and data cable infrastructure.

1.2 QUALITY ASSURANCE:

A. Do all work in accordance with the guidelines published in EIA/TIA standard 568 and 569. Where conflicts exist, the plans and specifications shall generally take precedence. Bring all such conflicts to the attention of the Architect for final resolution.

B. All workers involved in the installation and termination of cable shall have at least one year of experience. All workmen on the job shall have attended a vendor sponsored training program covering installation and termination of cable.

C. The Contractor installing the cable and components shall be approved by the manufacturer providing the 15 year warranty described below.

1.3 SUBMITTALS:

A. Submit complete and descriptive shop drawings in accordance with Division 1, and General Conditions. Include data for wall jacks, cable, racks, patch panels.

B. Submit floor plans indicating the boundaries for the area served by each IDF location. Clearly identify the boundaries on the as-built plans.

1.4 GUARANTEE:

A. The Contractor shall provide a full 15 year parts and labor guarantee on the entire wiring system, including all cable, outlets, and terminations. The warranty shall be a package warranty backed up by the manufacturers of the materials used in the installation.

B. The warranty shall assure that all components, links, and channels shall equal or exceed the EIA/TIA standards including attenuation, NEXT, etc. for the duration of the warranty.

C. Acceptable Installers are as follows.

1. Wasatch Electric
2. Cache Valley Electric (CVE)
3. Americom

D. Upon notification of a problem, the warranty provider shall furnish within 48 hours and at no cost to the owner, such labor and materials as are needed to restore the system to proper operation.

1.5 SYSTEMS TESTING AND DOCUMENTATION:

A. General Requirements:

B. Provide installation testing of equipment where required by manufacturer's installation instructions.

C. Provide complete end to end testing for all copper and fiber optic systems/channels based on latest applicable standards. Document all testing and submit with final as-built submittal package (see section 27 02 40.50)

D. For all controls and operating equipment, submit equipment/systems to at least three complete operational sequences, in which all equipment operations are tested, observed, and verified.

E. Prior to substantial completion and project acceptance inspection, submit test reports to indicated scope of startup and operational tests, with results of testing for each specified operation.

1. Copper Cabling System Testing

a. General: Copper cabling shall be tested and certified after installation as follows and as required for cable manufacturer's warranty. Twisted-pair copper cable channels shall be tested for continuity as specified below, presence of ac/dc voltage, and performance. All cabling shall be tested for conformance to horizontal cable specifications as outlined herein, and shall be tested according to test set manufacturers instructions utilizing latest firmware and software. Testing shall include all of electrical parameters as specified under Product. All cables and termination hardware shall be 100 percent tested by installation contractor for defects in installation and to verify cable performance under installed conditions. All conductors of each installed cable shall be verified useable by Contractor prior to system acceptance. All cables shall be tested according to contract documents, manufacturer's warranty provisions, and best industry practices. If any of these are in conflict, Contractor shall comply with most stringent requirements. All defects in cabling system installation shall be repaired or replaced in order to ensure 100 percent useable conductors in all cables installed, at no additional cost to Owner.

b. Continuity: Each pair of each installed cable shall be tested using a test unit that shows opens, shorts, polarity and pair-reversals, crossed pairs and split pairs. The test shall be recorded as pass/fail as indicated by test unit according to manufacturers' recommended procedures, and referenced to appropriate cable identification number and circuit or pair number. Any faults in wiring shall be corrected and cable re-tested prior to final acceptance.

c. Length: Each installed cable link shall be tested for installed length using a TDR type device. The cables shall be tested from patch panel to patch panel, block to block, patch panel to outlet or block to outlet as appropriate. The cable length shall conform to maximum distances set forth in TIA/EIA-568-B standards and all other applicable standards specified in Appendix 1: Codes, Standards, and Informative References. Cable lengths shall be recorded, referencing cable identification number and circuit or pair number. For multi-pair cables, shortest pair length shall be recorded as length for cable.

d. Factory testing: Every reel of cable shall be tested by cable manufacturer for all characteristics specified for cable type in this section. This testing shall be performed using a sweep test method and include frequencies specified for cable. A test report shall be available electronically, at no additional cost, for a minimum of five (5) years from the date of manufacture. The test report shall include the reel number, the date of the test, the Lot number, and test results for Return Loss (RL), Insertion Loss (Attenuation), Pair-to-Pair NEXT, and Power Sum NEXT Pair-to-Pair ELFEXT and Power Sum ELFEXT. The test report shall show the "Worst Case Margin" for the listed transmission characteristics.

e. Test results: Test results shall be automatically evaluated by equipment, using most up-to-date criteria from TIA/EIA-568-B standards and all other applicable standards specified in Appendix 1: Codes, Standards, and Informative References, and result shown as pass/fail. Test results shall be printed directly from test unit or from a download file using an application from test equipment manufacturer. The printed test results shall include all tests performed, expected test result and actual test result achieved.

f. Test reports: Test reports for all factory testing and field test reports for copper cabling installation shall be submitted to the Owner's Representative and manufacturer prior to commissioning voice and data system and final contract payment. Refer to Submittals in this Section.

2. Optical Fiber Cable Testing

a. General: Optical fiber cabling shall be tested and certified after installation as described below and as required for cable manufacturer's warranty. Fiber testing shall be performed on all fibers in completed end to end system. Testing shall consist of a bi-directional end to end test in accordance with applicable standards in 27 02 20.20, or a bi-directional end to end test performed by EIA/TIA-455-53A and all other applicable standards in 27 02 20.20. For spans greater than 90 meters, each tested span must test to a value less than or equal to value determined by calculating a link loss budget. For horizontal spans less than or equal to 90 meters, each tested span must be less than or equal to 2.0 decibels. The insertion loss for each mated optical fiber connector pair shall not exceed 0.40 decibels.

b. Pre-installation testing: Test all optical fiber cable for all fibers prior to installation of cable.

c. Performance testing: Where links are combined to complete a circuit between devices, Contractor shall test each link from end to end to ensure performance of system. Only a basic link test is required. Contractor can optionally install patch cords to complete circuit and then test entire channel. The test method shall be same used for test described above. The values for calculating loss shall be those defined in applicable TIA/EIA standards in Appendix 1: Codes, Standards, and Informative References.

d. Attenuation testing: Attenuation testing shall be performed with a stable launch condition using two-meter jumpers to attach test equipment to cable plant. The light source shall be left in place after calibration and power meter moved to far end to take measurements.

e. Loss budget: Fiber links shall have a maximum loss of:

f. (Allowable cable loss by kilometer) × (kilometers of fiber in link) + (0.2 decibels) × (number of connectors) = maximum allowable loss or (Allowable cable loss per kilometer) x (length of cable in kilometers) + (0.4 dB x number of mated connectors) + (0.3 dB x number of splices) = maximum allowable loss

F. Link loss: A mated connector to connector interface shall be considered a single connector. Loss numbers for installed link shall be calculated by taking sum of bi-directional measurements and dividing that sum by two. All links not meeting requirements of standard shall be brought into compliance by Contractor, at no additional cost to Owner.

G. Documentation: Following final documentation shall be submitted to the owner's representative prior to commissioning data system and final contract payment according to Submittals in this section.

1. Test results: Test results shall be automatically evaluated by equipment, using most up-to-date criteria from all applicable standards specified in 27 02 20.20 and result shown as pass/fail. Test results shall be printed directly from test unit or from a download file using an application from test equipment manufacturer. The printed test results shall include all tests performed, expected test result and actual test result achieved.
2. End-to-end loss data
3. As installed diagrams
3. Test Documentation

a. Provide test documentation in 3-ring binders within 2 weeks after completion of project testing. Binders shall be clearly marked on outside front cover and spine with words Test Results, project name, and date of completion (month and year). Major heading tabs, Horizontal and Backbone, shall divide binder. Each major heading shall be further sectioned by test type. Within horizontal and backbone sections, divide by tabs scanner test results by category, optical fiber attenuation test results, and continuity test results. Present test data within each section in sequence listed in administration records. Provide test equipment by name, manufacturer, model number and last calibration date at the end of document. Unless manufacturer specifies more frequent calibration cycle, annual calibration cycle shall be required on all test equipment used for this installation. Test document shall detail test method used and specific settings of equipment during test. Scanner tests shall be printed on 8 1/2 by 11 inches. Hand written test results (attenuation results and continuity results) shall be documented on a suitable test form. When repairs and re-tests are performed, note problem found and corrective action taken, and collocate in binder both failed and passed test data.

PART 2 - PRODUCTS

2.1 SYSTEM PERFORMANCE

A. The structured cable system and all of it's components and installation shall meet the requirements of the latest draft of the EIA/TIA performance standards for the category of cable and accessories specified elsewhere in this specification.

B. The cable is to meet IEEE 802.3bt Type 4 (up to 100W of POE power)

C. All components shall be backwards compatible. They shall satisfy all requirements of their category in addition to all existing lower category specifications.

2.2 ACCEPTABLE MANUFACTURERS:

A. Structured Cabling and Outlet Solutions:

CommScope

B. Equipment Racks: Hubbell, Chatsworth, Middle Atlantic

C. Ladder Tray: Hubbell, Chatsworth, Middle Atlantic

D. Requests for substitution of other products will be considered if submitted in accordance with the General Conditions, Division 1, and Section 27 05 00.

2.3 FIBER BACKBONE:

A. All fiber optic cable shall be Aqua 50/125, 10G/300 fiber optic or Aqua 50/125, 10G/550 fiber optic cable, based on fiber distance.

B. Terminate all fiber strands with type ST connectors unless noted otherwise.

C. All fiber cables terminating in IDF locations shall be terminated in rack mount patch panels. Patch panels shall be loaded with the correct quantity of connector couplings.

D. All fiber optic patch cords will be furnished and installed by the Owner.

E. All fiber backbone cable shall be run in innerduct.

2.4 COPPER BACKBONE:

A. All outdoor backbone/riser cable shall be multi-paired cable, consisting of 24AWG thermoplastic insulated conductors formed into binder groups of 25 pairs. Core to be flooded with gelled filling compound for water resistance. Cable must have overall shield/sheath of aluminum and steel with an outer jacket of polyethylene The cable shall meet the requirements for Category 3 horizontal UTP cable of EIA/TIA/ TSB-36 and ANSI/EIA/TIA-568 for 100-ohm UTP multi pair backbone cable.

B. 110 type protection blocks with solid state over-voltage protection and sneak current protection for terminating outdoor twisted pair cable shall be installed in the building entrance terminal. Blocks shall be complete with mounting hardware, protection modules, connecting blocks, retainers, wire management, designation strips, etc. Must be UL listed. Protection units shall be equipped with stub cable for splicing to the building entrance cables.

C. All indoor backbone/riser cable shall be multi-paired cable, consisting of 24AWG thermoplastic insulated conductors formed into binder groups of 25 pairs. Cable must be riser rated and meet the requirements of ANSI/EIA/TIA-568 for 100-ohm UTP multipair Backbone Cable.

D. Rack mount wire management panels are to be installed between each pair of 48 jack rack mount 110 type modular patch panels.

E. Provide minimum 2" wide horizontal slotted wall duct between rows of 110 blocks.

2.5 HORIZONTAL COPPER DISTRIBUTION

A. All UTP cable shall be 4-pair cable, of 24AWG solid copper conductors under a common sheath. Cable must meet the requirement for Category 6A of EIA/TIA standards and be rated for use in the environment in which it is used.

B. Voice and Data UTP cables shall terminate on rack mount 110-type UTP terminating Category 6A modular RJ-45 patch panels and shall be provided and installed in equipment racks. They must meet requirements for Category 6 of EIA/TIA TSB-40. Rack mount wire management panels are to be installed for each 48 jack rack mount patch panel.

C. All voice and data outlet plates shall be of a modular design capable of accepting interchangable RJ-11, RJ-45, video F connectors, BNC, fiber ST, SC, or MT-RJ connectors, or blank inserts into a single plate. Inserts shall be designed to permit them to be disconnected from the plate without removing the cable, and reinstalled on another plate. Plates shall be single gang nylon, color to match adjacent power receptacle plates.

D. All plates shall be 4 port with quantity of jacks as indicated elsewhere. Provide blank fillers in all unused ports.

E. Each outlet shall have UTP cables terminated on CAT 6A RJ-45 jacks as indicated on the symbol schedule or on the floor plans by a numeric designation adjacent to the outlet symbols. Video projectors and wireless LAN access points shall have two jacks per plate.

F. Wireless LAN and telemetry transceivers shall be wired per manufacturer's recommendations with 4 pr CAT 6 UTP. Wireless phone transceivers shall be wired per manufacturer's recommendations with 2 pr CAT 3 UTP. Leave 10 feet of slack at all wireless transceiver locations.

G. Wiring configuration is 568B.

H. Color code for the cabling is:

- White – Data Ports
- Orange – Wireless Access Ports
- Yellow – A/V
- Green – Security
- Blue – Network rack ethernet riser connections in multi-floor buildings or buildings with multiple network rooms

2.6 HORIZONTAL FIBER CABLE

A. All horizontal fiber optic cable shall be single or multimode as indicated on the drawings, and shall meet the requirement of ANSI/EIA/TIA-568 for optical fiber cable.

B. All fiber optic cable shall be Aqua 50/125, 10G/300 fiber optic or Aqua 50/125, 10G/550 fiber optic cable, based on fiber distance.

C. Terminate all fiber strands with type ST connectors unless noted otherwise. Plates shall be as described in the preceding section titled "Horizontal Copper Distribution".

D. All fiber cables terminating in IDF locations shall be terminated in rack mount patch panels. Patch panels shall be loaded with the correct quantity of connector couplings.

2.7 EQUIPMENT RACKS:

A. Racks shall be as shown on drawings.

2.8 LADDER TRAY:

A. Where indicated on the plans, ladder bottom type cable tray is to be installed in each telecommunication room. Coordinate the installation of tray with all other construction within the telecommunications room.

B. Channel type; steel; painted telephone equipment gray; complete with all necessary hardware and fittings for a complete installation; capable of supporting a cable load of a least 50 pounds per linear foot with side rail deflection not to exceed 0.5 inch at this load. Size as indicated.

C. Trays shall be attached to tops of equipment racks where they pass over them. Cable tray to be firmly attached per the manufacturers instructions. Provide cable dropouts at locations where 5 or more cables will exit the tray.

D. Provide seismic bracing acceptable to the code authorities having jurisdiction.

PART 3 - EXECUTION

3.1 INSTALLATION:

A. The Contractor shall furnish and install all cabling in accordance with this specification, and as indicated on the cable schedules and drawings.

B. Install each cable as an uninterrupted conductor section between the designated termination points, unless otherwise directed by the cable installation specifications. There shall be no splices or mechanical coupler installed between the cable points of origin and termination except as shown on drawings and or specifications.

C. Unless otherwise noted, all cable shall be routed through the building cable tray/conduit system where available. Coordinate with the Division 26 Contractor on cable tray sizing. Prior to installation, check the sizes of the cable tray specified in section 16115 and confirm that it has adequate capacity for the quantity of cables required. Notify the Architect prior to tray ordering and installation if there are any problem areas.

D. Coordinate the location of cable tray installed under Section 270528 to assure that required EIA/TIA clearances are maintained from line voltage power conduit (12"), motors and transformers (40"), and fluorescent fixtures (12"). Observe proper clearances for all installed cable.

E. Contractor is responsible for ensuring that cable jacket is suitable for the environment in which it is placed ie: CM, CMR, CMP rated.

F. All cable shall be attached to building structure except as noted below, at intervals not to exceed those mandated by the National Electrical Code.

G. At the same time cable is pulled into a cable pathway, also install a pull string of appropriate size to facilitate future cable pulls along those pathways.

H. Install "J-hooks" for horizontal cable support. Coordinate location of support hardware to avoid conflicts with other trades.

I. At no point will any station cable be tie wrapped or fastened to the cable tray. After cables have exited the cable tray they will Velcro strapped to the "J-hooks". The straps will be cinched snug enough around the cable bundle to keep them uniform and in the hooks, but not so tight as to damage the construction of the cables themselves.

J. Installation of workstation cables shall be coordinated with the modular furniture system contractor. Prior to the furniture system installation, the workstation cables will be pulled near the "stub-ups" or "poke-thrus" and left coiled with enough slack to reach the eventual outlet location. After the modular furniture systems are installed and walls are finished, the contractor will pull cable to the outlet locations and complete the cable installation.

K. Backbone and station cables shall be provided with an 8 foot service loop at all MDF and IDF locations.

L. Provide firestopping at all locations where cables penetrate fire rated surfaces. Materials and methods used shall be acceptable to the code authority having jurisdiction and shall maintain the fire integrity of the wall, floor, or ceiling.

3.2 CABLE IDENTIFICATION:

A. Cable tags containing a unique cable ID designator shall be placed on both ends of all cables, 6 inches from the connector and /or termination blocks. Also label all backbone cables passing through telecommunications rooms. Each label shall be pre-printed with the appropriate cable number as indicated. Hand written cable labels are not acceptable.

B. Individual station outlets shall be labeled with the designator of the cables terminated at that particular outlet.

C. If at any time during the job the cable tag becomes illegible or removed for whatever reason, the Contractor shall immediately replace it with a duplicate pre-printed cable tag at the Contractor's expense.

D. Labeling sequence to be determined by the Owner and to be followed by the contractor.

3.3 TELECOMMUNICATION ROOMS:

A. Provide plywood backboards where indicated on the plans. Backboards to be 3/4" AC fire rated plywood, 8' tall, width as indicated on the drawings.

3.4 TERMINATION HARDWARE

A. Quantities of termination blocks, racks, splice enclosures, and patch panels, etc. shown on drawings are illustrative only and are meant to indicate the general configuration of the work. The Contractor is responsible for providing the correct quantities of termination hardware required to terminate, patch, cross connect, etc. the volume of cable described herein and shown on the drawings. Rack quantities shall be no less than what is shown on the drawings.

B. At all times during the construction, the Contractor shall protect the equipment from damage and theft. Equipment shall not be installed until such time as other trades have completed their work in the area.

3.5 CABLE TERMINATION:

A. Fiber optic cables: After dressing the fiber to its final destination, sheath shall be removed to a point that allows the fibers to be splayed and terminated in a neat and uniform fashion. At this point all fiber strands will be terminated in strict compliance with the manufacturer's instructions.

B. Twisted pair metallic cables: After dressing cable to its final location the sheath shall be removed to a point that allows the conductors to be splayed and terminated in a neat and uniform fashion. Every effort must be made to maintain sheath integrity by removing only as much as is practical to accomplish termination. Cable pair twist shall be maintained up to the point of termination. Under no circumstances shall cable pairs be untwisted or otherwise altered prior to termination.

3.6 CROSS -CONNECT:

A. Twisted pair metallic cable: Perform all necessary cross-connect and patches as indicated in these specifications. Utilize cross-connect wire, and 25 pair cable as necessary. Cut all cross-connect wire to length, leaving enough slack to form a "3-finger loop". After completion of work, dress patch cords and cross-connect wire in cable management apparatus. Do not tie-wrap cross-connect wires into bundles.

B. NEED LIST OF PATCH CABLE LENGTHS AND QUANTITY FROM ERIK

3.7 GROUNDING:

A. All metallic cable tray, ladder rack, raceways, cable sheath/armor, enclosures, and equipment racks and other conductive surfaces shall be properly bonded to the grounding system. All paint and other coatings shall be removed at all contact surfaces to ensure proper ground.

B. Furnish and install an insulated # 6 copper ground wire from all telecommunication rooms to the main building electrical ground point in the main electrical room. Drawing notes indicating a larger size shall take precedence.

C. All grounding shall be in compliance with the NEC code Article 800, Article 250, well as EIA/TIA standard 607.

3.8 CABLE TESTING:

A. Copper

1. Visually inspect all cables, cable reels, and shipping cartons to detect cable damage incurred during shipping and transport. Return visibly damaged items to the manufacturer.
2. Conduct cable testing as described below upon completion of installation. Test fully completed systems only. Piecemeal testing is not acceptable, except by prior written approval from the Architect.
3. After terminating both ends, but before any cross connects are installed, test all UTP voice and data station cables for attenuation and for near-end cross talk (NEXT) to □ 100 □ 250 □ Mhz. Test all UTP backbone cable for cable pair/conductor continuity, ground fault, proper cross-connect, shorts and crossed pairs.

B. Fiber

1. Visually inspect all fiber, fiber reels, and shipping cartons to detect cable damage incurred during shipping and transport. Return visibly damaged items to the manufacturer.
2. Conduct fiber testing as described below upon completion of installation. Test fully completed systems only. Piecemeal testing is not acceptable, except by prior written approval from the Architect.
3. After installation of connectors, visually inspect each fiber end-face at 10X magnification. Refinish fibers with visible defects and/or sariations in the core area.
4. Perform end-to end, bi-directional attenuation (loss) test for each fiber strand at 850nm and 1300nm wave lengths. Conduct tests in accordance with EIA/TIA-526-14, method B and with test instrument manufacturers printed instructions.
5. Demonstrate that measured link loss does not exceed the "worst case" allowable loss which is the sum of: the connectors loss (based on the number of mated connector pairs at the EIA/TIA-568 maximum allowable loss of 1.0

db per mated pair) and the optical fiber loss (based on the EIA/TIA-568 maximum allowable loss of 3.75 db/km @ 850nm and 1.5dB/km @ 1300nm).

6. Strands whose measured attenuation falls outside the acceptable range shall be subject to further inspection and testing to determine the nature of the fault. At a minimum, an OTDR shall be used to determine the true loss for each connector pair, the exact length of the fiber, and to identify the presence of any core damage.
7. Faults related to connectorization shall be corrected, and the fiber re-tested as stated in the paragraph above until acceptable attenuation measurements are recorded.
8. Where defects are found to be inherent in the fiber itself, fiber must be removed and replaced. Also replace any cable having fewer than the manufactures guaranteed number of serviceable fibers.
9. Remove all defective cables from pathways system. Do not abandon cables in place.
10. The Architect reserves the right to observe the conduct of any or all portions of the testing process.
11. The Architect further reserves the right to conduct, using Contractor equipment and labor, a random re-test of up to five percent (5%) of the cable plant to confirm documented test results.
12. All test results and corrective procedures are to be documented and submitted to the Owner within fourteen (14) working days of test completion.

3.9 ACCEPTANCE:

A. Upon receipt of the Contractor's documentation of cable testing, the Architect will review the installation and may request a test in his presence, of up to 1% of the cables/wires installed.

END OF SECTION

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DIVISION 31 – EARTHWORK:

31 1000	Site Clearing
31 2000	Earth Moving
31 2319	Dewatering
31 2500	Erosion and Sedimentation Control

SECTION 31 10 00 – SITE CLEARING

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes:

1. Protecting existing vegetation to remain.
2. Removing existing vegetation.
3. Clearing and grubbing.
4. Stripping and stockpiling topsoil.
5. Removing above- and below-grade site improvements.
6. Disconnecting and capping or sealing site utilities.

1.2 MATERIAL OWNERSHIP

A. Except for stripped topsoil or other materials indicated to remain Owner's property, cleared materials shall become Contractor's property and shall be removed from Project site.

1.3 PROJECT CONDITIONS

A. Traffic: Minimize interference with adjoining roads, streets, walks, and other adjacent occupied or used facilities during site-clearing operations.

1. Do not close or obstruct streets, walks, or other adjacent occupied or used facilities without permission from Owner and authorities having jurisdiction.
2. Provide alternate routes around closed or obstructed traffic ways if required by authorities having jurisdiction.

B. Salvageable Improvements: Carefully remove items indicated to be salvaged and store on Owner's premises where indicated.

C. Utility Locator Service: Notify utility locator service for area where Project is located before site clearing.

D. Do not commence site-clearing operations until temporary erosion and sedimentation control measures are in place. See Division 31 Section "Erosion and Sedimentation Control (Includes SWPPP)."

PART 2 - PRODUCTS

2.1 SOIL MATERIALS

A. Satisfactory Soil Materials: Requirements for satisfactory soil materials are specified in Division 31 Section "Earth Moving."

1. Obtain approved borrow soil materials off-site when satisfactory soil materials are not available on-site.

PART 3 - EXECUTION

3.1 PREPARATION

A. Protect and maintain benchmarks and survey control points from disturbance during construction.

B. Locate and clearly flag trees and vegetation to remain or to be relocated.

C. Protect existing site improvements to remain from damage during construction.

1. Restore damaged improvements to their original condition, as acceptable to Owner.

3.2 TEMPORARY EROSION AND SEDIMENTATION CONTROL

A. Refer to Division 31 Section "Erosion and Sedimentation Controls."

3.3 TREE PROTECTION

A. Erect and maintain temporary fencing around tree protection zones before starting site clearing. Remove fence when construction is complete.

B. Do not excavate within tree protection zones, unless otherwise indicated.

C. Repair or replace trees and vegetation indicated to remain that are damaged by construction operations, in a manner approved by the Owner's Representative.

3.4 UTILITIES

A. Locate, identify, disconnect, and seal or cap off utilities indicated to be removed.

1. Arrange with utility companies to shut off indicated utilities.

B. Existing Utilities: Do not interrupt utilities serving facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary utility services according to requirements indicated:

1. Notify Owner's Representative not less than two days in advance of proposed utility interruptions.
2. Do not proceed with utility interruptions without written permission of Owner's Representative.

3.5 CLEARING AND GRUBBING

A. Fill depressions caused by clearing and grubbing operations with satisfactory soil material unless further excavation or earthwork is indicated.

1. Place fill material in horizontal layers not exceeding a loose depth of 8 inches (200 mm), and compact each layer to a density of 98 percent standard proctor.

3.6 TOPSOIL STRIPPING

A. Remove sod and grass before stripping topsoil.

B. Strip topsoil to whatever depths are encountered in a manner to prevent intermingling with underlying subsoil or other waste materials.

3.7 SITE IMPROVEMENTS

A. Remove existing above- and below-grade improvements as indicated and as necessary to facilitate new construction.

3.8 DISPOSAL

A. Disposal: Remove surplus soil material, unsuitable topsoil, obstructions, demolished materials, and waste materials including trash and debris, and legally dispose of them off Owner's property.

1. Submit schedule for recycling operations (if any) and obtain approval in writing from Owner's Representative. Separate recyclable materials produced during site clearing from other non-recyclable materials. Store or stockpile without intermixing with other materials and transport them to recycling facilities.

3.9 FIELD QUALITY CONTROL

A. Testing Agency: Owner will engage a qualified independent geotechnical engineering testing agency to witness filling operations of depressions caused by clearing and grubbing. Coordinate scheduled filling operations with the Owner's testing agency.

END OF SECTION 31 10 00

SECTION 31 20 00 – EARTH MOVING

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes:

1. Preparing subgrades for slabs-on-grade, walks, pavements, lawns and grasses, and exterior plants.
2. Excavating and backfilling for buildings and structures.
3. Drainage course for slabs-on-grade.
4. Subbase course for concrete walks and pavements.
5. Subbase and base course for asphalt paving.
6. Excavating and backfilling for utility trenches.

1.2 SUBMITTALS

A. Regional and recycled content if applicable.

1.3 DEFINITIONS

A. Backfill: Soil material used to fill an excavation.

1. Initial Backfill: Backfill placed beside and over pipe in a trench, including haunches to support sides of pipe.
2. Final Backfill: Backfill placed over initial backfill to fill a trench.

B. Base Course: Course placed between the subbase course and hot-mix asphalt paving.

C. Bedding Course: Course placed over the excavated subgrade in a trench before laying pipe.

D. Borrow Soil: Satisfactory soil imported from off-site or on site borrow pit for use as fill or backfill.

E. Drainage Course: Course supporting the slab-on-grade that also minimizes upward capillary flow of pore water.

F. Excavation: Removal of material encountered above subgrade elevations and to lines and dimensions indicated.

1. Authorized Additional Excavation: Excavation below subgrade elevations or beyond indicated lines and dimensions as directed by Owner's Representative. Authorized additional excavation and replacement material will be paid for according to Contract provisions changes in the Work.
2. Unauthorized Excavation: Excavation below subgrade elevations or beyond indicated lines and dimensions without direction by Owner's Representative. Unauthorized excavation, as well as remedial work directed by Owner's Representative, shall be without additional compensation.

G. Fill: Soil materials used to raise existing grades.

H. Structures: Buildings, footings, foundations, retaining walls, slabs, tanks, curbs, mechanical and electrical appurtenances, or other man-made stationary features constructed above or below the ground surface.

I. Subbase Course: Course placed between the subgrade and base course for hot-mix asphalt pavement, or course placed between the subgrade and a cement concrete pavement or a cement concrete or hot-mix asphalt walk.

J. Subgrade: Surface or elevation remaining after completing excavation, or top surface of a fill or backfill immediately below subbase, drainage fill, or topsoil materials.

K. Utilities: On-site underground pipes, conduits, ducts, and cables, as well as underground services within buildings.

1.4 QUALITY ASSURANCE

A. Imported (borrow) soil must be tested and certified, by the Owner's testing agency, as suitable material, free of any environmental contaminates. Coordinate imported materials and their source with Division 31 Section "Erosion and Sedimentation Control". The Contractor will be liable for any and all clean-up costs associated with unapproved, imported materials.

1.5 PROJECT CONDITIONS

A. Existing Utilities: Do not interrupt utilities serving facilities occupied by Owner or others unless permitted in writing by the Owner's Representative and then only after arranging to provide temporary utility services according to requirements indicated.

PART 2 - PRODUCTS

2.1 SOIL MATERIALS

A. General: Provide borrow soil materials when sufficient satisfactory soil materials are not available from excavations.

B. Provide ASTM D 2487 or AASHTO M 145 classified soil materials according to geotechnical engineer's written recommendations in Division 00 Section "Geotechnical Data."

C. Satisfactory Soils: Provide regionally extracted soils and materials. Recommended materials free of rock or gravel larger than 4 inches in any dimension, debris, waste, frozen materials, vegetation, and other deleterious matter.

1. Satisfactory soils not maintained within 2 percent of optimum moisture content at time of compaction will be considered unsatisfactory soil materials.

D. Provide granular soils materials regionally extracted according to the project soils report, local department of transportation (DOT) regulations or as follows (the project soils report takes precedence):

1. Subbase Material: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand; ASTM D 2940; with at least 90 percent passing a 1-1/2-inch (37.5-mm) sieve and not more than 12 percent passing a No. 200 (0.075-mm) sieve.
2. Base Course: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand; ASTM D 2940; with at least 95 percent passing a 1-1/2-inch (37.5-mm) sieve and not more than 8 percent passing a No. 200 (0.075-mm) sieve.
3. Engineered Fill: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand; ASTM D 2940; with at least 90 percent passing a 1-1/2-inch (37.5-mm) sieve and not more than 12 percent passing a No. 200 (0.075-mm) sieve.
4. Bedding Course: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand; ASTM D 2940; except with 100 percent passing a 1-inch (25-mm) sieve and not more than 8 percent passing a No. 200 (0.075-mm) sieve.
5. Drainage Course: Narrowly graded mixture of washed crushed stone, or crushed or uncrushed gravel; ASTM D 448; coarse-aggregate grading Size 57; with 100 percent passing a 1-1/2-inch (37.5-mm) sieve and 0 to 5 percent passing a No. 8 (2.36-mm) sieve.

2.2 ACCESSORIES

A. Warning Tape: Acid- and alkali-resistant polyethylene film warning tape manufactured for marking and identifying underground utilities, 6 inches (150 mm) wide and 4 mils (0.1 mm) thick, continuously inscribed with a description of the utility.

PART 3 - EXECUTION

3.1 PREPARATION

A. Comply with geotechnical engineer's written recommendations in Division 00 Section "Geotechnical Data."

B. Protect structures, utilities, sidewalks, pavements, and other facilities from damage caused by settlement, lateral movement, undermining, washout, and other hazards created by earthwork operations.

C. Preparation of subgrade is specified in Division 31 Section "Site Clearing."

D. Protect and maintain erosion and sedimentation controls, which are specified in Division 31 Section "Erosion and Sedimentation Control" during earthwork operations.

3.2 EXCAVATION

A. Unclassified Excavation: Excavate to subgrade elevations regardless of the character of surface and subsurface conditions encountered. No changes in the Contract Sum or the Contract Time will be authorized except for rock excavation or removal of obstructions not specifically indicated in the Contract Documents.

1. If excavated materials intended for fill and backfill include unsatisfactory soil materials and rock, replace with satisfactory soil materials.
2. Authorized additional excavation and replacement material will be paid for according to Contract provisions as specified in Division 00 Section "General Conditions."

B. Excavation for Structures: Excavate to indicated elevations and dimensions within a tolerance of plus or minus 1 inch (25 mm). If applicable, extend excavations a sufficient distance from structures for placing and removing concrete formwork, for installing services and other construction, and for inspections

C. Excavation for Walks and Pavements: Excavate surfaces under walks and pavements to indicated lines, cross sections, elevations, and subgrades.

D. Excavation for Utility Trenches: Excavate trenches to indicated gradients, lines, depths, and elevations or as required by authorities having jurisdiction.

1. Trench Width: Provide a clearance of 12 inches (300 mm) on each side of pipe or conduit. Excavate trench walls vertically from trench bottom to 12 inches (300 mm) higher than top of pipe or conduit, unless otherwise indicated.
2. Trench Bottoms: Provide uniform bearing and support of pipes and conduit. Shape subgrade to provide continuous support for bells, joints, and barrels of pipes and for joints, fittings, and bodies of conduits. Remove projecting stones and sharp objects along trench subgrade.

    a. Excavate trenches 6 inches (150 mm) deeper than elevation required in rock or other unyielding bearing material, 4 inches (100 mm) deeper elsewhere, to allow for bedding course as required by authorities having jurisdiction.

3.3 SUBGRADE INSPECTION

A. Proof-roll subgrade below the building slabs and pavements with heavy pneumatic-tired equipment to identify soft pockets and areas of excess yielding. Do not proof-roll wet or saturated subgrades. Proof-roll in presence of Owner's testing agency.

B. Reconstruct subgrades damaged by freezing temperatures, frost, rain, accumulated water, or construction activities, as directed by Owner's testing agency, without additional compensation.

3.4 UNAUTHORIZED EXCAVATION

A. Fill unauthorized excavation under foundations, wall footings, utility pipe, or other construction as approved by the Owner's testing agency.

3.5 STORAGE OF SOIL MATERIALS

A. Stockpile borrow soil materials and excavated satisfactory soil materials without intermixing that will be reused on the site, if site area permits. Place, grade, and shape stockpiles to drain surface water. Cover or temporarily stabilize as specified in Division 31 Section "Erosion and Sedimentation Control."

1. Stockpile soil materials away from edge of excavations. Do not store within drip line of remaining trees.

3.6 UTILITY TRENCH BACKFILL

A. General: Backfill trenches as indicated on Drawings.

B. Place backfill on subgrades free of mud, frost, snow, or ice.

C. Place and compact bedding course on trench bottoms and where indicated. Shape bedding course to provide continuous support for bells, joints, and barrels of pipes and for joints, fittings, and bodies of conduits.

D. Backfill trenches excavated under footings and within 18 inches (450 mm) of bottom of footings with satisfactory soil; fill with concrete to elevation of bottom of footings. Concrete is specified in Division 03 Section "Cast-in-Place Structural Concrete."

E. Provide concrete encasement for piping or conduit less than 24 inches (610 mm) below surface of roadways only when indicated on the Drawings or as required by authorities having jurisdiction.

F. Place and compact initial backfill of subbase material or satisfactory soil.

1. Carefully compact initial backfill under pipe haunches and compact evenly up on both sides and along the full length of utility piping or conduit to avoid damage or displacement of piping or conduit. Coordinate backfilling with utilities testing and Owner's testing agency.

G. Place and compact final backfill as indicated on Drawings to final subgrade elevation.

H. Install warning tape directly above utilities, 12 inches (300 mm) below finished grade, except 6 inches (150 mm) below subgrade under pavements and slabs.

3.7 SOIL FILL

A. Plow, scarify, bench, or break up sloped surfaces steeper than 1 vertical to 4 horizontal so fill material will bond with existing material.

B. Place and compact fill material in layers to required elevations. Comply geotechnical engineer's written recommendations in Division 00 Section "Geotechnical Data."

3.8 SOIL MOISTURE CONTROL

A. Uniformly moisten or aerate subgrade and each subsequent fill or backfill soil layer before compaction to within 2 percent of optimum moisture content or as directed by Owner's Testing Agency.

1. Do not place backfill or fill soil material on surfaces that are muddy, frozen, or contain frost or ice.
2. Remove and replace, or scarify and air dry, at no additional cost to the Owner, otherwise satisfactory soil material that exceeds optimum moisture content by 2 percent and is too wet to compact to specified dry unit weight. See Division 31 Section "Dewatering"

3.9 COMPACTION OF SOIL BACKFILLS AND FILLS

A. Place backfill and fill soil materials in layers not more than 8 inches (200 mm) in loose depth for material compacted by heavy compaction equipment, and not more than 4 inches (100 mm) in loose depth for material compacted by hand-operated tampers.

B. Place backfill and fill soil materials evenly on all sides of structures to required elevations, and uniformly along the full length of each structure.

C. Compact soil materials to not less than the following percentages of maximum dry unit weight according to ASTM D 698, Standard Proctor:

1. Under structures, building slabs, future expansion areas, steps, walkways, and pavements, scarify and recompact top 8 inches (203 mm) of existing subgrade and each layer of backfill or fill soil material at 98 percent.
2. Under lawn or unpaved areas, scarify and recompact top 6 inches (150 mm) below subgrade and compact each layer of backfill or fill soil material at 85 percent.

3.10 GRADING

A. General: Uniformly grade areas to a smooth surface, free of irregular surface changes. Comply with compaction requirements and grade to cross sections, lines, and elevations indicated.

B. Site Grading: Slope grades to direct water away from buildings and to prevent ponding. Finish subgrades to required elevations within the following tolerances:

1. Lawns, Unpaved Areas, and Walks: Plus or minus 1 inch (25 mm).
2. Pavements: Plus or minus 1/2 inch (13 mm).

C. Grading inside Building Lines: Finish subgrade to a tolerance of 1/2 inch (13 mm) when tested with a 10-foot (3-m) straightedge.

3.11 SUBBASE AND BASE COURSES

A. Place subbase and base course on subgrades free of mud, frost, snow, or ice.

B. On prepared subgrade, place subbase and base course under pavements and walks as follows:

1. Shape subbase and base course to required crown elevations and cross-slope grades.
2. Compact subbase and base course at optimum moisture content to required grades, lines, cross sections, and thickness to not less than 98 percent of maximum dry unit weight according to ASTM D 698, Standard Proctor.

3.12 DRAINAGE COURSE

A. Place drainage course on subgrades free of mud, frost, snow, or ice.

B. On prepared subgrade, place and compact drainage course under cast-in-place concrete slabs-on-grade as follows:

1. Place drainage course that exceeds 6 inches (150 mm) in compacted thickness in layers of equal thickness, with no compacted layer more than 6 inches (150 mm) thick or less than 3 inches (75 mm) thick.
2. Compact each layer of drainage course to required cross sections and thicknesses to not less than 98 percent of maximum dry unit weight according to ASTM D 698.

3.13 FIELD QUALITY CONTROL

A. Testing Agency: Owner will engage a qualified independent geotechnical engineering testing agency to perform field quality-control testing. Coordinate scheduled earth moving work with the Owner's testing agency.

B. Allow testing agency to inspect and test subgrades and each fill or backfill layer. Proceed with subsequent earthwork only after test results for previously completed work comply with requirements.

C. Footing Subgrade: At footing subgrades, at least one test of each soil stratum will be performed to verify design bearing capacities. Subsequent verification and approval of other footing subgrades may be based on a visual comparison of subgrade with tested subgrade when approved by the Owner's testing agency.

D. Testing agency will test compaction of soils in place according to ASTM D 1556, ASTM D 2167, ASTM D 2922, and ASTM D 2937, as applicable.

E. Provide other field tests, such as bearing ratio of subgrades, subbases, and bases for paving, as required by authorities having jurisdiction.

F. When testing agency reports that subgrades, fills, or backfills have not achieved degree of compaction specified, scarify and moisten or aerate, or remove and replace soil to depth required; recompact and retest, at the Contractor's cost, until specified compaction is obtained.

3.14 PROTECTION

A. Protecting Graded Areas: Protect newly graded areas from traffic, freezing, and erosion. Keep free of trash and debris.

B. Repair and reestablish grades to specified tolerances where completed or partially completed surfaces become eroded, rutted, settled, or where they lose compaction due to subsequent construction operations or weather conditions.

C. Where settling occurs before Project warranty period elapses, remove finished surfacing, backfill with additional soil material, compact, and reconstruct surfacing.

3.15 DISPOSAL OF SURPLUS AND WASTE MATERIALS

A. Disposal: Remove surplus satisfactory soil and waste material, including unsatisfactory soil, trash, and debris, and legally dispose of it off Owner's property. Recycle and reuse as much material as possible, see Section 31 1000 – Site Clearing – Item 3.8, A, 1.

END OF SECTION 31 20 00

SECTION 31 23 19 - DEWATERING

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes:

1. Construction dewatering.

1.2 PERFORMANCE REQUIREMENTS

A. Dewatering Performance: Design, furnish, install, test, operate, monitor, and maintain dewatering system of sufficient scope, size, and capacity to control hydrostatic pressures and to lower, control, remove, and dispose of ground water and permit excavation and construction to proceed on dry, stable subgrades. Coordinate work with Division 31 Section "Erosion and Sedimentation Control (Includes SWPPP)."

1.3 QUALITY ASSURANCE

A. Regulatory Requirements: Comply with governing EPA notification regulations before beginning dewatering. Comply with hauling and disposal regulations of authorities having jurisdiction.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 INSTALLATION

A. Provide temporary grading to facilitate dewatering and control of surface water.

B. Monitor dewatering systems continuously.

C. Protect and maintain temporary erosion and sedimentation controls, which are specified in Division 31 Section "Erosion and Sedimentation Control (Includes SWPPP)" during dewatering operations.

D. Install dewatering system utilizing wells, well points, or similar methods complete with pump equipment, standby power and pumps, filter material gradation, valves, appurtenances, water disposal, and surface-water controls.

E. Before excavating below ground-water level, place system into operation to lower water to specified levels. Operate system continuously until drains, sewers, and structures have been constructed and fill materials have been placed or until dewatering is no longer required.

F. Provide an adequate system to lower and control ground water to permit excavation, construction of structures, and placement of fill materials on dry subgrades. Install sufficient dewatering equipment to drain water-bearing strata above and below bottom of foundations, drains, sewers, and other excavations.

1. Do not permit open-sump pumping that leads to loss of fines, soil piping, subgrade softening, and slope instability.

G. Reduce hydrostatic head in water-bearing strata below subgrade elevations of foundations, drains, sewers, and other excavations.

1. Maintain piezometric water level a minimum of 24 inches (600 mm) below surface of excavation.

H. Dispose of water in a manner consistant with requirements in Division 31 Section "Erosion and Sedimentation Control (Includes SWPPP)."

I. Provide standby equipment on site, installed and available for immediate operation, to maintain dewatering on continuous basis if any part of system becomes inadequate or fails. If dewatering requirements are not satisfied due to inadequacy or failure of dewatering system, restore damaged structures and foundation soils at no additional expense to Owner.

1. Remove dewatering system from Project site on completion of dewatering. Plug or fill well holes with sand or cut off and cap wells a minimum of 36 inches (900 mm) below overlying construction.

END OF SECTION 31 23 19

SECTION 31 25 00 - EROSION AND SEDIMENTATION CONTROL

PART 1 - GENERAL

1.1 QUALITY ASSURANCE

A. Preinstallation Conference: Conduct conference at Project site with applicable subcontractors, the civil engineer of record, the Owner's Representative, and any applicable governing officials.

1.2 PROJECT CONDITIONS

A. Traffic: Minimize interference with adjoining roads, streets, walks, and other adjacent occupied facilities when installing erosion controls. Coordinate all measures with applicable government authorities having jurisdiction over the connecting, adjacent, or surrounding roadways.

B. Utility Locator Service: Notify utility locator service for area where Project is located before installing erosion or sediment control measures.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Seed, sod, and or ground covers as indicated on the Drawings.

B. Erosion/Sediment control devices or Best Management Practices as indicated on the Drawings

PART 3 - EXECUTION

3.1 PREPARATION

3.2 IMPLEMENTATION AND DOCUMENTATION

A. Inspect, repair, and maintain erosion and sedimentation control measures, during construction until permanent vegetation has been established.

B. Update, maintain, alter, or add temporary erosion and sediment controls in conjunction with the ongoing earthwork activities as required for the Project.

C. The Owner's Representative has the right and authority to limit earth-moving activities and to direct the Contractor to immediately provide permanent or temporary pollution control measures.

D. Install permanent erosion measures such as pavement and lawn areas as soon as practically possible to minimize temporary pollution control measures.

Remove erosion and sedimentation controls and restore and stabilize areas disturbed during removal.

END SECTION 31 25 00

DIVISION 32 – EXTERIOR IMPROVEMENTS

32 1216	Asphalt Paving
32 1313	Concrete Paving
32 1373	Concrete Pavement Joint Sealant
32 1700	Paving Specialties
32 8400	Irrigation System
32 9000	Planting

SECTION 32 12 16 - ASPHALT PAVING

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes

1. Hot-mix asphalt paving.
2. Pavement Marking

1.2 SUBMITTALS

A. Job-Mix Designs: Certification, by authorities having jurisdiction, of approval of each job mix proposed for the Work.

B. Material Certificates: For each paving material, from manufacturer.

1.3 QUALITY ASSURANCE

A. Manufacturer Qualifications: Manufacturer shall be registered with and approved by authorities having jurisdiction or the DOT of the state in which Project is located.

B. Regulatory Requirements: Comply with state or local DOT for asphalt paving work.

C. Asphalt-Paving Publication: Comply with AI MS-22, "Construction of Hot Mix Asphalt Pavements," unless more stringent requirements are indicated.

1.4 PROJECT CONDITIONS

A. Environmental Limitations: Do not apply asphalt materials if subgrade is wet or excessively damp or if the following conditions are not met:

1. Tack Coat: Minimum surface temperature per requirements of asphalt course.
2. Asphalt Base and Surface Course: Minimum surface temperature of 40 deg F (4.4 deg C) and rising at time of placement.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Use locally available materials and gradations which exhibit a satisfactory record of previous installations.

B. Base Course Aggregate: Sound, non-expansive angular crushed stone, crushed gravel, or crushed slag, sand, stone or slag screenings, 1" Gradation.

0. Uncrushed gravel may be used in base course mixture if required to suit local material availability.

C. 1" Gradation Table

Sieve Size	Ideal Gradation (Percent Passing)	Ideal Gradation Tolerance (Percent)
1"	100	
1/2"	85	+/- 6
No. 4	55	+/- 6
No. 16	31	+/- 4
No. 50	19	+/- 4
No. 200	9	+/- 2

D. Asphaltic Concrete: All materials used in the asphaltic concrete paving work shall be obtained from the same source and/or manufacturer throughout the entirety of the project.

E. The aggregate for the asphaltic concrete shall consist of crushed stone or gravel (slag of any type will not be permitted) meeting the requirements of ASTM D-448 for coarse aggregate, ASTM D-1073 for fine aggregate and ASTM D-242 for mineral filler.

1. The gradation of the crushed aggregate shall be a mixture of coarse aggregate, retained on a No. 8 sieve, fine aggregate, passing a No. 8 sieve and mineral filler passing the No. 200 sieve conforming to the following "Master Job Mix Formula".

MASTER JOB MIX FORMULA		
Sieve Size	Percent Passing By Weight	Job Mix Tolerances
1/2"	100	±0
No. 4	70	±10
No. 16	37	±7
No. 50	17	±6
No. 200	7	±2

2. Local or State Highway department specifications closely conforming to the above "Master Job Mix Formula" and approved by the Soils Engineer may be substituted; however, job mix tolerances shall be maintained.
3. Maximum aggregate size shall be no greater than one-half of the design thickness of the binder or wearing course. Gradation percentages shall closely parallel the median wherever possible.

C. Asphalt cement for asphaltic concrete mixture shall be Penetration Grade 60-70 or 85-100 conforming to AASHTO designation M20 or Viscosity Grade AC-20 conforming to AASHTO designation M-226.

1. Mix shall contain 4.5% to 7% by weight of mixture of asphalt cement.

D. Asphalt for tack coat shall be slow setting emulsified asphalt SS-1 or SS-1h conforming to AASHTO designation M-140.

2.2 MIXES

A. Hot-Mix Asphalt: Dense, hot-laid, hot-mix asphalt plant mixes approved by authorities having jurisdiction; designed according to procedures in AI MS-2, "Mix Design Methods for Asphalt Concrete and Other Hot-Mix Types"; and complying with the following requirements:

1. Plant mixed asphaltic concrete mixture shall meet the following requirements when tested by the Marshall Method, ASTM D-1559. The requirements are based on the asphaltic concrete being compacted with 50 blows and tested at 140 degrees F.

Physical Test	Binder Course
Stability (min.)	1500 psi
Flow (1/100")	6 - 18

Total Voids (%) 2 - 5

2. Asphalt cement content shall be 4.5 - 7.0 percent by weight of total mix. Upper limit may be raised when using absorbent aggregate.

   A. Optimum asphalt cement content shall be determined by the Marshall Method test property curve. The amount of asphalt cement shall be selected to meet specified stability and flow requirements. A 1% tolerance in air voids is permitted.

   B. Use dry material to avoid foaming. Mix uniformly and thoroughly.

PART 3 - EXECUTION

3.1 COLD MILLING

A. Clean existing pavement surface of loose and deleterious material immediately before cold milling. Remove existing asphalt pavement by cold milling to grades and cross sections indicated.

3.2 PATCHING

A. Hot-Mix Asphalt Pavement: Saw cut perimeter of patch and excavate existing pavement section to sound base. Excavate rectangular or trapezoidal patches, extending 12 inches (300 mm) into adjacent sound pavement, unless otherwise indicated. Cut excavation faces vertically. Remove excavated material. Recompact existing unbound-aggregate base course to form new subgrade.

B. Tack Coat: Apply uniformly to vertical surfaces abutting or projecting into new, hot-mix asphalt paving at a rate of 0.05 to 0.15 gal./sq. yd. (0.2 to 0.7 L/sq. m).

C. Patching: Fill excavated pavements with hot-mix asphalt base mix and, while still hot, compact flush with adjacent surface.

3.3 SURFACE PREPARATION

A. Proof-roll subbase as specified in Division 31 Section "Earth Moving."

B. General: Immediately before placing asphalt materials, remove loose and deleterious material from substrate surfaces. Ensure that prepared subgrade is ready to receive paving.

C. Herbicide Treatment: Apply herbicide according to manufacturer's recommended rates and written application instructions. Apply to dry, prepared subgrade or surface of compacted-aggregate base before applying paving materials.

D. Tack Coat: Apply when overlaying existing pavement, on adjacent horizontal surfaces such as curbs, and between base and surface courses when the two courses are not installed in a continuous installation.

1. Apply at a rate of 0.05 to 0.15 gal./sq. yd. (0.2 to 0.7 L/sq. m).
2. Avoid smearing or staining adjoining surfaces, appurtenances, and surroundings. Remove spillages and clean affected surfaces.

3.4 HOT-MIX ASPHALT PLACING

A. Machine place hot-mix asphalt on prepared surface, spread uniformly, and strike off. Place asphalt mix by hand to areas inaccessible to equipment in a manner that prevents segregation of mix. Place each course to required grade, cross section, and thickness when compacted.

1. Spread mix at minimum temperature of 250 deg F (121 deg C).
2. Regulate paver machine speed to obtain smooth, continuous surface free of pulls and tears in asphalt-paving mat.

B. Place paving in consecutive strips not less than 10 feet (3 m) wide unless infill edge strips of a lesser width are required.

C. Promptly correct surface irregularities in paving course behind paver. Use suitable hand tools to remove excess material forming high spots. Fill depressions with hot-mix asphalt to prevent segregation of mix; use suitable hand tools to smooth surface.

3.5 JOINTS

A. Construct joints to ensure a continuous bond between adjoining paving sections. Construct joints free of depressions, with same texture and smoothness as other sections of hot-mix asphalt course.

3.6 COMPACTION

A. General: Begin compaction as soon as placed hot-mix paving will bear roller weight without excessive displacement. Compact hot-mix paving with hot, hand tampers or with vibratory-plate compactors in areas inaccessible to rollers.

1. Complete compaction before mix temperature cools to 185 deg F (85 deg C).
2. Install and compact longitudinal joints to achieve a uniform density of pavement.

B. Breakdown Rolling: Complete breakdown or initial rolling immediately after rolling joints and outside edge. Examine surface immediately after breakdown rolling for indicated crown, grade, and smoothness. Correct laydown and rolling operations to comply with requirements.

C. Intermediate Rolling: Begin intermediate rolling immediately after breakdown rolling while hot-mix asphalt is still hot enough to achieve specified density. Continue rolling until hot-mix asphalt course has been uniformly compacted to the following density:

1. Average Density: 92 percent of reference maximum theoretical density according to ASTM D 2041, but not less than 90 percent nor greater than 96 percent.

D. Finish Rolling: Finish roll paved surfaces to remove roller marks while hot-mix asphalt is still warm.

E. Edge Shaping: While surface is being compacted and finished, trim edges of pavement to proper alignment. Bevel edges while asphalt is still hot; compact thoroughly.

F. Protection: After final rolling, do not permit vehicular traffic on pavement until it has cooled and hardened.

G. Erect barricades to protect paving from traffic until mixture has cooled enough not to become marked.

3.7 INSTALLATION TOLERANCES

A. Pavement Thickness: Compact each course to produce the thickness indicated within the following tolerances:

1. Base Course: Plus or minus 1/2 inch (13 mm).
2. Surface Course: Plus 1/4 inch (6 mm), no minus.

B. Pavement Surface Smoothness: Compact each course to produce a surface smoothness within the following tolerances as determined by using a 10-foot (3-m) straightedge applied transversely or longitudinally to paved areas:

1. Base Course: 1/4 inch (6 mm).
2. Surface Course: 1/8 inch (3 mm).

3.8 FIELD QUALITY CONTROL

A. Testing Agency: Owner will engage a qualified testing agency to perform tests and inspections. Coordinate Work with the Owner's testing agency.

B. Replace and compact hot-mix asphalt where core tests were taken.

C. Additional testing and inspection work to correct or repair unsatisfactory work will be at the expense of the Contractor.

D. Remove and replace or install additional hot-mix asphalt, at the Contractor's expense, where test results or measurements indicate that it does not comply with specified requirements.

3.9 DISPOSAL

A. Except for material indicated to be recycled, remove excavated materials from Project site and legally dispose of them in an EPA-approved landfill.

END OF SECTION 32 12 16

SECTION 32 13 13 - CONCRETE PAVING

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes:

1. Exterior cement concrete pavement for the following:

a. Parking lots.
b. Curbs and gutters.
c. Walkways.
d. Concrete pads

1.2 SUBMITTALS

A. Product Data: For each type of product indicated.

B. Design Mixtures: For each concrete pavement mixture.

1.3 QUALITY ASSURANCE

A. Manufacturer Qualifications: Manufacturer of ready-mixed concrete products who complies with ASTM C 94/C 94M requirements for production facilities and equipment.

B. ACI Publications: Comply with ACI 301, "Specification for Structural Concrete," unless modified by requirements in the Contract Documents.

PART 2 - PRODUCTS

2.1 STEEL REINFORCEMENT

A. Plain-Steel Welded Wire Reinforcement: ASTM A 185, fabricated from as-drawn steel wire into flat sheets.

B. Deformed-Steel Welded Wire Reinforcement: ASTM A 497, flat sheet.

C. Reinforcing Bars: ASTM A 615/A 615M, Grade 60 (Grade 420); deformed.

D. Plain Steel Wire: ASTM A 82, as drawn.

E. Deformed-Steel Wire: ASTM A 496.

F. Bar Supports: Bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars, welded wire reinforcement, and dowels in place. Manufacture bar supports according to CRSI's "Manual of Standard Practice."

2.2 CONCRETE MATERIALS

A. Cementitious Material: Use the following cementitious materials, of the same type, brand, and source throughout the Project:

1. Portland Cement: ASTM C 150, Type II. Supplement, if desired, with fly ash, ASTM C 618, Class C or F with maximum not to exceed 25% of cement content by weight.

B. Normal Weight Aggregates: ASTM C 33, and as herein specified. Provide aggregates from a single source for exposed concrete.

1. For exterior exposed surfaces, do not use fine or coarse aggregates containing spalling-causing deleterious substances.
2. Fine Aggregates shall comply with the following gradations:

Sieve	Percent passing
3/8"	100
No. 4	95 to 100
No. 16	50 to 85
No. 50	10 to 30
No. 100	2 to 10

3. Course Aggregates shall comply with the following gradations:

Sieve	Percent passing
1-1/2"	100
3/4"	90 to 100
3/8"	25 to 55
No. 4	0 to 10
No. 8	0 to 5
No. 200	Not to exceed 1.75 percent by weight in the combined course and fine aggregate.

C. Air-Entraining Admixture: ASTM C 260.

D. Water-Reducing Admixture: ASTM C-494, Type A.

2.3 RELATED MATERIALS

A. Clear Waterborne Membrane-Forming Curing Compound: ASTM C 309, Type 1, Class B, dissipating.

B. Expansion- and Isolation-Joint-Filler Strips: ASTM D 1751, asphalt-saturated cellulosic fiber not greater than 1/2 inch (13 mm).

2.4 CONCRETE MIXTURES

A. Prepare design mixtures, proportioned according to ACI 301, with the following properties:

1. Compressive Strength (28 Days): 4000 psi.
2. Maximum Water-Cementitious Materials Ratio at Point of Placement: 0.50.
3. Slump Limit: 4-6 inches (100-150 mm) except 8 inches (200 mm) acceptable for concrete having HRWR admixture (super-plasticizer).
4. Air Content: 5.0 to 7.0 percent.

B. Ready-Mixed Concrete: Measure, batch, and mix concrete materials and concrete according to ASTM C 94/C 94M. Furnish batch certificates for each batch discharged and used in the Work.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Proof-roll subbase as specified in Division 31 Section "Earth Moving."

3.2 PAVEMENT SUBBASE COURSE:

A. Place aggregate base course material on prepared subgrade as specified in Division 31 Section “Earth Moving.”

3.3 EDGE FORMS AND SCREED CONSTRUCTION

A. Set, brace, and secure edge forms, bulkheads, and intermediate screed guides for pavement to required lines, grades, and elevations. Install forms to allow continuous progress of work and so forms can remain in place at least 24 hours after concrete placement.

B. Clean forms after each use and coat with form-release agent to ensure separation from concrete without damage.

3.4 STEEL REINFORCEMENT

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

3.5 JOINTS

A. General: Form construction, isolation, and contraction joints and tool edgings true to line with faces perpendicular to surface plane of concrete. Construct transverse joints at right angles to centerline, unless otherwise indicated.

B. Construction Joints: Set construction joints at side and end terminations of pavement and at locations where pavement operations are stopped for more than one-half hour unless pavement terminates at isolation joints.

C. Isolation Joints: Form isolation joints of preformed joint-filler strips abutting concrete curbs, catch basins, manholes, inlets, structures, walks, other fixed objects, and where indicated.

D. Contraction Joints: Sawcut joints, 1/8 inch (3 mm) wide sectioning concrete into areas as indicated. Sawcut contraction joints for a depth equal to at least one-fourth of the concrete thickness.

E. Edging: Tool edges of pavement, gutters, curbs, and joints in concrete after initial floating with an edging tool to a 1/4-inch (6-mm) radius. Repeat tooling of edges after applying surface finishes. Eliminate tool marks on concrete surfaces.

3.6 CONCRETE PLACEMENT

A. Moisten subbase to provide a uniform dampened condition at time concrete is placed.

B. Comply with ACI 301 requirements for measuring, mixing, transporting, and placing concrete.

C. Deposit and spread concrete in a continuous operation between transverse joints. Do not push or drag concrete into place or use vibrators to move concrete into place.

D. Screed pavement surfaces with a straightedge and strike off.

E. Commence initial floating using bull floats or darbies to impart an open textured and uniform surface plane before excess moisture or bleed water appears on the surface. Do not further disturb concrete surfaces before beginning finishing operations or spreading surface treatments.

3.7 FLOAT FINISHING

A. General: Do not add water to concrete surfaces during finishing operations.

B. Float Finish: Begin the second floating operation when bleed-water sheen has disappeared and concrete surface has stiffened sufficiently to permit operations. Float surface with power-driven floats, or by hand floating if area is small or inaccessible to power units. Finish surfaces to true planes. Cut down high spots and fill low spots. Refloat surface immediately to uniform granular texture.

1. Medium-to-Fine-Textured Broom Finish: Draw a soft bristle broom across float-finished concrete surface perpendicular to line of traffic to provide a uniform, fine-line texture.

3.8 CONCRETE PROTECTION AND CURING

A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures.

B. Comply with ACI 306.1 for cold-weather protection.

C. Begin curing after finishing concrete but not before free water has disappeared from concrete surface.

D. Curing Methods: Cure concrete by moisture curing, moisture-retaining-cover curing, curing compound or a combination of these methods.

3.9 PAVEMENT TOLERANCES

A. Comply with tolerances of ACI 117 and as follows:

1. Elevation: 1/4 inch (6 mm).
2. Thickness: Plus 3/8 inch (10 mm), no minus.
3. Surface: Gap below 10-foot- (3-m-) long, unleveled straightedge not to exceed 1/4 inch (6 mm).
4. Joint Spacing: 3 inches (75 mm).
5. Contraction Joint Depth: Plus 1/4 inch (6 mm), no minus.
6. Joint Width: Plus 1/8 inch (3 mm), no minus.

3.10 REPAIRS AND PROTECTION

A. Remove and replace concrete pavement that is broken, damaged, or defective or that does not comply with requirements in this Section.

B. Protect concrete from damage. Exclude traffic from pavement for at least 14 days after placement.

C. Maintain concrete pavement free of stains, discoloration, dirt, and other foreign material. Sweep concrete pavement not more than two days before date scheduled for Substantial Completion inspections.

END OF SECTION 32 13 13

SECTION 32 13 73 - PAVING JOINT SEALANTS

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes:

1. Expansion and contraction joints within pavement, walks and curbs.
2. Joints between cement concrete and asphalt pavement.
3. Joints between concrete or asphalt and building walls, columns or structures.

1.2 SUBMITTALS

A. Product Data: For each joint-sealant product indicated.

B. Samples: For each type and color of joint sealant required.

PART 2 - PRODUCTS

2.1 MATERIALS, GENERAL

A. Compatibility: Provide joint sealants, backing materials, and other related materials that are compatible with one another and with joint substrates under conditions of service and application, as demonstrated by joint-sealant manufacturer based on testing and field experience.

1. Primers: Product recommended by joint-sealant manufacturer where required for adhesion of sealant to joint substrates indicated, as determined from preconstruction joint-sealant-substrate tests and field tests.

2.2 JOINT SEALANTS

A. Sealant for Expansion and Contraction Joints within Cement Concrete Pavement and Between Concrete Walks, Pads, Paving, and Building Walls, Columns, and Structures: Cold applied two-part pourable urethane joint sealant, Type M, Grade P, Class 25, Use T

1. Products:

a. Sonneborn, Div. of ChemRex, Inc.; Sonoborn SL 2
b. Pecora Corporation; Dynatrol II-SG.
c. Tremco; Vulkem 245
d. Sika Corporation; Sikaflex - 2c SL

2. Color: Match Concrete.

B. Sealant for Joints Larger Than 1/4 inch (6 mm) Between Cement Concrete and Asphalt Pavement or Within Asphalt Pavement (Including Longitudinal Joints, Cracks or Butt Joints.): Polymeric hot applied single-component formulation complying with ASTM D 3405.

1. Products:

a. Carlisle Coatings and Waterproofing; CCW MiraSEAL EJS
b. Meadows, W. R., Inc.; Sealtight Hi-Spec.

2. Color: Black

2.3 JOINT-SEALANT BACKER MATERIALS

A. General: Provide joint-sealant backer materials as required that are nonstaining; are compatible with joint substrates, sealants, primers, and other joint fillers; and are approved for applications indicated by joint-sealant manufacturer based on field experience and laboratory testing.

B. Provide one of the following types of backer materials as applicable:

1. Round Backer Rods for Cold- and Hot-Applied Sealants: ASTM D 5249, Type 1, of diameter and density required to control sealant depth and prevent bottom-side adhesion of sealant.
2. Backer Strips for Cold- and Hot-Applied Sealants: ASTM D 5249; Type 2; of thickness and width required to control sealant depth, prevent bottom-side adhesion of sealant, and fill remainder of joint opening under sealant.
3. Round Backer Rods for Cold-Applied Sealants: ASTM D 5249, Type 3, of diameter and density required to control sealant depth and prevent bottom-side adhesion of sealant.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Surface Cleaning of Joints: Clean out joints immediately before installing joint sealants to comply with joint-sealant manufacturer's written instructions.

B. Joint Priming: Prime joint substrates where indicated or where recommended in writing by joint-sealant manufacturer, based on preconstruction joint-sealant-substrate tests or prior experience.

C. Sealant Installation Standard: Comply with recommendations in ASTM C 1193 for use of joint sealants as applicable to materials, applications, and conditions indicated.

D. Install backer materials to support sealants during application and at position required to produce optimum sealant movement capability. Do not leave gaps between ends of backer materials. Do not stretch, twist, puncture, or tear backer materials. Remove absorbent backer materials that have become wet before sealant application and replace them with dry materials.

E. Install sealants at the same time backings are installed to completely fill recesses provided for each joint configuration and to produce uniform, cross-sectional shapes and depths relative to joint widths that allow optimum sealant movement capability.

F. Clean off excess sealants or sealant smears adjacent to joints as the Work progresses by methods and with cleaning materials approved by manufacturers of joint sealants and of products in which joints occur.

G. Protect applied sealant from traffic and other damage until sealants cured enough not to track. Provide temporary barricades or other protective measures recommended by the manufacturer.

END OF SECTION 32 13 73

SECTION 32 17 00 - PAVING SPECIALTIES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Pavement markings
2. Precast concrete parking bumpers
3. Metal bollards
4. Tactile warning surfacing

1.2 SUBMITTALS

A. Product Data: Manufacturer's printed product data for each product specified.

B. Samples: For each product specified to match color as specified in Division 01 Sections.

1.3 QUALITY ASSURANCE

A. Americans with Disabilities Act (ADA): Title III Regulations, 28 CFR Part 36 ADA Standards For Accessible Design, Appendix A, Section 4.29.2 Detectable Warnings On Walking Surfaces.

B. California Code of Regulations (CCR): Provide only approved DSAAC detectable warning products as provided in the California Code of Regulations (CCR) Title 24, Part 2, Section 205 definition of "Detectable Warning". Section 1117A.4 and 1127B.5 for "Curb Ramps" and Section 1133B.8.5 for "Detectable Warnings at Hazardous Vehicular Areas"

1.4 JOB CONDITIONS

A. Environmental Requirements: Apply marking paint in dry weather when temperature is 50 deg F (10 deg C) or above and anticipated to remain above 50 deg F (10 deg C) for four hours after completing application.

PART 2 - PRODUCTS

2.1 PAVEMENT MARKING PAINT

A. Marking paint: High solids, water based acrylic paint containing ultraviolet resistant pigments.

1. Products:

a. ICI Paints; Traffic Marking Paint, #4800
b. M.A.B. Paints; Zone Marking Latex Traffic Paint, #072 Line
c. Benjamin Moore and Co.; Safety and Zone Marking Latex, M58
d. Pittsburgh Paints; Zone & Traffic Marking Paint, #11-23
e. Porter Paint Co.; PorterGuard Acrylic Traffic Paint, #2408
f. The Sherwin Williams Co.; Promar Traffic Marking Paint, B29 Series

2. Colors:

a. Parking: Yellow or White.
b. Traffic Lanes, Directions, Lettering, etc.: Yellow or White.
c. Handicapped Emblems: Blue.
d. Fire Lane: Red.

2.2 PARKING BUMPERS

A. Precast Concrete Parking Bumpers: Precast, air-entrained concrete, 2500-psi (17.2-MPa) minimum compressive strength, 4-1/2 inches (115 mm) high by 9 inches (225 mm) wide by 72 inches (1800 mm) long. Provide chamfered corners and drainage slots on underside and holes for anchoring to substrate.

1. Dowels: Galvanized steel, 3/4-inch (19-mm) diameter, 10-inch (254-mm) minimum length.

2.3 METAL BOLLARDS

A. Fabricate from ASTM A-53, Type E or S, Grade B, Schedule 40 steel pipe.

2.4 TACTILE WARNING SURFACE

A. Basis of Design Product: Engineered Plastics Inc.; "Armor-Tile."

B. Configuration: Cast-in Place.

C. Material: Vitrified polymer composite (VPC) epoxy polymer composition with an ultra violet stabilized coating employing aluminum oxide particles in the truncated domes.

D. Slip Resistance: ASTM C 1028-96, not to be less than 0.80 on top of domes and field area.

E. Fire Resistance: ASTM E 84-05 flame spread – less than 15.

F. Pattern: In-line pattern of truncated domes measuring nominal 0.2 inch (5 mm) height, 0.9 inch (23 mm) base diameter, and 0.45 inch (11 mm) top diameter, spaced center-to-center 2.35 inch (60 mm) as measured on a diagonal and 1.67 inch (42 mm) as measured side by side.

G. Field Area: Non-slip surface with a minimum of 40 – 90 degree raised points 0.045 inches (11 mm) high, per square inch;

H. Dimensions: As indicated on Drawings.

I. Color: Red.

PART 3 - EXECUTION

3.1 PAVEMENT MARKING

A. Verify that new asphalt is complete and has been accepted by Owner's Representative.

B. Thoroughly clean surfaces free of dirt, sand, gravel, oil, and other foreign matter. Protect adjacent curbs, walks, and other items from paint application.

C. Sweep and clean surface to eliminate loose material and dust.

D. Apply paint with mechanical equipment to produce pavement markings, of dimensions indicated, with uniform, straight edges. Apply at manufacturer's recommended rates.

E. Apply stripes straight and even in accordance with Drawings.

F. Remove overspray, spills, or drips from surfaces other than those requiring marking paint.

G. Barricade marked areas until paint is dried and ready for traffic.

3.2 PARKING BUMPERS

A. Securely attach precast concrete parking bumpers into pavement with not less than two galvanized steel dowels embedded in holes drilled or cast into parking bumpers at one-quarter to one-third points. Firmly bond each dowel to parking bumper and to pavement. Securely install dowels into pavement and bond to wheel stop. Recess head of dowel beneath top of parking bumper.

3.3 TACTILE WARNING SURFACE

A. Install tactile warning surface as recommended by manufacturer and as follows:

1. Pour concrete true and smooth to the required dimensions and slope prior to the tactile warning surface placement. Immediately after finishing concrete, the electronic level should be used to check that the required slope is achieved.
2. Place tile true and square to the curb edge in accordance with the Drawings.
3. Tamp or vibrate tactile warning surface tile into the fresh concrete so that the field level of the tactile warning surface is flush to the adjacent concrete surface. Do not embed by stepping on tactile warning surface tile.
4. Immediately after placement, check the tactile warning surface tile elevation to adjacent concrete. Ensure that the field surface of the tile is flush with the surrounding concrete and back of curb so that no ponding is possible on the tile at the back side of curb.
5. Keep traffic from tactile warning surface tile until concrete has set.

3.4 METAL BOLLARDS

A. Anchor bollards in place with concrete footings as indicated on Drawings. Place concrete and vibrate or tamp for consolidation. Support and brace bollards in position until concrete has cured.

B. Fill bollards solidly with concrete, mounding top surface to shed water.

END OF SECTION 32 17 00

SECTION 32 84 00 - IRRIGATION SYSTEM

PART 1 - GENERAL

1.1 SUMMARY

A. The sprinkling system will be constructed using the sprinkler heads, drip irrigation, control valves, piping, fittings, controller(s), wiring, etc., of sizes specified.

B. It is the intention of these specifications, together with the accompanying drawings to accomplish the work of installing an irrigation system which will operate in an efficient and satisfactory manner according to the workmanlike standards established for the irrigation industry.

1.2 ADMINISTRATIVE REQUIREMENTS

A. Pre-installation Meeting: Conduct a pre-installation meeting at Project site or via phone.

1. Attendees: Landscape and irrigation installer, irrigation designer, Landscape Architect, manufacturer's representative for Smart Controller, and General Contractor.

    a. Notify Owner at least 1 week in advance of the scheduled pre-installation meeting for their elective participation.

2. Minutes: The irrigation designer will record and distribute- meeting minutes via email to all attendees and Owner.

1.3 PERFORMANCE REQUIREMENTS

A. The work consists of furnishing and installing a complete underground irrigation system as shown on the drawings and specifications. Include all labor, equipment and materials and perform all operations in connection with the construction of the irrigation system.

B. It will be the Contractor's responsibility to report to the Architect any deviations between the drawings, specifications and the site. Failure to do so prior to the installing of equipment, and resulting in replacing, and/or relocating, will be done at the Contractor's expense.

C. Existing Utilities: Before any trenching, excavating or digging below the surface for any reason is begun, the Contractor shall have the area "Blue Staked" in order to determine as close as possible the location of all underground utilities. The Contractor will conduct his work in such a manner to protect all utilities from damage. It is the responsibility of the Contractor to repair or replace any damage incurred by the Contractor or his/her employees at no expense to the Owner.

D. Site Inspection: Installer shall acquaint themselves with all site conditions. Should utilities not shown on the plans be found during excavations notify the Architect. Failure to do so will make installer liable for any and all damage thereto arising from their operations subsequent to discovery of such utilities not shown on plans.

E. Protection of Existing Site Conditions: The Installer shall take necessary precautions to protect site conditions to remain. Should damage be incurred, the Installer shall repair the damage to its original condition at his own expense.

1.4 SUBMITTALS

A. Product Data: Submit copies of manufacturer's technical data and installation instructions for landscape irrigation system.

B. Record Irrigation Drawings: Prepare a record drawing which shall show deviations from the contract documents made during construction affecting the main line pipe, lateral pipe, controller locations, remote control valves, manual drain valves, and all sprinkler heads. The drawings shall also indicate and show approved substitutions of size, materials and manufacturer's name and catalog name and catalog number. The Contractor will keep a record of all departures from the

working drawings that occur during construction. These shall be kept on a clean set of prints of the working drawings. Two sets of completed record drawings indicated above shall be supplied to the Owner by the Contractor.

C. Laminated Wall mounted map indicating location of all controls, piping, heads (including type), valves and connection to water service. (8 ½" x 11" or 11" x 17")

D. Maintenance Manuals; indicating proper operation/maintenance of irrigation system.

1.5 QUALITY ASSURANCE

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

1.6 WARRANTY

A. Special Warranty: The Contractor shall make good any deficiencies at the time he is notified of any faults, and place in satisfactory condition any damage to the buildings or grounds without cost to the Owner within specified warranty period.

1. Warranty Periods from Date of Store Opening or Final Project Acceptance (whichever is longer): 12 months.

1.7 MAINTENANCE SERVICE

A. Provide full maintenance by skilled employees of planting irrigation Installer. Maintain as required in Part 3. Maintenance cost to be included in the overall base bid pricing with a breakout amount provided. Include breakout amount in Contractor's Schedule of Values.

PART 2 - PRODUCTS

2.1 GENERAL

A. All materials throughout the system shall be new and in perfect condition.

2.2 PIPES AND FITTINGS

A. All mainline and lateral pipe shall be Schedule 40, Polyvinyl Chloride (PVC) pipe. Piping shall be free from cracks, holes, foreign material, blisters, inside bubbles, wrinkles and dents. Pipe ratings shall be printed on the pipe and no pipe shall be less than ¾" diameter. All joints shall be solvent welded per manufacturer's recommendations, using both primer and glue. All joints must be allowed to set for a minimum of 24 hours prior to pressure testing.

B. All mainline fittings to be Schedule 80 Polyvinyl Chloride (PVC) and all lateral lines to be Schedule 40 Polyvinyl Chloride (PVC) standard weight as manufactured by Sloan or Lasco, as shown in details.

2.3 SLEEVES

A. All new sleeves shall be PVC Schedule 40 of sizes shown. Install sleeves in locations as shown on the drawings and at the depths specified for lateral and mainlines.

2.4 VALVE BOXES

A. Valve boxes shall be of sufficient size to fit 1 (one) electric remote control valves and still allow room for maintenance without having to excavate or perform similar operations. Boxes shall be as manufactured by Carson or Brooks Industries.

B. Valve boxes shall be set flush with the finished grade. Valve manifolds shall be set 4" below the top of the box including ball valves and quick couplers where called for. All valves must have ample room and access for repair. Include weed barrier and a 3" gravel base within entire base area of all valve boxes.

2.5 VALVES

A. Electronic Remote Control Valve: All valves shall be of the size and type as specified on the drawings.

1. Rain Bird PEB & PESB Series for all lawn control zones
2. Rain Bird XCZ-100-PRB-COM for all shrub control zones

B. Quick-Coupler: All valves shall be of the size and type as specified on the drawings.

1. Rain Bird 33DLRC: 3/4" Locking Rubber Cover with 2 piece body
2. Rain Bird 33-NP: 3/4" Locking Rubber Cover with 2 piece body Non-potable
3. Rain Bird 33-DK: 3/4" Quick Coupling Key
4. Rain Bird SH-0: 1" Hose Swivel

C. Brass Ball Valve: All valves shall be of the size and type as specified on the drawings.

1. NIBCO Series as shown on the drawings

D. Bronze Stop and Waste Valve: All valves shall be of the size and type as specified on the drawings.

1. Mueller Oriseal as shown on the drawings

E. Manual Drain Valve: All valves shall be of the size and type as specified on the drawings.

1. 3/4" Conbraco as shown on the drawings. To be installed on mainlines only.

F. Backflow Preventer:

1. Manufacturer: Febco 825Y Series as shown on the drawings. Installed in Backflow preventer as specified on drawings.

G. Secondary Water Filter

H. Manufacturer: Amiad Series as shown in irrigation schedule. See plan for size. Filter to be plastic w/ a min. of 300 Micron screen filter element.

2.6 SPRINKLERS AND ACCESSORIES

A. Sprinkler Heads: All heads shall be of the size and type as specified on the drawings. Nozzle patterns are indicated as shown. However specific site conditions may require a different nozzle pattern to be used.

1. Rain Bird 1800 Series

B. Drip Tubing/Accessories: All drip components shall be of the size and type as specified on the drawings.

1. Rain Bird XT-700 - 3/4" Distribution Tubing
2. Rain Bird XQ-100 – 1/4" Distribution Tubing
3. Rain Bird XB-10PC - Xeri-Bug Emitters (1 Gal/Hr.)
4. Rain Bird TS025 - Tie Down Stakes
5. Rain Bird DBC-025 – Diffuser Bug Cap
6. Rain Bird MDCFCAP – Flush Cap
7. Rain Bird XBT-05-06 – Multi-Outlet Xeri-Bug
8. Rain Bird SXB-360-SPYK – Xeri-Spray 360 on 5" Stake
9. Rain Bird PSI-L30X-075 – Inline Pressure Regulator
10. Netafim Techline CV Dripline w/ inline Emitters – See schedule for spacing

2.7 CONTROLLERS

A. Automatic Control: All controllers shall be of the type as specified on the drawings.

1. Rain Bird ESP Series.
2. Transformers as required for low voltage system.
3. Wires shall be UF direct burial type and as sized on the drawings. No wire shall be smaller than #14. Ground or neutral wires shall be white, grass areas shall be green, drip-shrubbery areas shall be red, and all spare(s) wires shall be blue.
4. Splices in electric control wires shall be fitted with a #M DBY Direct Bury Splice Kit. All splices shall be contained in a valve box, preferably in the same box as the electric remote control valves. Do not run short pieces of wire. Failure to do so will result in the replacement of the wire at the Contractor's expense.
5. Circuit Control with switch for manual or automatic control of each circuit.
6. Timing Device: 24 hour, 7 day and even/odd interval watering adjustment, with provision for manual or semi-automatic operation and hard wired rain sensor which will suspend watering when ground is wet from rain.

PART 3 - EXECUTION

3.1 WORKMANSHIP

A. Lay out irrigation as accurately as possible to the drawings. The drawings are drawn diagrammatic to the extent that swing joints, offsets and all fittings are not shown. Install all irrigation components within landscape areas. All irrigation lines shall be installed in common trenches where possible.

B. If for any reason full and complete coverage of all irrigation areas does not occur, irrigation Contractor shall be responsible to contact the Architect before continuing with his work.

3.2 EXCAVATION AND TRENCHING

A. Install piping and wiring in sleeves under sidewalks, roadways, parking lots.

B. Backfill with rock free clean fill around pipes, valves, drains, or any irrigation system components. Water settle all trenches and excavations. Restore all surfaces, existing and underground installations, etc., damaged or cut as a result of the excavations to their original condition

C. Provide minimum cover over top of underground piping according to the following:

1. Irrigation Main Piping: Minimum depth of 18 inches below finished grade.
2. Lateral Piping: 12 inches.
3. Drain Piping: 12 inches.
4. Sleeves: 22 inches from the top of the pipe for mainline and 16 inches for laterals

D. All trenches are to be 12" away from all curbs, buildings, and sidewalks.

E. Grade and lay all piping such that the entire system will drain. Where possible, drain the main line to the valve manifold and install the drain in the valve box. All lateral lines beyond the valve manifold should be laid in such a manner as to drain by gravity to a single low point with automatic drains.

F. Run all electrical wires in mainline trench as shown in detail on drawings. Where it becomes necessary for wires to leave the mainline trench, the trench for all electrical wires shall be treated as a mainline trench and run in specified on conduit.

3.3 INSTALLATION

A. Install automatic control valves where shown and group together where practical. Place no closer than 12 inches to walk edges, building, and walls. Install in valve box, arranged for easy adjustment and removal. Allow sufficient space around entire valve assembly. Adjust automatic control valves to provide flow rate of rated operating pressure required for each sprinkler circuit. See irrigation schedule.

B. Plastic pipe and fittings shall be solvent welded using solvents and methods as recommended by manufacturer of the pipe, except where screwed connections are required. Pipe and fittings shall be thoroughly cleaned of dirt, dust, and moisture before applying solvent with a non-synthetic bristle brush.

C. Install PVC pipe in dry weather when temperature is above 40 degrees F in strict accordance with manufacturer's instructions.

D. Pipe may be assembled and welded on the surface. Snake pipe from side to side of trench bottom to allow for expansion and contraction. Install piping free of sags and bends.

E. Irrigation head and valve locations are shown on the drawings diagrammatically. It will be the Contractor's responsibility to determine the exact location of each irrigation head and valve to accommodate the conditions as found on the site in order to provide complete coverage of all areas. Avoid installing valves in areas where curbs and sidewalks come together or at any intersection of two or more walkways. All control valves shall not be located within 3 feet of any driveway, traffic aisle, island, etc., where they could be damaged by vehicles driving over the curbs. Do NOT exceed the spacing as recommended by the manufacturer and as shown on the drawings for the irrigation heads. Minor adjustments in the system will be permitted to clear existing fixed obstructions subject to the approval of the Landscape Architect. All deviances from the drawings shall be noted on the record drawings.

F. All irrigation heads will be set perpendicular to the finished grade unless otherwise designated on the drawings or specified.

G. Install the quick couplers, isolation valves, manual drains as shown on drawings.

3.4 AUTOMATIC CONTROL SYSTEM INSTALLATION

A. All controllers shall be as a specified on the drawings and installed according to the details. The owner shall determine exact location of the clock.

B. Place copy of zone map, with all zone valve locations shown and approved irrigation plan, in protective jacket, with the main irrigation control panel.

C. Control cable to be taped to underside of main piping every ten feet

D. Install cable in separate sleeve under paved areas if irrigation piping is installed in sleeve.

3.5 FLUSHING AND TESTING

A. After installation of all new pipes and risers for a given circuit and after completion of all division work and before the installation of any irrigation head, the control valve shall be opened fully and a full head of water be used to flush out the system.

B. Testing shall be performed after completion of each circuit and after completion of the entire system. At this time any necessary repair work will be done at the Contractor's expense and the entire system will be in good working order prior to the issuance of the Certificate of Substantial Completion.

3.6 PIPE INSPECTION

A. Before any pipes are covered, the Landscape Architect and a representative of the Owner shall inspect the system for compliance with specifications and drawings. Any required changes will be made at this time at the expense of the Contractor.

3.7 FIELD QUALITY CONTROL

A. Observation: Allow irrigation designer, Owner, or Owner's inspector/agent to inspect the ongoing work at any time for proper materials and workmanship.

B. Tests and inspections by Installer:

1. Perform leak and operational testing with proper adjustments prior to the final designer walk-through. Notify the irrigation designer at least 3 days in advance of testing. Correct deficient work within five days of written notice.
2. Prior to final completion, conduct a walkthrough inspection of the complete irrigation system to allow the irrigation designer to certify that the work meets contract requirements and operates correctly. Utilize the manufacturer's technical support for the proper installation of sensors and programming of the smart controller. The installer will be held responsible for all costs associated with re-inspecting work that is not substantially complete at the time of the final walk through.
3. The irrigation designer shall provide written documentation of the final walk through and acceptance via email to the Owner, Contractor, and installer.
4. All heads will be adjusted to their proper coverage and set to the proper depth at this time.

3.8 ADJUSTING

A. Adjust settings of controllers.

B. Adjust automatic control valves to provide flow rate of rated operating pressure required for each sprinkler circuit.

C. Adjust sprinklers so they will be flush with, or not more than 1/2 inch above, finish grade.

3.9 CLEANING

A. Flush dirt and debris from piping before installing sprinklers and other devices.

3.10 DEMONSTRATION AND TRAINING

A. The Installer shall conduct a training/demonstration session with the Owner or the Owner's operations personnel, and the irrigation designer. The training must include any required winterization procedures. The Contractor shall document the training session with appropriate minutes and sign-in sheet.

3.11 MAINTENANCE

A. Winterization: In applicable climates within the warranty period, installer to schedule and perform proper winterization procedure in coordination with Owner's personnel.

B. Initial Maintenance Service: Beginning at Substantial Completion, maintenance service shall include 12 months' full maintenance by skilled employees of planting irrigation Installer. Include monthly preventive maintenance, repair or replacement of worn or defective components, lubrication, cleaning, and adjusting as required for proper operation. Parts and supplies shall be manufacturer's authorized replacement parts and supplies.

1. Perform maintenance during normal working hours.

END OF SECTION 32 84 00

SECTION 32 90 00 - PLANTING

PART 1 - GENERAL

1.1 SUMMARY

A. Furnish and install landscaping materials as shown on the landscape plan and detail sheet and also according to the following specifications.

1.2 ADMINISTRATIVE REQUIREMENTS

A. Pre-installation Meeting: Conduct a pre-installation meeting at Project site or via phone.

1. Attendees: Landscape and Irrigation Installer, Professional Landscape Architect; and General Contractor.

    a. Include the irrigation designer installer if an irrigation system is required for the project.
    b. Notify Owner at least 1 week in advance of the scheduled pre-installation meeting for their elective participation.

2. Minutes: Professional Landscape Architect will record and distribute meeting minutes via email to all attendees and Owner.

1.3 SUBMITTALS

A. Product Data: For each type of product indicated.

B. Samples for Verification: For each of the following:

1. 5 lb sample of specified mulch in labeled plastic bags.
2. Landscape boulders or photos of boulder type, before delivery to site.

C. Certification of Native Grass Seed.

D. Topsoil Analysis

E. As-Built Drawings: Indicate species, size, and location. Drawings must be certified by the landscape design professional, who created the landscape drawings.

1.4 QUALITY ASSURANCE

A. USA Standard for Nursery Stock shall govern the quality of plant materials.

B. Topsoil Analysis: Furnish soil analysis by a qualified soil-testing laboratory stating percentages of organic matter; gradation of sand, silt, and clay content; cation exchange capacity; sodium absorption ratio; deleterious material; pH; and mineral and plant-nutrient content of topsoil.

1. Report suitability of topsoil for plant growth. State-recommended quantities of nitrogen, phosphorus, and potash nutrients and soil amendments to be added to produce satisfactory topsoil.

C. Turf and plants are subject to the approval of the Owner's Representative. Approval of plants at the nursery does not alter the right of rejection at the project site.

1.5 WARRANTY

A. Special Warranty: Installer agrees to repair or replace plantings and accessories that fail in materials, workmanship, or growth within specified warranty period.

1. Failures include, but are not limited to, the following:

   a. Death and unsatisfactory growth, except for defects resulting from abuse, lack of adequate maintenance, or neglect by Owner, or incidents that are beyond Contractor's control.
   b. Structural failures including plantings falling or blowing over.

2. Warranty Periods from Date of Store Opening or Final Project Acceptance (whichever is longer): 12 months.

1.6 MAINTENANCE SERVICE

A. Provide full maintenance by skilled employees of landscape Installer. Maintain as required in Part 3. Begin maintenance immediately after turf and plants are installed and continue until plantings are acceptably healthy and well established but for not less than the warranty period. Maintenance cost to be included in the overall base bid pricing with a breakout amount provided. Include breakout amount in Contractor's Schedule of Values.

PART 2 - PRODUCTS

2.1 SEED

A. Grass Seed: Fresh, clean, dry, new-crop seed complying with ASOSA's "Journal of Seed Technology; Rules for Testing Seeds" for purity and germination tolerances.

2.2 TURFGRASS SOD

A. Certified Sod:

1. Superior sod grown from certified, high quality, seed of known origin or from plantings of certified grass seedlings or stolons:

   a. Assure overall high quality and free of noxious weeds or an excessive amount of other drop and weedy plants at time of harvest.

2. Sod shall be composed of two varieties minimum of Kentucky Blue Grass Seed.

2.3 PLANT MATERIAL

A. General: Furnish plants as indicated on Drawings, nursery-grown, true to genus, species, variety, cultivar, stem form, shearing, and other features complying with ANSI Z60.1; and with healthy root systems developed by transplanting or root pruning. Provide well-shaped, fully branched, healthy, vigorous stock, densely foliated when in leaf and free of disease, pests, eggs, larvae, and defects such as knots, sun scald, injuries, abrasions, and disfigurement.

B. Provide trees and shrubs of sizes, grades, and ball or container sizes complying with ANSI Z60.1 for types and form of trees and shrubs required. Trees and shrubs of a larger size may be used if acceptable to Architect, with a proportionate increase in size of roots or balls.

C. Root-Ball Depth: Furnish trees and shrubs with root balls measured from top of root ball, which shall begin at root flare according to ANSI Z60.1. Root flare shall be visible before planting.

D. Ground Cover: Provide ground cover of species indicated, established and well rooted in pots or similar containers, and complying with ANSI Z60.1.

E. Annuals and Perennials: Provide healthy, disease-free plants of species and variety shown or listed, with well-established root systems reaching to sides of the container to maintain a firm ball, but not with excessive root growth encircling the container. Provide only plants that are acclimated to outdoor conditions before delivery and that are in bud but not yet in bloom.

F. Vines: Provide vines of species indicated complying with requirements in ANSI Z60.1 as follows:

1. Two-year plants with heavy, well-branched tops, with not less than 3 runners 18 inches or more in length, and with a vigorous well-developed root system.
2. Provide field-grown vines. Vines grown in pots or other containers of adequate size and acclimated to outside conditions will also be acceptable.

G. Topsoil: Existing Topsoil to be stripped and stockpiled from site for landscape use. Contractor shall verify existing topsoil amounts and quality with the general contractor. The landscape contractor shall perform a soil analysis on existing and/or imported topsoil and amend per soil analysis recommendations. Soil analysis to be done by a certified soil testing agency. Provide new imported topsoil as needed from a local source. Imported topsoil must be a premium quality dark sandy loam, free of rocks, clods, roots, and plant matter. Topsoil to be installed in all landscaping areas.

1. Imported Topsoil Criteria:

a. Chemical Characteristics:

1) PH range of 5.5 to 7.5
2) Soluble Salts: less than 2.0 mmhos/cm
3) Sodium Absorption Ratio (SAR): less than 3.0

b. Physical Characteristics:

1) Sand: 15 to 60 percent
2) Silt: 10 to 60 percent
3) Clay: 5 to 30 percent

H. Planting Backfill Mix: Mixture shall be composed of three parts topsoil to one part soil conditioner.

I. Planting Tablets: 20-10-5 Agriform Tablets (21 gram)

J. Tree Stakes: 2″ Dia. x 6′ Long Lodgepole Pine

K. Tree Staking Ties: 32″ Cinch-Tie tree ties by V.I.T. Products Inc. or equal as approved by Architect

L. Pre-Emergent Herbicide: Elanco XL, Ronstar, Surflan or approved equal

M. Weed Barrier: Dewitt Pro 5 Weed Barrier or Equal

N. Mulches:

1. Organic: Shredded Bark Mulch - see plant schedule & notes for size, color, type, & depth

a. Available from:

1) See material schedule for specified suppliers.

2. Inorganic: Decorative Stone Surfacing - see material schedule & notes for size, color, type, & depth

a. Available from:

1) See material schedule for specified suppliers.

O. Landscape Decorative Boulder:

1. 3′ to 5′ diameter boulders as indicated in material schedule. Submit photos/sample for approval

a. Available from:

1) See material schedule for specified suppliers.

P. Landscape Edging:

1. 4" x 6" Concrete landscape curbing
2. 3/16" x 4" Steel Edging by Sure-Loc
3. Shovel Cut Edge – Use between lawn and tree 36" tree ring

PART 3 - EXECUTION

3.1 EXAMINATION

A. Before proceeding with work, check and verify dimensions and quantities. Report variations between drawings and site to Architect before proceeding with work.

B. Plant totals on landscape plan are for convenience only and are not guaranteed. Verify amounts shown on drawings. All planting indicated on drawing is required unless indicated otherwise.

C. Landscape Contractor must examine the site conditions under which the work is to be performed and notify the Project Manager in writing of unsatisfactory conditions. Do not proceed until conditions have been corrected.

3.2 PREPARATION

A. Protect structures, utilities, sidewalks, pavements, and other facilities, and lawns and existing exterior plants from damage caused by planting operations.

B. Provide erosion-control measures to prevent erosion or displacement of soils and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways.

C. Lay out individual tree and shrub locations and areas for multiple plantings. Stake locations, outline areas, adjust locations when requested, and obtain Architect's acceptance of layout before planting. Make minor adjustments as required.

D. Trunk Wrapping: Inspect tree trunks for injury, improper pruning, and insect infestation; take corrective measures required before wrapping. Wrap trees of 2-inch caliper and larger with trunk-wrap tape. Start at base of trunk and spiral cover trunk to height of first branches. Overlap wrap, exposing half the width, and securely attach without causing girdling.

E. Apply antidesiccant to trees and shrubs using power spray to provide an adequate film over trunks (before wrapping), branches, stems, twigs, and foliage to protect during digging, handling, and transportation.

1. If deciduous trees or shrubs are moved in full leaf, spray with antidesiccant at nursery before moving and again two weeks after planting.

F. Wrap trees and shrubs with burlap fabric over trunks, branches, stems, twigs, and foliage to protect from wind and other damage during digging, handling, and transportation.

3.3 INSTALLATION

A. All debris and compacted subsoil shall be removed from the planter area to a minimum depth of 12 inches below the top of walkway and curb.

B. Loosen subgrade to a minimum depth of 6 inches Remove stones larger than 1-1/2 inches in any dimension and sticks, roots, rubbish, and other extraneous matter and legally dispose of them off Owner's property.

1. Spread existing or imported topsoil to a depth of 12 inches in parking islands and 8 inches in all planting beds but not less than required to meet finish grades after light rolling and natural settlement. Do not spread if topsoil or subgrade is frozen, muddy, or excessively wet.

C. Finish Grading: Grade planting areas to a smooth, uniform surface plane with loose, uniformly fine texture. Grade to within plus or minus 1/2 inch finish elevation. Roll and rake, remove ridges, and fill depressions to meet finish grades. Limit finish grading to areas that can be planted in the immediate future.

D. Moisten prepared area before planting if soil is dry. Water thoroughly and allow surface to dry before planting. Do not create muddy soil.

E. Before planting, obtain Owner's acceptance of finish grading; restore planting areas if eroded or otherwise disturbed after finish grading.

3.4 TREE AND SHRUB PLANTING

A. Planting Pits and Trenches: Excavate circular planting pits with sides sloping inward at a 45-degree angle. Excavations with vertical sides are not acceptable. Trim perimeter of bottom leaving center area of bottom raised slightly to support root ball and assist in drainage away from center. Do not further disturb base. Ensure that root ball will sit on undisturbed base soil to prevent settling. Scarify sides of planting pit smeared or smoothed during excavation.

1. Excavate approximately twice diameter of the rootball.
2. Excavate at least 12 inches deeper than the root ball to accommodate vertical roots for bare-root stock.

B. Before planting, verify that root flare is visible at top of root ball according to ANSI Z60.1.

C. Set stock plumb and in center of planting pit or trench with root flare 1 inch above adjacent finish grades.

1. Add specified plant backfill.
2. Balled and Burlapped: After placing some backfill around root ball to stabilize plant, carefully cut and remove burlap, rope, and wire baskets from tops of root balls and from sides, but do not remove from under root balls. Remove pallets, if any, before setting. Do not use planting stock if root ball is cracked or broken before or during planting operation.
3. Balled or Container-Grown: Carefully remove root ball from container without damaging root ball or plant.
4. Fabric Bag-Grown Stock: Carefully remove root ball from fabric bag without damaging root ball or plant. Do not use planting stock if root ball is cracked or broken before or during planting operation.
5. Backfill around root ball in layers, tamping to settle soil and eliminate voids and air pockets. When planting pit is approximately one-half filled, water thoroughly before placing remainder of backfill. Repeat watering until no more water is absorbed.
6. Place planting tablets in each planting pit when pit is approximately one-half filled; in amounts recommended in soil reports from soil-testing laboratory. Place tablets beside the root ball about 1 inch from root tips; do not place tablets in bottom of the hole. Apply according to manufacturer's recommendations.
7. Continue backfilling process. Water again after placing and tamping final layer of soil.

D. Bare-Root Stock: Set and support bare-root stock in center of planting pit or trench with root flare 1 inch above adjacent finish grade.

1. Add specified plant backfill.
2. Spread roots without tangling or turning toward surface, and carefully work backfill around roots by hand. Puddle with water until backfill layers are completely saturated. Plumb before backfilling, and maintain plumb while working backfill around roots and placing layers above roots.

E. Provide new supports for trees noted on the drawings to be staked.

1. Remove nursery stakes delivered with and attached to tree.
2. Tree support shall consist of two stakes drive into holes base before backfill so roots are not damaged. Place stakes vertically and run parallel to tree trunk. Install stakes so three feet of stake length is below finish grade.

3. Place tree ties 6 to 12 inches below crotch of main tree canopy.
4. Remove tops of tree stakes so top of stake is 6 inches below main tree canopy to prevent damage to tree branches and canopy growth.

F. Concrete landscape curbing to be used between all lawns and planting areas. See plan for specified areas. Curbing to be continuous and not be interrupted. Contact Architect if problems arise for modification of curbing alignment.

3.5 PLANTING AREA MULCHING

A. Areas shall be free of existing weed growth prior to application of herbicide.

B. Prior to mulching, treat planting areas with pre-emergent weed killer, applied according to the manufacturer's directions.

C. After planting and application of herbicide in planting areas, install weed barrier fabric with the fuzzy side down. Achieve 100 percent coverage over ground areas. Overlap seams 6 inches minimum. Staple at 5 feet on center using triangular spacing with two at each corner. Staple within 3 inches of all edges.

D. Install specified mulch in all planting areas at specified depths. See materials schedule for details.

E. At base of trees in lawn areas, leave 36 inch diameter circle free of any. See tree planting details and landscape notes.

3.6 HYDROSEEDING

A. Hydroseeding: mix specified seed, fertilizer, and fiber mulch in water, using equipment specifically designed for hydroseeding application. Continue mixing until uniformly blended into homogeneous slurry suitable for hydraulic application.

1. See plant schedule & hydroseed detail for seed mix and application rates.

3.7 SOD INSTALLATION

A. Sod area preparation:

1. Moisten sod area to a depth of 6" prior to laying sod.
2. Allow sufficient time between watering and sod application for soil to become workable and walkable without compromising the quality of the finish grade.

B. Laying Sod:

1. Soil in sod area to be moist at time sod is layed.
2. Final grade of soil after sodding of lawn areas is complete shall be one inch below top of adjacent pavement of any kind.
3. Lay sod during growing season.
4. Lay sod within 36 hours of being lifted.
5. Lay sod in rows with joints staggered. Butt sections closely without overlapping or leaving gaps between sections. Cut out irregular or thin sections.
6. Lay sod flush with adjoining existing sodded surfaces.
7. Do not sod slopes steeper than 3:1.

C. After Sodding is Complete:

1. Water sodded areas immediately after laying sod to obtain moisture penetration through sod into top six inches of topsoil.

3.8 MAINTENANCE

A. Tree and Shrub Maintenance: Maintain plantings by pruning, cultivating, watering, weeding, fertilizing, restoring planting saucers, adjusting and repairing stakes and guy supports and root-ball stabilization, and resetting to proper grades or vertical position, as required to establish healthy, viable plantings. Spray or treat as required to keep trees and shrubs free of insects and disease. Restore or replace damaged tree wrappings.

B. Ground Cover, Perennial, and Orn. Grass Maintenance: Maintain and establish plantings by watering, weeding, fertilizing, mulching, and other operations as required to establish healthy, viable plantings.

C. Turf Maintenance: Mow turf as soon as top growth is tall enough to cut. Repeat mowing to maintain height appropriate for species without cutting more than 1/3 of grass height. Remove no more than 1/3 of grass-leaf growth in initial or subsequent mowings.

3.9 SATISFACTORY TURF

A. Satisfactory Seeded Turf: At end of maintenance period, a healthy, uniform, close stand of grass has been established, free of weeds and surface irregularities, with coverage exceeding 90 percent over any 10 sq. ft. (0.92 sq. m) and bare spots not exceeding 5 by 5 inches (125 by 125 mm).

B. Satisfactory Sodded Turf: At end of maintenance period, a healthy, well-rooted, even-colored, viable turf has been established, free of weeds, open joints, bare areas, and surface irregularities.

C. Use specified materials to reestablish turf that does not comply with requirements and continue maintenance until turf is satisfactory.

END OF SECTION 32 90 00

DIVISION 33 – UTILITIES:

33 1100	Water Utility Piping
33 3100	Sanitary Sewerage Piping
33 4100	Storm Utility Drainage Piping

SECTION 33 11 00 - WATER UTILITY DISTRIBUTION PIPING

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes:

1. Domestic water and fire suppression lines.

a. Terminate as indicated on the Drawings.

1.2 SUBMITTALS

A. Product Data: For each material specified.

1.3 QUALITY ASSURANCE

A. Comply with governing codes and regulations. Provide products of acceptable manufacturers which have been in satisfactory use in similar service for three years. Use experienced installers. Deliver, handle, and store materials in accordance with manufacturer's instructions.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Domestic Water and Fire Suppression Lines: Provide piping manufactured from the following materials list. Materials must also meet City Specifications. Do not provide domestic water and fire suppression lines in materials outside of size limits specified:

1. Polyethylene (PE) Water Pipe (Up to 3 inches diameter), AWWA C901 "Polyethylene (PE) Pressure Pipe and Tubing, 1/2-inch through 3-inch for Water Service.", PE 3408, SDR 9 (200 psi)
2. Copper Pipe (Up to 3 inches diameter): Type "K."

a. Joints: Sweat silver soldered on 2 inch and above.

3. Polyvinyl Chloride (PVC) (4 inches to 12 inches diameter): AWWA C900, Class 200

a. Fittings: Mechanical and Flanged joints of ductile iron per ANSI/AWWA C110/A21.10 and ANSI/AWWA C111/A21.11.

4. Ductile Iron (DI) (3 inches to 12 inches diameter): AWWA C150 for a minimum 150 psi working pressure plus 100 psi surge pressure. Manufacture DI pipe per AWWA C151 with standard asphaltic coating on the exterior and cement-mortar lining on the interior.

a. Fittings: Mechanical and Flanged joints of ductile iron per ANSI/AWWA C110/A21.10 and ANSI/AWWA C111/A21.11.

B. Water meter: Local utility company standard.

C. Valves

1. Gate Valves: UL-listed, 175 psi working pressure for 12" and smaller, 150 psi for sizes larger than 12". Threaded, flanged, hub, or other end configurations to suit size of valve and piping connection. Inside screw type for use with indicator post, iron body bronze mounted, non- rising stem, solid wedge disc.

2. Check Valves: UL-listed, 175 psi working pressure for 2" through 12", 150 psi for sizes larger than 12". Swing type, iron body bronze mounted with metal-to-metal or rubber-faced checks. Threaded, flanged, or hub end, to suit size and piping connections.

D. Fire Hydrants

1. Provide cast-iron body fire hydrants, compression type, opening against pressure and closing with pressure, base valve design, 200 psi working pressure, with 1/4" gage tapping and bronze plug in standpipe, conforming to the latest edition of AWWA C-502, "Dry Barrel Fire Hydrants."
2. Features: Provide the following features:

    1. Size: 5" valve opening.
    2. Direction to Open Hydrant: Left.
    3. Size and Shape of Operating and Cap Nuts: Pentagon 1-1/2" point to flat.
    4. Hose Nozzles: 2-1/2" National Standard Thread, cap and chain.
    5. Pumper Nozzles: 5" National Standard Thread, cap and chain.
    6. Depth of Trench: 4'-6".
    7. Connection to Main: 6" mechanical joint.

E. Accessories

1. Anchorages: Provide anchorages for tees, wyes, crosses, plugs, caps, bends, valves, and hydrants. After installation, apply full coat of asphalt or other acceptable corrosion-retarding material to surfaces of ferrous anchorages.
2. Clamps, Straps, and Washers: Steel, ASTM A 506.
3. Rods: Steel, ASTM A 575.
4. Rod Couplings: Malleable-iron, ASTM A 197.
5. Bolts: Steel, ASTM A 307.
6. Cast-Iron Washers: Gray-iron, ASTM A 126.
7. Thrust Blocks: Concrete, 3,000 psi.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Before commencing pipe installation, field verify building tie-in locations/inverts, tap locations/inverts, and all utilities crossings. Notify owner's representative of any conflicts.

3.2 INSTALLATION

A. Install materials and systems in accordance with manufacturer's instructions and approved submittals and in proper relation with adjacent construction. Coordinate with work of other sections.

B. Excavate and backfill utility trenches as specified in Division 31 Section "Earth Moving" and the trench detail on the Drawings.

C. Clean and sterilize system in accordance with local authorities. Test for proper operation. Backfill and protect work from damage.

D. Provide 6-inch thick, 12-inch wide concrete pad at valves, manholes, meters set in paving.

3.3 FIELD QUALITY CONTROL

A. Test new piping systems and parts of existing systems (that have been altered, extended, or repaired) for leaks and defects per pipe manufacturer's recommendations and requirements of local authorities having jurisdiction.

1. Do not enclose, cover, or put into service any piping systems before inspection and approval is obtained from the Engineer and the City.

2. Replace any defective areas found during inspections and testing and repeat the process until results are acceptable.
3. Project Completion Reports: Provide copies of test reports to the Owner's Representative, for each system or line, witnessed by either local authorities having jurisdiction or the Owner's testing agency per the test requirements.

END OF SECTION 33 11 00

SECTION 33 31 00 - SANITARY UTILITY SEWERAGE PIPING

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes:

1. Operating underground, exterior sanitary sewer collection system including cleanouts, sewer conduits, manholes, frames, covers and gratings.

1.2 SUBMITTALS

A. Product Data, Shop Drawings, and manufacturer's test reports.

B. Field Quality Control Test Repots.

1.3 QUALITY ASSURANCE

A. Comply with governing codes and regulations. Provide products of acceptable manufacturers, which have been in satisfactory use in similar service for three years. Use experienced installers. Deliver, handle, and store materials in accordance with manufacturer's instructions.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Gravity Piping; Provide piping manufactured to the following materials list. Materials must also meet City Specifications:

1. Polyvinyl Chloride (PVC): ASTM. D-3034, SDR-35. (SDR-26 if required by local authority) utilizing elastomeric gasket joints.
2. Reinforced Concrete Pipe (RCP): AASHTO M-170 with bell and spigot rubber gasket type joints or ASTM C76 Class 3 (up to 15 feet diameter).

B. Pressure Piping:

1. Polyvinyl Chloride (PVC) (4 inches to 12 inches diameter): AWWA C900, DR 18 150 PSI rated.

a. Basis of Design Product: Blue Brute.

C. Manholes: Precast concrete, ASTM C 478.

D. Manhole frames, covers, gratings, and steps: Grey cast-iron with service type cast in covers and gratings.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Before commencing pipe installation, field verify building tie-in locations/inverts, tap locations/inverts, and all utilities crossings. Notify owner's representative of any conflicts.

3.2 INSTALLATION

A. Install materials and systems in accordance with manufacturer's instructions and approved submittals and in proper relation with adjacent construction. Coordinate with work of other sections.

B. Excavate and backfill utility trenches as specified in Division 31 Section "Earth Moving" and the trench detail on the Drawings.

C. Provide 12-inch (305-mm) thick, 12-inch (305-mm) by 5-inch (127-mm) concrete pad at cleanouts set in paving.

D. Test for proper operation. Clean out system and protect work from damage.

3.3 FIELD QUALITY CONTROL

A. Test new piping systems and parts of existing systems (that have been altered, extended, or repaired) for leaks and defects per pipe manufacturer's recommendations and requirements of local authorities having jurisdiction.

1. Do not enclose, cover, or put into service any piping systems before inspection and approval is obtained from the Engineer and the City.
2. Replace any defective areas found during inspections and testing and repeat the process until results are acceptable.
3. Project Completion Reports: Provide copies of test reports to the Owner's Representative, for each system or line, witnessed by either local authorities having jurisdiction or the Owner's testing agency per the test requirements.

B. Visual Inspection

1. After approximately 24 inches (610 mm) of backfill and after completion of final grade (paving or landscaping installed), inspect the interior pipe runs for alignment and deflection (less than 7-1/2 percent). Utilize lamps and mirrors if necessary.

C. Mandrel Testing

1. Conduct for all pipes under 30 inches (762 mm) in diameter and provide project completion reports witnessed by local authorities having jurisdiction or the Owner's testing agency.
2. Install and backfill pipe runs to subgrade elevation (preferably to final grade elevation) at least 30 days prior to mandrel testing.
3. Flush and clean lines prior to utilizing a 5-point mandrel of a size not less than 92.5 percent of the pipe diameter.

D. Pressure, Infiltration, or Exfiltration Testing

1. Preform tests as required by local authorities having jurisdiction or manufacturer and provide test reports witnessed by the local authority having jurisdiction or the Owner's testing agency.
2. For low pressure piping, at no time should the internal pipe pressure exceed PSI rating of pipe.
3. For pressure piping, do not exceed manufacturer's recommendations.

END OF SECTION 33 31 00

SECTION 33 41 00 - STORM UTILITY DRAINAGE PIPING

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes:

1. Gravity-flow, nonpressure storm drainage outside the building, with the following components:

a. Precast catch basins / junction boxes.
b. Precast concrete manholes.
c. Cast in place inlet / outlet structures.

1.2 PERFORMANCE REQUIREMENTS

A. Gravity-Flow, Nonpressure, Drainage-Piping Pressure Rating: 10-foot head of water (30 kPa).

1.3 SUBMITTALS

A. Product Data: For each type of product indicated.

B. Shop Drawings: For manholes and catch basins. Include plans, elevations, sections, details, and frames and covers.

C. Field quality-control test reports.

1.4 QUALITY ASSURANCE

A. Storm Sewer piping and installation shall conform to the standard specifications of the local water district requirements.

PART 2 - PRODUCTS

2.1 PIPE AND FITTINGS

A. Polyvinyl Chloride (PVC): ASTM D 3034, SDR-35 (SDR-26 if required by local authority having jurisdiction) utilizing elastomeric gasket joints.

B. Reinforced Concrete Pipe (RCP): AASHTO M-170 with bell and spigot rubber gasket type joints or ASTM C76 (confirm class type with depth of pipe and traffic loads). Provide heavy duty RCP in paved areas when less vthan 2 feet of cover is available.

2.2 NONPRESSURE-TYPE PIPE COUPLINGS

A. Comply with ASTM C 1173, elastomeric, sleeve-type, reducing or transition coupling, for joining underground nonpressure piping. Include ends of same sizes as piping to be joined and corrosion-resistant-metal tension band and tightening mechanism on each end.

B. Sleeve Materials:

1. For Cast-Iron Soil Pipes: ASTM C 564, rubber.
2. For Plastic Pipes: ASTM F 477, elastomeric seal or ASTM D 5926, PVC.
3. For Dissimilar Pipes: ASTM D 5926, PVC or other material compatible with pipe materials being joined.

C. Unshielded Flexible Couplings: Elastomeric sleeve with corrosion-resistant-metal tension band and tightening mechanism on each end.

D. Shielded Flexible Couplings: ASTM C 1460, elastomeric or rubber sleeve with full-length, corrosion-resistant outer shield and corrosion-resistant-metal tension band and tightening mechanism on each end.

E. Ring-Type Flexible Couplings: Elastomeric compression seal with dimensions to fit inside bell of larger pipe and for spigot of smaller pipe to fit inside ring.

2.3 CLEANOUTS

A. Gray-Iron Cleanouts: ASME A112.36.2M, round, gray-iron housing with clamping device and round, secured, scoriated, gray-iron cover. Include gray-iron ferrule with inside calk or spigot connection and countersunk, tapered-thread, brass closure plug.

1. Top-Loading Classification(s): Heavy duty.
2. Sewer Pipe Fitting and Riser to Cleanout: ASTM A 74, Service class, cast-iron soil pipe and fittings.

2.4 MANHOLES

A. Standard Precast Concrete Manholes: ASTM C 478 (ASTM C 478M), precast, reinforced concrete, of depth indicated, with provision for sealant joints.

2.5 CONCRETE

A. General: Cast-in-place concrete according to ACI 318/318R, ACI 350R, and the following:

1. Cement: ASTM C 150, Type II.
2. Fine Aggregate: ASTM C 33, sand.
3. Coarse Aggregate: ASTM C 33, crushed gravel.
4. Water: Potable.

B. Ballast and Pipe Supports: Portland cement design mix, 3000 psi (20.7 MPa) minimum, with 0.58 maximum water-cementitious materials ratio.

1. Reinforcement Fabric: ASTM A 185, steel, welded wire fabric, plain.
2. Reinforcement Bars: ASTM A 615/A 615M, Grade 60 (420 MPa), deformed steel.

2.6 CATCH BASINS

A. Standard Precast Concrete Catch Basins: ASTM C 478 (ASTM C 478M), precast, reinforced concrete, of depth indicated, with provision for sealant joints.

B. Frames and Grates: ASTM A 536, Grade 60-40-18, ductile iron designed for A-16, structural loading. Include 24-inch (610-mm) ID by 7- to 9-inch (178- to 229-mm) riser with 4-inch (102-mm) minimum width flange, and 26-inch- (660-mm-) diameter flat grate with small square or short-slotted drainage openings.

1. Grate Free Area: Approximately 50 percent, unless otherwise indicated.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Before commencing pipe installation, field verify building tie-in locations/inverts, tap locations/inverts, and all utilities crossings. Notify owner's representative of any conflicts.

3.2 PIPING INSTALLATION

A. General Locations and Arrangements: Drawing plans and details indicate general location and arrangement of underground storm drainage piping. Location and arrangement of piping layout take design considerations into account.

Install piping as indicated, to extent practical. Where specific installation is not indicated, follow piping manufacturer's written instructions.

B. Excavate and backfill utility trenches as specified in Division 31 Section "Earth Moving" and the trench detail on the Drawings.

C. Install piping beginning at low point, true to grades and alignment indicated with unbroken continuity of invert. Place bell ends of piping facing upstream. Install gaskets, seals, sleeves, and couplings according to manufacturer's written instructions for using lubricants, cements, and other installation requirements.

D. Install manholes for changes in direction unless fittings are indicated. Use fittings for branch connections unless direct tap into existing sewer is indicated.

E. Install proper size increasers, reducers, and couplings where different sizes or materials of pipes and fittings are connected. Reducing size of piping in direction of flow is prohibited.

F. Install gravity-flow, nonpressure drainage piping according to the following:

1. Install piping pitched down in direction of flow, at minimum slope of 2 percent, unless otherwise indicated.
2. Install piping NPS 6 (DN 150) and larger with restrained joints at tee fittings and at changes in direction. Use corrosion-resistant rods, pipe or fitting manufacturer's proprietary restraint system, or cast-in-place-concrete supports or anchors.
3. Install piping below frost line.
4. Install hub-and-spigot, cast-iron soil piping according to CISPI's "Cast Iron Soil Pipe and Fittings Handbook."
5. Install PVC sewer piping according to ASTM D 2321 and ASTM F 1668.

G. Clear interior of piping and manholes of dirt and superfluous material as work progresses.

3.3 PIPE JOINT CONSTRUCTION

A. Where specific joint construction is not indicated, follow piping manufacturer's written instructions.

B. Join gravity-flow, nonpressure drainage piping according to the following:

1. Join hub-and-spigot, cast-iron soil piping with gasket joints according to CISPI's "Cast Iron Soil Pipe and Fittings Handbook" for compression joints.
2. Join hub-and-spigot, cast-iron soil piping with calked joints according to CISPI's "Cast Iron Soil Pipe and Fittings Handbook" for lead and oakum calked joints.
3. Join PVC sewer piping according to ASTM D 2321 and ASTM D 3034 for elastomeric-gasket joints.
4. Join dissimilar pipe materials with nonpressure-type flexible couplings.

3.4 CLEANOUT INSTALLATION

A. Install cleanouts and riser extensions from sewer pipes to cleanouts at grade. Use cast-iron soil pipe fittings in sewer pipes at branches for cleanouts and cast-iron soil pipe for riser extensions to cleanouts. Install piping so cleanouts open in direction of flow in sewer pipe.

1. Use heavy-duty, top-loading classification cleanouts in all areas.

B. Set cleanout frames and covers in concrete pavement with tops flush with pavement surface.

3.5 MANHOLE INSTALLATION

A. General: Install manholes, complete with appurtenances and accessories indicated.

B. Install precast concrete manhole sections with sealants according to ASTM C 891.

C. Set tops of frames and covers flush with finished surface of manholes that occur in pavements.

3.6 CATCH BASIN INSTALLATION

A. Set frames and grates to elevations indicated.

3.7 CONNECTIONS

A. Make connections to existing piping and underground manholes.

1. Use commercially manufactured wye fittings for piping branch connections. Remove section of existing pipe; install wye fitting into existing piping; and encase entire wye fitting, plus 6-inch (150-mm) overlap, with not less than 6 inches (150 mm) of concrete with 28-day compressive strength of 3000 psi (20.7 MPa).

3.8 CONCRETE COLLARS

A. Provide 6-inch thick, 12-inch wide concrete pad at cleanouts, manholes, catch basins, and other structures set in paving.

3.9 FIELD QUALITY CONTROL

A. Test new piping systems and parts of existing systems (that have been altered, extended, or repaired) for leaks and defects per pipe manufacturer's recommendations and requirements of local authorities having jurisdiction.

1. Do not enclose, cover, or put into service any piping systems before inspection and approval is obtained.
2. Replace any defective areas found during inspections and testing and repeat the process until results are acceptable.
3. Project Completion Reports: Provide copies of test reports to the Owner's Representative, for each system or line, witnessed by either local authorities having jurisdiction or the Owner's testing agency per the test requirements.

B. Visual Inspection

1. After approximately 24 inches (610 mm) of backfill and after completion of final grade (paving or landscaping installed), inspect the interior pipe runs for alignment and deflection (less than 7-1/2 percent). Utilize lamps and mirrors if necessary.
2. For pipes 30 inches (762 mm) in diameter and greater, project completion reports may consist of visual and interior measurements (conducted under proper safety guidelines) that are witnessed by local authorities or the owner's testing agency. Reports must indicate that any pipe deflection is less than 7-1/2 percent of the pipe diameter.

C. Mandrel Testing

1. Conduct for all pipes under 30 inches (762 mm) in diameter and provide project completion reports witnessed by local authorities having jurisdiction or the Owner's testing agency.
2. Install and backfill pipe runs to subgrade elevation (preferably to final grade elevation) at least 30 days prior to mandrel testing.
3. Flush and clean lines prior to utilizing a 5-point mandrel of a size not less than 92.5 percent of the pipe diameter.

D. Pressure, Infiltration, or Exfiltration Testing

1. Preform tests as required by local authorities having jurisdiction or manufacturer and provide test reports witnessed by the local authority having jurisdiction or the Owner's testing agency.
2. For low pressure piping, at no time should the internal pipe pressure exceed PSI rating of pipe.

E. For pressure piping, do not exceed manufacturer's recommendations.

END OF SECTION 33 41 00