Project Manual For:
Idaho Transportation Department
District #1

ITD D-1 Lab
Maintenance Building
Phase II – Building Construction
600 W. Prairie Ave.
Coeur d’ Alene, Idaho 83815

Kootenai County

Monday, May 13th, 2024

MSA Project Number: 2314
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SECTION 000030.1 – ADVERTISEMENT FOR BIDS

PRIME CONTRACT PACKAGES for:
D231130 – D-1 Coeur d’Alene Laboratory Facility – Phase 2
Idaho Transportation Department (ITD), Coeur d’Alene, Idaho

Bid Packages shall consist of multiple individual trade scope packages that will be direct prime contracts with ITD. ITD has retained a CM Agent (Bateman-Hall, Inc.) to help coordinate the management of the overall project.

Each Prime Contractor will be required to cooperate and coordinate with the CM and all other Contractors to perform their work in accordance with a Master Project Schedule developed, updated, and maintained by the CM. Each Prime Contractor will be required to provide specified scheduling information necessary to maintain the Master Project Schedule and to meet the milestone completion dates as identified on the Bid Form and in each Prime Contract.

PROJECT SCOPE: New building for Asphalt and Concrete Testing Laboratory on District #1 Campus. The proposed facility is a single-story that is separated into four primary sections: office space, D-1 Lab area, a residency lab area, and storage area. The facility is to be constructed out of Concrete Masonry Construction and Light wood frame construction. The facility has concrete slab-on-grade floors and low sloped roofs. The roof are single ply roofing and metal roofing.

All work shall be performed in accordance with Contract Documents, Plans, Specifications, Department of Public Works Standards, The International Building Code, and as directed by the ITD Representatives.

BID PACKAGES Will be as per BID PACKAGE INDEX (Spec Section 000031.1).

Complete Bidding Documents will be available beginning May 23rd, 2024. Plans (on a CD) will be made available at no cost from Bateman-Hall, Inc. at 208-523-2681.

Plans can also be viewed or downloaded on smartbidnet.com. If you do not have a username and password, please send a request by email to bids@bateman-hall.com. Please include the following: Company Name, Contact Person, Phone Number, Fax or E-mail, Company Scope of Work, and States the company works in.

PRE-BID CONFERENCE: Will be held at 11:00 AM (PST) on Tuesday, June 11th, 2024, at the project location of ITD Coeur d’Alene Office, 600 W. Prairie AVE, Coeur D’Alene, ID 83814. Attendance is highly recommended.

COMMUNICATION: All communication is to be through Bateman-Hall, Inc. Requests for clarification or interpretation of the Bidding Documents must be in writing and received no later than June 13th, 2024, at 12:00 PM (PST). Questions received after the above-noted deadline may be answered at the discretion of the ITD Representative.
Revisions, additions, and deletions will be made by written addenda issued by the CM and/or Miller Stauffer Architects. Only questions answered by formal written addenda will be binding. Oral and other interpretations or clarifications will be without legal effect. Questions may be mailed, e-mailed, or faxed to:

Malone Bullock, Bateman-Hall, Inc.
P.O. Box 1464, Idaho Falls, Idaho 83403-1464
Phone: 208-523-2681 Fax: 208-524-4435
E-mail: Malone.bullock@bateman-hall.com

**BID DATE:** All bids are to be submitted in a sealed and labeled envelope on **Tuesday, June 18th, 2024.**

**BID TIMES - STAGGERD (Pacific Time Zone):** Bid due times will be staggered by bid package (identified below) and will be opened and read publicly immediately following the closing of each bid package.

<table>
<thead>
<tr>
<th>Bid Package (BP) #</th>
<th>BP Description</th>
<th>Submission Deadline</th>
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<tbody>
<tr>
<td>BP-03 (FM12417)</td>
<td>Landscape &amp; Sprinkler</td>
<td>10:59 59 AM (PST)</td>
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<td>BP-04 (FM12418)</td>
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<td>BP-05 (FM12419)</td>
<td>Building Concrete</td>
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<td>BP-06 (FM12420)</td>
<td>Floor Sealer</td>
<td>11:39 59 AM (PST)</td>
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<td>Masonry</td>
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<tr>
<td>BP-08 (FM12422)</td>
<td>Metal Fabrication</td>
<td>11:49 59 AM (PST)</td>
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<td>BP-09 (FM12423)</td>
<td>Framing/Lumber</td>
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<tr>
<td>BP-10 (FM12424)</td>
<td>Wood Truss Supply</td>
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<td>BP-11 (FM12425)</td>
<td>Architectural Woodwork</td>
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<td>BP-12 (FM12426)</td>
<td>Insulation</td>
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<td>BP-13 (FM12427)</td>
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<td>BP-14 (FM12428)</td>
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<td>BP-15 (FM12429)</td>
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<td>BP-16 (FM12430)</td>
<td>Storefronts &amp; Windows</td>
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<td>Gypsum, Acoustical Ceilings &amp; FRP</td>
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<td>BP-21 (FM12434)</td>
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<td>BP-23 (FM12436)</td>
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<tr>
<td>BP-28 (FM12441)</td>
<td>Fire Alarm</td>
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Each sealed envelope should be labeled with the following: **Company’s Name, Address, “Sealed Bid Enclosed for D231130”, Bid Package Name and Number.**

**Bids will be received only at:**

ITD District 1  
ATTN: Front Desk, Drue Hatfield  
600 W. Prairie  
Coeur d’Alene, ID 83815

**FAXED OR EMAILED BIDS WILL NOT BE ACCEPTED.**

This Public Works project **IS NOT** financed in whole or in part by federal funds. Contractors will be required to pay not less than the minimum wage established by the Idaho Legislature or by the Department of Labor - State of Idaho that is in effect at the time the contract is awarded.

Contractors shall be licensed in the State of Idaho in accordance with the provisions of the **Idaho Public Works Contractors’ State License Law.**

The Owner reserves the right to accept or reject any and all proposals with or without cause, for any reason determined in its sole subjective determination to be in its best interest and to waive any informality in bidding.

ITD will determine whether to award the Contract within a period not to exceed forty-five (45) days from Bid Opening Date and will notify the Bidders of the determination. **All Bidders are expected to honor their proposals for the 45-day review period.**

**Bid Bond will be required** by Contractors for this project at the rate of **5% of the total bid** and is to be included in the sealed envelope. Form of Bid Bond must be in the form of a surety bond or may be a cashier’s check or money order made to the order of “Idaho Transportation Department” as outlined by Idaho Statutes for public work projects.

**Final Addendum will be issued on Friday, June 14th, 2024.**

-**END OF ADVERTISEMENT FOR BIDS**-
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BP-03  Irrigation & Landscaping FM#12417

Supply and Installation per Contract Documents
Including all drawings and the following specifications:
   Contract Documents
   Division 00 – Procurement and Contracting Requirements
   Division 01 – General Requirements

   Applicable Spec Sections
   328400 – Planting Irrigation
   329113 – Soil Preparation
   323200 – Turf and Grasses
   329300 - Plants

Work to Include, but not limited to the supply and installation of:

   Excavation and backfill required for own work;
   Topsoil as needed for own scope of work;
   Fine grading; Irrigation Sleeves; Irrigation Controls and wiring; Haul off excess materials/spoil;
   Dust Control; SWPPP Maintenance of Own Work;
   Clean-Up and Waste Disposal of own work;

BP-04  Fencing FM#12418

Supply and Installation per Contract Documents
Including all drawings and the following specifications:
   Contract Documents
   Division 00 – Procurement and Contracting Requirements
   Division 01 – General Requirements

   Applicable Spec Sections
   323100 – Fences and Gates

Work to Include, but not limited to the supply and installation of:

   Fencing, New gate and hardware per plans;
BP-05  Building Concrete FM#12419

Supply and Installation per Contract Documents
Including all drawings and the following specifications:
  Contract Documents
  Division 00 – Procurement and Contracting Requirements
  Division 01 – General Requirements

Applicable Spec Sections

  033000 – Cast-In-Place Concrete – Structural
  033500 – Concrete Finishing
  034700 – Site Cast Concrete
  071113 – Damp proofing
  079200 – Joint Sealants

Work to Include, but not limited to the supply and installation of:

All concrete associated with the building; All site concrete (including rebar of own work);
Placement of all bollards (bollards supplied by steel package);
Under Slab Vapor barrier;
Equipment concrete pad;
Fine grading of Aggregate base course placed by others;
Concrete pumping (as required); Exposed concrete sack finishes (as required);
Installation of Rigid Insulation under slab and on perimeter foundation walls (Supplied by others);
Clean-Up and Waste Disposal of Own Work;
Expansion materials, Weather protection, as needed for own scope of work;

BP-06  Floor Sealer FM#12420

Supply and Installation per Contract Documents
Including all drawings and the following specifications:
  Contract Documents
  Division 00 – Procurement and Contracting Requirements
  Division 01 – General Requirements

Applicable Spec Sections

  079200 – Joint Sealants

Work to Include, but not limited to the supply and installation of:

Concrete Joint Filler;
Sealing of all expose concrete
**BP-07  Masonry FM#12421**

Supply and Installation per Contract Documents
Including all drawings and the following specifications:
  - Contract Documents
  - Division 00 – Procurement and Contracting Requirements
  - Division 01 – General Requirements

Applicable Spec Sections
- 034500 – Precast Architectural Concrete
- 042200 – Concrete Unit Masonry
- 079200 – Joint Sealants

Work to Include, but not limited to the supply and installation of:
- Reinforcing steel of own work; Weather protection, if needed;
- Installation of Masonry Lintels (provided by BP-08);
- Layout and Placement of embeds; Drill and epoxy masonry rebar in concrete;
- installation of hollow metal frames in masonry walls;
- Masonry precast caps;
- Temporary Bracing as needed for own scope of work;
- All masonry flashings; Joint Fillers;
- Masonry Insulation (Placement of insulation between Masonry walls);
- Pressure Washing of Masonry;
- Protection of adjacent work during construction; Haul offsite Excess Materials and Waste;
- Dust Control; SWPPP Maintenance and repairs for Own Work;
- Clean-Up and Waste Disposal of Own Work.

**BP-08  Metal Fabrication (Supply & Installation) FM#12422**

Supply and Installation per Contract Documents
Including all drawings and the following specifications:
  - Contract Documents
  - Division 00 – Procurement and Contracting Requirements
  - Division 01 – General Requirements

Applicable Spec Sections
- 051200 – Structural Steel Framing
- 055000 – Metal Fabrications

Work to Include, but not limited to the supply and installation of:
Supply of steel bollards (placement of all bollards by others);
Bent Plate to wrap overhead doors;
Masonry ledgers, angle iron and anchors;
Gate at dumpster encloser;
Exterior Canopies and anchors;
Supply of Lintels & anchors for lintels (installation by BP-07 & BP-09)
Roof Ladders;

**BP-09 Framing/Lumber FM#12423**

Supply and Installation per Contract Documents
Including all drawings and the following specifications:
  - Contract Documents
    - Division 00 – Procurement and Contracting Requirements
    - Division 01 – General Requirements
  - Applicable Spec Sections
    - 061000 – Rough Carpentry
    - 061600 – Sheathing
    - 061753 – Shop-Fabricated Wood Trusses
    - 061800 – Glue-Laminated Construction
    - 072500 – Weather Barriers

Work to Include, but not limited to the supply and installation of:

All necessary equipment & fasteners to complete installation of Rough Carpentry;
All hardware & hangers;
Back up & blocking for all toilets accessories, cabinets, shelving, & miscellaneous;
Placement of Wood Trusses (supplied by BP-10);
Placement of lintels for trusses;
Wood nailer at parapet cap;
Weather Barriers per plans;
Provide and install HD hold-Downs;
Layout of own work; Receiving and unloading of materials;
Clean-up and Waste Disposal of own work
FOB to jobsite; Idaho Sales Tax

**BP-10 Wood Truss (Supply) FM#12424**

Supply and Installation per Contract Documents
Including all drawings and the following specifications:
  - Contract Documents
    - Division 00 – Procurement and Contracting Requirements
Division 01 – General Requirements

Applicable Spec Sections

061753 – Shop-Fabricated Wood Trusses

Work to Include, but not limited to the supply of:

Wood Trusses;
FOB to jobsite; Idaho Sales Tax

BP-11 Architectural Woodwork FM#12425

Supply and Installation per Contract Documents
Including all drawings and the following specifications:
Contract Documents
Division 00 – Procurement and Contracting Requirements
Division 01 – General Requirements

Applicable Spec Sections

064023 – Interior Architecture Woodwork
064116 – Plastic-Laminate-Clad Architectural Cabinets;
066116 – Solid Surface Fabrications
123553 – Stainless Steel Laboratory Casework
123616 – Stainless Steel Countertops

Work to Include, but not limited to the supply and installation of:

Windowsills; Countertop Brackets; Clean-Up and Waste Disposal of Own Work.
Stainless Steel Countertops;
Metal Upper Cabinet Units;
Wood Trim;
Field Measurements for own work;

BP-12 Insulation FM#12426

Supply and Installation per Contract Documents
Including all drawings and the following specifications:
Contract Documents
Division 00 – Procurement and Contracting Requirements
Division 01 – General Requirements
Applicable Spec Sections

072100 – Thermal Insulation

Work to Include, but not limited to the supply and installation of:

Supply of rigid insulation for under slab and perimeter foundation walls (installed by BP-5);
Masonry wall insulation;
Batt Insulation and Sound Insulation;
Clean-Up and Waste Disposal of Own Work.

**BP-13 Roofing FM#12427**

Supply and Installation per Contract Documents
Including all drawings and the following specifications:
Contract Documents
Division 00 – Procurement and Contracting Requirements
Division 01 – General Requirements

Applicable Spec Sections

074113.19 – Concealed Fastener Metal Roof Panels
074619 – Steel Siding
075423 – Thermoplastic Polyolefin Roofing
076200 – Sheet Metal Flashing and Trim

Work to Include, but not limited to the supply and installation of:

New roofing, gutters, downspouts, facia, trim, soffits and roofing insulation;
Standing seam metal roofing;
Walking Pads around equipment; Caulking of own work;
Metal Parapet Cap at Dumpster Encloser;
Roof Panels, Wall Panels & Siding;
Equipment Required to Perform Work; Clean-Up and Waste Disposal of Own Work.

**BP-14 Doors, Frames, & Hardware (Supply & Install) FM#12428**

Supply and Installation per Contract Documents
Including all drawings and the following specifications:
Contract Documents
Division 00 – Procurement and Contracting Requirements
Division 01 – General Requirements

Applicable Spec Sections

081113 – Hollow Metal Doors and Frames
081416 – Flush Wood Doors
083116 – Access Panels and Doors
087111 – Door Hardware

Work to Include, but not limited to the supply and installation of:

Doors, frames and hardware; Knox Box;
Prep and Installation of all Door Frames (Frames in masonry will be Installed by Mason – Coordinate with Mason including foaming of the door frames for hardware prep.)
Access Doors;
Include additional adjustment of hardware after three months of use;
Prep all doors and frames for paint (including bondo as needed);
Clean-Up and Waste Disposal of Own Work.

BP-15 Overhead Doors FM#12429

Supply and Installation per Contract Documents
Including all drawings and the following specifications:
Contract Documents
Division 00 – Procurement and Contracting Requirements
Division 01 – General Requirements

Applicable Spec Sections

083300 – Insulated Rolling Service Doors

Work to Include, but not limited to the supply and installation of:

Overhead doors with motors; Weather stripping; Layout and Field Measurement of own work;
Angle Iron for door track;
Z-Type Lintel brush seal;
Clean-Up and Waste Disposal of Own Work.
BP-16 Storefront & Windows FM#12430

Supply and Installation per Contract Documents
Including all drawings and the following specifications:

Contract Documents
Division 00 – Procurement and Contracting Requirements
Division 01 – General Requirements

Applicable Spec Sections

084100 – Entrances and Storefronts
087111 – Door Hardware
088000 – Glazing

Work to Include, but not limited to the supply and installation of:

- Flashing & Break metal of own work where required;
- Provide & installation of all glazing for all doors;
- All caulking, sealants and material for windows/storefront including; Removal of all stickers;
- Fire rated glazing where required; Include additional adjustment of hardware after three months of use;
- Clean-Up and Waste Disposal of Own Work.

BP-17 Gypsum, Acoustical Ceiling, & FRP FM#12431

Supply and Installation per Contract Documents
Including all drawings and the following specifications:

Contract Documents
Division 00 – Procurement and Contracting Requirements
Division 01 – General Requirements

Applicable Spec Sections

066400 – Plastic Paneling
092900 – Gypsum Wall Board
095300 – Acoustical Ceilings Suspension Assemblies

Work to Include, but not limited to the supply and installation of:

- Cementitious Tile Backer;
- FRP;
- Clean-Up and Waste Disposal of Own Work.
BP-18 Resilient Flooring & Base FM#12432

Supply and Installation per Contract Documents
Including all drawings and the following specifications:
  Contract Documents
  Division 00 – Procurement and Contracting Requirements
  Division 01 – General Requirements

Applicable Spec Sections

  096513 – Resilient Base and Accessories
  096519 – Resilient Tile Flooring

Work to Include, but not limited to the supply and installation of:

  Transitions to adjacent surfaces; Floor preparation;
  Protection of work after installation;
  Moisture Mitigation for Own Work;
  Clean-Up and Waste Disposal of Own Work.

BP-19 Ceramic Tile FM#12445

Supply and Installation per Contract Documents
Including all drawings and the following specifications:
  Contract Documents
  Division 00 – Procurement and Contracting Requirements
  Division 01 – General Requirements

Applicable Spec Sections

  093013 – Tiling

Work to Include, but not limited to the supply and installation of:

  Transitions to adjacent surfaces;
  Tile preparation;
  Protection of work after installation;
  Clean-Up and Waste Disposal of Own Work.
BP-20  Painting FM#12433

Supply and Installation per Contract Documents
Including all drawings and the following specifications:
   Contract Documents
   Division 00 – Procurement and Contracting Requirements
   Division 01 – General Requirements

   Applicable Spec Sections
   099113 – Exterior Painting
   099123 – Interior Painting

Work to Include, but not limited to the supply and installation of:

   Painting of bollards; Caulking of HM frames prior to painting;
   Clean, sand and prep all items prior to painting;
   Block sealer (All exposed masonry block);
   Painting of gas piping;
   Any necessary touch up painting required for steel; Protection of other work as necessary;
   Clean-Up and Waste Disposal of Own Work (including any over-spray).

BP-21  Specialties FM#12434

Supply and Installation per Contract Documents
Including all drawings and the following specifications:
   Contract Documents
   Division 00 – Procurement and Contracting Requirements
   Division 01 – General Requirements

   Applicable Spec Sections
   101423 – Signage
   102600 – Wall and Door Protection
   102800 – Toilet, Bath, and Laundry Accessories
   104413 – Fire Protection Cabinets
   104416 – Fire Extinguisher

Work to Include, but not limited to the supply and installation of:

   Protection of other work as necessary;
   FOB job site; Idaho State Sales Tax
BP-22 Window Blinds FM#12435

Supply and Installation per Contract Documents
Including all drawings and the following specifications:
   Contract Documents
   Division 00 – Procurement and Contracting Requirements
   Division 01 – General Requirements

   Applicable Spec Sections
   122400 – Window Shades

Work to Include, but not limited to the supply and installation of:

   Protection of other work as necessary;
   Clean-Up of Own Work;

BP-23 Fire Sprinkler FM#12436

Supply and Installation per Contract Documents
Including all drawings and the following specifications:
   Contract Documents
   Division 00 – Procurement and Contracting Requirements
   Division 01 – General Requirements

   Applicable Spec Sections
   21000 – Fire Suppression

Work to Include, but not limited to the supply and installation of:

   Design; Shop drawings, Permit approval, and Fees; Fire Water Connection and Line into Building;
   Installation for fire riser into building, include excavation, backfill and pouring of thrust blocks;
   Fire caulking and fire stopping for own penetrations;
   Protection of heads after install and removal of protection at substantial completion;
   Commissioning and Start Up Reports;
   Clean-Up and Waste Disposal of Own Work.
BP-24  Plumbing FM#12437

Supply and Installation per Contract Documents
Including all drawings and the following specifications:
  Contract Documents
  Division 00 – Procurement and Contracting Requirements
  Division 01 – General Requirements

  Applicable Spec Sections
  Division 22 - Plumbing

Work to Include, but not limited to the supply and installation of:
  Plumbing complete; Permits and Fees;
  Utilities from 5' Outside of Building;
  Excavation and backfill of own work; Spoil pile remove of own work; Trench Drains; Gas piping;
  Seismic bracing per code requirements;
  Roof drains connection to storm drain system;
  Condensation lines for own plumbing equipment;
  Core drilling, saw cutting, grouting, caulking and fire Stopping for own penetrations;
  All Plumbing Fixtures; Commissioning and Start Up Reports;
  Clean-Up of Own Work;

BP-25  HVAC FM#12438

Supply and Installation per Contract Documents
Including all drawings and the following specifications:
  Contract Documents
  Division 00 – Procurement and Contracting Requirements
  Division 01 – General Requirements

  Applicable Spec Sections
  Division 23 - HVAC

Work to Include, but not limited to the supply and installation of:
  Mechanical complete; Permits and Fees;
  Seismic bracing per code requirements;
  Condensation lines for own equipment;
  Core drilling, saw cutting, grouting, caulking and fire Stopping for own penetrations;
  Roof curbs for mechanical equipment; HVAC controls;
  All Mechanical Fixtures; Commissioning and Start Up Reports;
Commissioning Plan by Design Professional;  
Test and Balancing with Reports; Clean-Up of Own Work;

**BP-26 Building Electrical FM#12439**

Supply and Installation per Contract Documents  
Including all drawings and the following specifications:  
 Contract Documents  
Division 00 – Procurement and Contracting Requirements  
Division 01 – General Requirements

Applicable Spec Sections  
Division 260000 – Electrical

Work to Include, but not limited to the supply and installation of:

Electrical Permits and Fees; Coordination with Power Company for services needed;  
All trenching, backfill conduits and concrete associated with new service;  
Excavation and backfill of own work; Removal of own spoil piles;  
Heating cable for roof drains, gutters, & downspouts as called in drawings;  
Core drilling, saw cutting, grouting, caulking and fire caulking for own penetrations;  
Underground electrical conduits are to be placed under the slab gravel;  
Electrical Pedestal per architectural sheets;  
All race ways (conduit) for fire alarm, access control, and low voltage;  
DBS/DAS System;  
Blocking for electrical items; Seismic bracing per code requirements;  
Low voltage wiring; Clean-Up of Own Work;

**BP-27 Access Control FM#12440**

Supply and Installation per Contract Documents  
Including all drawings and the following specifications:  
 Contract Documents  
Division 00 – Procurement and Contracting Requirements  
Division 01 – General Requirements

Applicable Spec Sections

260500 – Electrical General Provisions  
281300 – Access Control
Work to Include, but not limited to the supply and installation of:

All wire, devices, and controls for system;

**BP-28  Fire Alarm FM#12441**

Supply and Installation per Contract Documents
Including all drawings and the following specifications:
Contract Documents
Division 00 – Procurement and Contracting Requirements
Division 01 – General Requirements

Applicable Spec Sections

260500 – Electrical General Provisions
284600 – Fire Alarm

Work to Include, but not limited to the supply and installation of:

Include all components, wiring, and conduit;

**BP-29  Low Voltage / Data FM#12442**

Supply and Installation per Contract Documents
Including all drawings and the following specifications:
Contract Documents
Division 00 – Procurement and Contracting Requirements
Division 01 – General Requirements

Applicable Spec Sections

260500 – Electrical General Provisions
Division 270000 - Communications

Work to Include, but not limited to the supply and installation of:

All wiring and devices;

**END OF SECTION 000031**
SECTION 000070 – LICENSING OF PUBLIC WORKS CONTRACTORS NOTICE

NOTICE LICENSING OF PUBLIC WORKS CONTRACTORS STATE OF IDAHO

UNLAWFUL  For any person to engage in the business or act in the capacity of a PUBLIC WORKS CONTRACTOR in the State of Idaho without a license.

PENALTIES  Any person, firm, co-partnership, or corporation, acting as a PUBLIC WORKS CONTRACTOR without a license shall be guilty of a MISDEMEANOR.

EVERY PUBLIC OFFICER who knowingly lets a public contract to any person, firm, co-partnership, or corporation, who does not hold a license shall be guilty of a MISDEMEANOR.

EXCEPTION  No contractor shall be required to have a license in order to submit a bid or proposal for contracts for public works FINANCED IN WHOLE OR IN PART BY FEDERAL AID FUNDS, but at or prior to the award and execution of any such contract by the State of Idaho, or other contracting authority, the successful bidder shall secure a license.

SUPPLY ONLY CONTRACTS  Contractors whose scope of work is supply only are not required to have a public works license.

WHO MUST BE LICENSED  “Public works contractors,” – which is any “builder,” or “specialty contractor,” or any person who offers to submit a proposal or enter into a contract with the STATE OF IDAHO, or any COUNTY, CITY, TOWN, VILLAGE, SCHOOL DISTRICT, IRRIGATION DISTRICT, DRAINAGE DISTRICT, SEWER DISTRICT, FIRE DISTRICT, or any other taxing subdivision or district of the State, authorities to let or award contracts for the construction, repair or reconstruction of any public work.

PUBLIC WORK includes HEAVY, HIGHWAY, BUILDING and SPECIALTY construction.

EXEMPTION  Any construction, alteration, improvement or repair involving an estimate cost of less than $10,000.

AUTHORITY - Title 54, Chapter 19, Idaho Code as amended, “THE PUBLIC WORKS CONTRACTORS LICENSE ACT.”

DIVISION OF BUILDING SAFETY
PUBLIC WORKS CONTRACTORS LICENSING
1090 E Watertower Street, Suite 150
Meridian, ID 83642
Phone: 208-334-4057

END OF SECTION 000070
SECTION 000100 – INSTRUCTIONS TO BIDDERS

DEFINITIONS
The Bidding Documents comprise the Project Documents and shall consist of the plans, the contents of the specification books (including all documents referred to in the plans and specifications) and any addenda issued by the architect. The Bidding Requirements and the proposed Contract Documents are also included in the Project Documents.

Addenda are written or graphic documents issued by the Architect or Construction Manager prior to execution of the Contract which modify or interpret the Project Documents. The Addenda become part of the Contract Documents as noted in the Form or Agreement upon execution of the Contract.

Verbal Communications do not supersede the project documents. The project documents (plans, specifications, addenda) take precedence over verbal, email or other comments not included in addenda. If you feel a verbal comment made during a pre-bid meeting, phone call, etc. is important, it must be issued to the CM in RFI format and clarified in an official addendum.

A sample of the Contract is included in the project documents. Accepted bidder will be issued a contract that will include the Executed Bid Form as an attachment/exhibit to the Contract.

BIDDER’S REPRESENTATIONS
By submitting a bid, the bidder represents that:
1) Bidder has carefully studied and compared the Bidding Documents with each other. Bidder understands the Bidding Documents and the bid is fully in accordance with the requirements of those documents;
2) Bidder has thoroughly examined the site and buildings located thereon, has become familiar with local conditions which might directly or indirectly affect the contract work, and has correlated its personal observation with the requirements of the proposed Project Documents; and
3) Bidder fully understands the requirements identified in the Bid Form and understands that the Bid Form will be incorporated into the executed contract; and
4) Bid is based on the material, equipment, and systems required by the Bidding Documents without exception.

BIDDING DOCUMENTS
Copies of Bidding Documents in digital format shall be obtained from the Construction Manager as outlined in the Advertisement for Bids. Partial sets of Bidding Documents will not be issued.

Bidders shall use complete sets of Bidding Documents in preparing bids and make certain that those submitting sub-bids to them have access to all portions of the documents that pertain to the work covered by sub-bid, including General conditions, Special & Supplementary Conditions, and Division 00 & 01. Bidder assumes full responsibility for errors or misinterpretations resulting from use of partial sets of Bidding Documents by itself or any sub-bidder.

Interpretation or Correction of Bidding Documents
If any bidder, in his study of the Bidding Documents as described above, is in doubt as to the true meaning of any part of the proposed Contract Documents or finds errors, discrepancies, or omissions in them, he shall at once request interpretation or correction of those errors, discrepancies, and omissions as outlined in the Advertisement for Bids.

Bid the MOST EXPENSIVE option called for in the bidding documents. If there is a discrepancy between any documents (plans, specifications, addenda), you are to include the most expensive option. Also, you are welcome to submit any cost savings option as identified in the Bid Form Attachment section of this specification (see below).
Substitutions & Equal Products

Substitutions for specified products and systems, as defined in the Uniform Commercial Code, are not acceptable. However, equal products may be approved upon compliance with Contract Documents requirements. The terms “Acceptable Manufacturers” and “approved Manufacturers/Supplies/Installers” are used throughout the Project Manual to differentiate among the options available to Contractor regarding specified products, manufacturers and suppliers.

Base bid only on material, equipment, systems, and suppliers specified in the Project Manual unless:
- Specified Material, equipment, or system is listed under the heading “acceptable Manufacturers, and
- Request for use of equal products is submitted in a properly complete Equal Product Approval Request Form for Architect’s approval seven days minimum prior to bid opening, and
- Approval for use of such equal product is secured by Addendum issued prior to the scheduled bid opening time.

Addenda

Addenda will be posted no later than 48 hours prior to bid opening. No addenda will be issued less than 48 hours prior to bid opening.

BIDDING PROCEDURES

Bids shall be prepared on Contractor Bid Form shown in section 000300. A photocopy of the form bound in the Project Manual or a modified form included in an addendum is acceptable. Fill in all blanks on bid Form by typewriter or by printing manually in ink. Signatures shall be in longhand and executed by representative of bidder duly authorized to make contracts.

Bids shall bear no information other than that requested on Bid Form. Bid form shall bear no other marks, erasures writing changes or interlineations. Attachments shall not be included unless specifically required by a statement on the Bid Form or as addressed in the Bid Form Attachment section of this specification.

Bid Form Attachment

1) Bidders are encouraged to provide “Value Engineering Options or Cost Saving Options (VE Options)” in addition to their base bid, on their own form as an attachment to the bid. ITD will take into consideration the attached VE items in evaluating subcontractor proposals for award. VE Options shall not be included in the Base Bid (Bid Form) numbers and will only be included and identified as an attachment to the Bid Form.

Bid Bond

A Bid Bond in the amount of 5% of the total bid will be required as per the instructions identified in the Advertisement for Bids, Section 000030.

Performance & Payment Bond

It is not required of each bidder to provide a payment and performance bond at time of bid; however, each bidder must be capable of providing a payment and performance bond in the amount of 100% of the contract sum and will identify their Bond Rate/Amount on their Bid Form. The owner and reserves the right to elect some bidders to provide such bonding prior to contract award. The costs for a payment and performance bond will be incorporated into the notice of award and the contractor shall have 10 days from the notice of award to secure the bonding.

Failure or refusal to furnish bonds or insurance policies or certificates in a form satisfactory to the Owner shall subject the bidder to loss of time from the allowable construction period equal to the time of delay in furnishing the required material.

Insurances

Liability and Workers’ Compensation Insurance shall be provided at time of award for the amounts identified in the contract. Contractor shall name Owner and CM as additional Insured.
Submission of Bids
Submit bid in accordance with Section 000030 Advertisement for Bids & 000300 Contractor Bid Form.

Modification Or Withdrawal of Bid
Bidder guarantees there shall be no revisions or withdrawal of bid amount for 45 days after bid opening. Prior to bid opening, bidders may withdraw bid by written request or by reclaiming bid envelope.

Naming of Contractors
With regard to possessing an appropriate license or certificate of competency all contractors must have, at the time of the bid opening, a current license in the appropriate category (class, type and specialty category) as issued by the Public Works Contractors State License Board. In addition, plumbing and electrical subcontractors shall have, at the time of the bid opening, a valid plumbing contractor’s license or electrical contractor’s license, respectively as issued by the Idaho Division of Building Safety.

CONSIDERATION OF BIDS
Opening of bids – See Advertisement for Bids

Right to Accept or Reject - The Owner reserves the right to accept or reject any and all bids with or without cause, for any reason determined in its sole subjective determination to be in its best interest and to waive any informality in bidding.

Acceptance of Bid – No bidder shall consider itself under contract after opening and reading of bids until a Notice of Award has been issued and compliance therewith has been made.

The Owner does not discriminate on the basis of race, religion, sex, national origin, marital status, age, physical handicap, ownership by women or minorities or sexual orientation.

Bidders past performance, installer qualifications/certifications, organization, subcontractor’s selection, equipment, and ability to perform and complete its contract in the manner and within time specified, together with amount of bid and VE items provided, will be elements considered in award of a contract.

FORM OF AGREEMENT BETWEEN CM/GC & SUBCONTRACTOR
Form to be used – Agreement form will be like the Owner’s sample Form of Agreement included in project documents.

END OF SECTION 000100
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SECTION 000300.1 – CONTRACTOR BID FORM

Bid Proposal for:
D231130 – D1 Coeur d’Alene Laboratory Facility
Idaho Transportation Department (ITD)
Coeur d’Alene, Idaho

The Bidder, in compliance with the advertisement for bids for the above project, having examined the bidding and contract documents and the site of the proposed work, and being familiar with all of the conditions surrounding the construction of the proposed project including the availability of materials and labor, hereby proposes all labor, equipment, materials and supplies, and to provide the service and insurance in accordance with the Contract Documents, within the time set forth, and at the prices stated below. These prices are to cover all expenses incurred in performing the work required under the Contract Documents.

TIME SCHEDULE:

Bidder agrees to complete the work within the time schedule as established by the CM. Basic principles of the project schedule are as follows:

Milestone “Completed By” Dates:

<table>
<thead>
<tr>
<th>Site:</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Construction Start on or before</td>
<td>06/03/24</td>
</tr>
<tr>
<td>Building Pad</td>
<td>06/28/24</td>
</tr>
<tr>
<td>Right-of-Way Utilities</td>
<td>07/05/24</td>
</tr>
<tr>
<td>Site Utilities &amp; Electrical</td>
<td>08/16/24</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Building:</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Construction Start</td>
<td>07/22/24</td>
</tr>
<tr>
<td>Concrete Slab Complete</td>
<td>09/23/24</td>
</tr>
<tr>
<td>Masonry Block Complete</td>
<td>11/18/24</td>
</tr>
<tr>
<td>Wood Framing Complete</td>
<td>11/25/24</td>
</tr>
<tr>
<td>Roofing Complete</td>
<td>12/09/24</td>
</tr>
<tr>
<td>Gypsum Walls Complete</td>
<td>01/06/25</td>
</tr>
<tr>
<td>Substantial Completion</td>
<td>03/17/25</td>
</tr>
</tbody>
</table>

By signing this bid form, bidder acknowledges the above milestone dates and agrees to accomplish their work on or before their respective milestone(s) and within the overall schedule in concert with other trades as directed by the CM.

Bidding Company Name: ________________________________
This bid form applies to bid package number & title:
(a separate bid form for each bid package must be provided)

<table>
<thead>
<tr>
<th>Bid Package No.</th>
<th>Bid Package Title</th>
</tr>
</thead>
</table>

Bidder acknowledges receipt of the **Addenda No:** ____________________________.
(List by Add. Number(s))

**BASE PROPOSAL – Laboratory Facility Phase 2 (Building):** The complete Scope of Work for the Bid Package noted above (Idaho State sales tax is included), for the sum of:

Dollars($__________________________)

(Amount shall be shown in both figures and words. In case of discrepancy, the amount in words will govern.)

- If a **Performance and Payment Bond** is requested for the above scope, please list the **Bonding Rate Percentage and dollars**, that would be applied to the base bid amount:

  Rate %__________ $__________________________

For contractors bidding on more than one Bid Package a discount may be offered by your firm if both (or more) packages are accepted. Note the discount amount, as applicable, below. The Owner reserves the right to select the combination of separate bids, or a combination of bids with the discount, whichever results in the lowest bid.

List of Bid Packages to combine: _______________________________________

**Discount, in dollars**, if accepted in combination: $__________________________

Bidder understands that the Owner and/or the CM reserves the right to accept or reject any and all bids with or without cause, for any reason determined in its sole subjective determination to be in its best interest and to waive any informality in bidding.

**The bidder agrees that this bid shall be good and may not be withdrawn for a period of forty-five (45) calendar days after the scheduled closing time for receiving bids (including alternate items).**

The scope of each bid package must be bid in its entirety as a lump sum. Segregated bids will not be accepted. Any qualifications, exceptions, clarifications, or exclusions to one’s bid may
disqualify their proposal with exception of the Bid Form Attachment (VE Options items) identified in the Instructions to Bidders Spec Section and as below.

Bid Form Attachment - Bidders are encouraged to provide “Value Engineering Options or Cost Saving Options (VE Options)” in addition to their base bid, on their own form as an attachment to this bid form. ITD will take into consideration the attached VE items in evaluating subcontractor proposals for award. VE Options shall not be included in the Bid Form Base Proposal or Alternate/Optional Numbers and will only be included and identified as an attachment to this Bid Form.

Upon receipt of written notice of the acceptance of this bid, Bidder will execute the formal contract referenced within seven (7) days and deliver Insurance Certificates, P&P Bonds, and Special Condition Forms as required by the Bid Documents.

Additional Bidder Provisions

By submitting a bid for this Project, the undersigned bidder agrees that, if awarded, the Contractor will conform to all conditions and requirements of the Contract, Contract Documents and the following additional provisions:

95% Bona Fide Idaho Residents. Contractor agrees to comply with conditions pertaining to Sections 44-1001 and 44-1002, Idaho Code, requiring the employment of ninety-five percent (95%) bona fide Idaho residents and providing for a preference in the employment of bona fide Idaho residents and regarding the employment of persons not authorized to work in the United States.

Certification Concerning Boycott of Israel. Pursuant to Idaho Code section 67-2346, if payments under the Contract exceed one hundred thousand dollars ($100,000) and Contractor employs ten or more persons, Contractor certifies that it is not currently engaged in, and will not for the duration of the Contract engage in, a boycott of goods or services from Israel or territories under its control. The terms in this section defined in Idaho Code section 67-2346 shall have the meaning defined therein.

Debarment and Suspension. In submitting this bid proposal, we hereby certify that we have not been suspended or in any way excluded from procurement actions by any State Agency. We fully understand that if information contrary to this certification subsequently becomes available, such evidence may be grounds for non-award or nullification of a bid contract.

Anti-Collusion. In submitting this bid proposal, we hereby certify this proposal was developed and prepared without any collusion with any competing bidder or State employee. The content of this proposal has not been disclosed to any competing or potentially competing bidder prior to the proposal due date and time. Furthermore, no action to persuade any person, partnership or corporation to submit or withhold a bid has been made.

Equal Employment Opportunity. In submitting this bid proposal, you certify to the State that your company and the subcontractors you hire will comply with the requirements of 41 CFR §§ 60-1.4(a), 60-300.5(a), and 60-741.5(a). These regulations prohibit discrimination against
qualified individuals based on their status as protected veterans or individuals with disabilities and prohibit discrimination against all individuals based on their race, color, religion, sex, sexual orientations, gender identity or national origin. Moreover, these regulations required that covered prime contractors and subcontractors take affirmative action to employ and advance in employment individuals without regard to race, color, religion, sex, sexual orientation, gender identity, national origin, protected veteran status or disability.

**Domestic Procurement Preferences.** In submitting this bid proposal and in accordance with 2 CFR §200.322 Domestic preferences, you certify to the District that your company will, as appropriate and to the extent consistent with law, provide preference for the purchase and use of goods, products or materials produced in the United States (including but not limited to iron, aluminum, steel, cement, and other manufactured products).

The names and addresses of the entities that will perform the work identified below, subject to approval of ITD, if Undersigned is awarded the Contract, are as follows:

**Plumbing**
(Name)  
(Address)  
Idaho Public Works Contractors License No.  
Idaho Plumbing Contractors License No.  

**HVAC**
(Name)  
(Address)  
Idaho Public Works Contractors License No.  
Idaho HVAC Contractors License No.  

**Electrical**
(Name)  
(Address)  
Idaho Public Works Contractors License No.  
Idaho Electrical Contractors License No.  

Failure to name a properly licensed contractor in each of the above categories may render the bid unresponsive and void. *Please note that if the above trades do not apply to this bid package, empty lines should be noted as “Not Applicable” or “N/A”.*

The State of Idaho policy prohibits purchase of asbestos products and asbestos containing materials for use in or on any facility, including personal and real property, where acceptable alternatives are
available. The contractor certifies by submission of this bid proposal that the products or materials to be furnished as a result of this bid are free of asbestos and hazardous materials.

Execute as part of this bid form:

CONTRACTOR’S AFFIDAVIT
CONCERNING ALCOHOL AND DRUG-FREE WORKPLACE

STATE OF ______________________
COUNTY OF ______________________

Pursuant to the Section 72-1717, Idaho Code, I, the undersigned, being duly sworn, depose and certify that __________________________ is in compliance with the provisions of Section 72-1717, Idaho Code; that __________________________ provides a drug-free workplace program that complies with the provisions of Title 72, Chapter 17, Idaho Code, and will maintain such program throughout the life of a state construction contract; and that __________________________ shall subcontract Work only to subcontractors meeting the requirements of Section 72-1717(1)(a), Idaho Code.

______________________________
Name of Contractor

______________________________
Address

______________________________
City and State

By: ____________________________
(Signature)

Subscribed and sworn to before me this _________________ day of __________________, __________.

______________________________
NOTARY PUBLIC
Residing at: __________________________
Commission expires: __________________________

FAILURE TO EXECUTE THIS AFFIDAVIT AND SUBMIT IT ALONG WITH YOUR BID SHALL MAKE YOUR BID NON-RESPONSIVE.
This Executed Bid Form shall be an attachment to the Contract. The Undersigned notifies that he is of this date duly licensed as an Idaho Public Works Contractor and further that he possesses the following as applicable:

Idaho **Public Works** License: ____________________________  Exp. Date: __________________

Idaho **Contractor Registration**: __________________________

Dated this ________ day of ____________, ____________.

(date) (month) (year)

Respectfully Submitted,

By: ________________________________

(Company)

________________________________________

(Business Address)

________________________________________

(Authorized Signature)

________________________________________

(Printed Name & Title)

________________________________________

(Email Address)

________________________________________

(Telephone) (Fax Number)

**PLEASE NOTE:**
- All bids are to be submitted in a sealed properly labeled envelope
- No lines are to be left blank (NA or “Not Applicable” may be used to complete empty lines)
- Bid Bond included at a rate of 5% of the total bid

**END OF SECTION 000300**
SECTION 000600 – SPECIAL CONDITIONS

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1.0 Prime Contracts
2.0 Bid (Scope Packages)
3.0 Site Access, Security, Rules & Regulations
4.0 Temporary Services
5.0 Material Handling, Parking & Scaffolding
6.0 Weather Protection (Heat & Cover)
7.0 Clean Up
8.0 Safety
9.0 Drug & Alcohol Policy
10.0 Storm Water Pollution Prevention
11.0 Supervision
12.0 Weekly Progress Meetings
13.0 Schedule
14.0 Change/Proposal Requests
15.0 Test & Inspections
16.0 Permits & Licensing
17.0 Submittals, O&M Manuals & As-Built Drawings
18.0 Taxes
19.0 Survey & Layout
20.0 Qualifications of Personnel
21.0 Warranty
22.0 Right of Joint-Check Payment
23.0 Slab Protection
24.0 ITD Facility Operations

1.0 Prime Contracts
1.1 Prime Contracts will be issued directly, by Idaho Transportation Department (ITD), for each of the Bid Packages identified in specification section 000031. ITD has retained a CM Agent (Bateman-Hall, Inc.) to help coordinate the management of the overall project.

1.2 Each Prime Contractor (Contractor) will be required to cooperate and coordinate with the CM and all other Contractors to perform their work in accordance with a Master Project Schedule developed, updated, and maintained by the CM.

2.0 Bid (Scope) Packages
2.1 The scope of each bid package must be bid in its entirety. Any qualifications, exceptions, clarifications, or exclusions to one’s bid may disqualify their proposal with exception of the VE Options items identified on the Bid Form and in the Instructions to Bidders Spec Section 000100.

2.2 The scope of work in each bid package will become part of the bidder’s contract. All Contractors will be accountable for the following requirements:

3.0 Site Access, Security, Rules & Regulations
3.1 All visitors sponsored by the Owner, Architect/Engineer, CM, Contractor, Subcontractors, or Unions must check in with the CM and must follow all project rules and regulations. Each Contractor is to keep a strict attendance list of who is approved to be on site and when they are on site.
3.2 Any unauthorized personnel on site will be considered as a trespasser, and the appropriate authorities will be contacted. Unauthorized personnel are defined as any and all people not previously approved to be on site by the CM/ITD. Last Contractor on site each day is responsible for complete project lock-up.

3.3 A normal work week for this project will consist of a 40-hour Monday-Friday work schedule. Any time required by a contractor outside of a normal work week will require a 48-hour advanced notification. The CM Supervision required for work outside of the normal work week timeframe will be billed to the requesting contractor at a rate of $200/HR for each Supervisor necessary.

4.0 **Temporary Services**

4.1 Services provided by the Construction Manager will consist of the following: Temporary sanitary facilities, temporary power to central locations only, and dumpsters for miscellaneous construction debris only. Temporary general building lighting will be provided (under the Electrical Package) but trade specific task lighting will be by each contractor.

4.2 Large amounts of construction debris such as concrete, masonry block, demolition work, pallets, boxes, and other large packaging materials will be the contractor’s responsibility to provide proper disposal of into their own containment systems whether on-site or off-site.

5.0 **Material Handling, Parking & Scaffolding**

5.1 All Contractors will be fully responsible for their own materials. This includes the off-loading, relocating, storage, protection, security, etc. For on-site storage, the CM’s superintendent is to be notified prior to the arrival of all materials for coordination of the laydown area. All deliveries are to be coordinated in the CM Weekly Coordination meetings.

5.2 The CM and/or ITD is not responsible for unloading material. A $500/HR minimum fee will be back charged to all Contractors and/or Suppliers not performing their own unloading.

5.3 All off-site storage will need to be kept in a bonded and certified warehouse, inspected by the CM and/or owner and properly labeled prior to payment.

5.4 Parking areas are to be coordinated with the CM. Parking may be limited and the CM & Owner are not responsible for lost, damaged or stolen material, equipment, vehicles, etc.

5.5 Each Contractor is responsible to provide hoisting, vertical transportation, and scaffolding necessary to complete Contractor’s work. Unless agreed to in writing, any hoisting, vertical transportation, or scaffolding is not to be shared.

6.0 **Weather Protection (Heat & Cover)**

6.1 Any heating, covering, and/or snow removal required to properly perform contracted work will be the responsibility of the Contractor. Bid accordingly as these costs are expected to be part of Contractor’s bid for their own work for all exterior finishes.

6.2 Heating of the building once enclosed will be addressed by the CM.

7.0 **Clean Up**

7.1 Daily clean-up is a must for all Contractors. A clean project is a safe and productive site. All construction debris must be placed in garbage cans or dumpster at the end of each workday and areas where work was performed is to be cleared and swept.
7.2 Contractors that fail to keep up on their clean-up will be billed at a rate of $500/HR minimum fee to have this work completed for them by crews of the Construction Manager’s choosing.

8.0 Safety
8.1 Each Contractor will be required to hold a weekly safety meeting with their own personnel and provide a copy of the meeting minutes to the CM’s Superintendent. Each Contractor will be required to provide a copy of their safety manual to the CM’s Superintendent, which will be maintained in the onsite job trailer. Each Contractor’s Foreman will be required to attend a weekly safety meeting held by the CM’s Superintendent.

8.2 The Contractor shall implement appropriate safety measures pertaining to their work and the project, including required training, documentation, certification, establishing safety rules, posting appropriate warnings and notices, erecting safety barriers, establishing proper notice procedures and implementing and maintaining a drug and alcohol-free workplace program to protect persons and property at the site and adjacent to the site from injury, loss, or damage.

8.3 The Contractor is required to designate an individual at the site in the employ of the Contractor who shall act as the Contractor’s designated safety representative with a duty to prevent accidents. Unless otherwise identified by the Contractor in writing, the designated safety representative and the competent person for the work shall be Contractor’s project foreman.

8.4 Before commencing work on the project, a Job Hazard Analysis (JHA’s) will be required by all Contractors for their scopes of work. Each JHA will be turned into the CM’s Superintendent and approved prior to the start of that scope of work. JHA’s shall include, as a minimum, Contractors work activities, the hazards associated with the activities and how each activity hazards will be safely addressed in both PPE requirements and course of actions. Documented training forms shall accompany each JHA assuring that all personnel working have been trained for the associated hazards involved.

8.5 Contractors shall require all employees and sub tier employees to wear proper construction attire entailing hard hats and bright colored shirts or vests when on the job site, as a minimum.

8.6 Each Contractor will be required to provide MSDS (Material Safety Data Sheets) for all products that may be used for their work.

8.7 If hazardous substances of a type of which an employer is required by law to notify its employees are being used on the site by the Contractor, the Contractor’s sub-subcontractors or anyone directly or indirectly employed by them, the Contractor shall, prior to harmful exposure of any employees on the site to such substance, give written notice of their hazardous communications plan as well as all MSDS pertaining to the project to the Contractor in sufficient detail and time to permit compliance with the law.

8.8 The Contractor shall give prompt written notice to the Contractor of:
8.8.1 any accident involving bodily injury requiring a physician’s care,
8.8.2 any property damage exceeding Five Hundred Dollars ($500.00) in value, or
8.8.3 any failure that could have resulted in serious bodily injury, whether or not such an injury was sustained.

8.9 A detailed written report shall be furnished if requested by the CM.

8.10 Prevention of accidents at the site is the responsibility of all persons and entities at the site. Establishment of a safety program by the CM shall not relieve the Contractor or other parties of their
safety responsibilities. The Contractor shall establish its own safety program implementing safety measures, policies and standards conforming to those required or recommended by governmental and quasi-governmental authorities having jurisdiction and by the CM and Owner, including, but not limited to, requirements imposed by the Subcontract Documents.

8.11 The Contractor shall comply with the reasonable recommendations of insurance companies having an interest in the Project.

8.12 The Contractor shall stop any part of the contract work which the contractor deems unsafe until corrective measures satisfactory to the CM shall have been taken. The CM’s failure to stop the Contractor’s unsafe practices shall not relieve the Contractor of the responsibility therefor.

8.13 Contractor agrees to comply in all respects with federal, state and local law applicable to the prosecuting of Work under this Agreement, including such specific laws to which Contractor is bound by the Contract Documents. Such compliance shall include, but not be limited to, the maintenance of a drug-free and alcohol-free workplace as such laws and others may apply. Contractor’s failure to comply with federal, state and local law applicable to the prosecution of Work under this Agreement shall be grounds for withholding of payment and/or termination for default of this Agreement. Compliance will be strictly enforced.

8.14 Use of telephones can be a distraction to the safe performance of the Work. Use of telephones for personal use – including mobile phones – is prohibited on the jobsite during work time.

8.15 Listening to music can be a distraction to the safe performance of the Work. Listening to music is prohibited on the jobsite during work time.

8.16 All traffic control; signage; barricading, etc. as required to perform work is the responsibility of the Contractor performing the work.

8.17 All Contractors are strongly encouraged to familiarize themselves with OSHA’s Silica Dust Requirements. Compliance will be strictly enforced.

8.18 COVID-19 safe work requirements may be anticipated for this project. Current guidelines for safe work practices implemented by local, state, and federal jurisdictions will be followed and adhered to at the jobsite and may be subject to change as each of the aforementioned jurisdiction requirements change throughout the timeline of the project. Each Contract will be required to comply.

8.19 Any OSHA fines levied against the CM and/or the Owner as a result of a Contractor’s actions or inactions will be treated as a deductive change order to that Contractor’s contract amount.

9.0 Drug & Alcohol Policy

9.1 Drug and Alcohol Abuse at the job site will not be tolerated. Drug and Alcohol Abuse means being under the influence of illegal drugs and/or alcohol while at the job site; it also means being at the job site while in the possession of illegal drugs.

9.2 Workers who engage in Drug and Alcohol Abuse at the job site jeopardize the safety of themselves and other workers. Contractor shall be responsible for the investigation and, if necessary, discipline of its employee(s) who are suspected of Drug and Alcohol Abuse.
9.3 If a contractor foreman cannot be found, Contractor grants CM’s superintendent with the authority to dismiss that worker from the site until Contractor’s foreman is located and Contractor can conduct its investigation.

10.0 **Storm Water Pollution Prevention**

10.1 The Site Contractor will have primary responsibility to implement and maintain the storm water pollution prevention plan. However, each Contractor will also be held responsible to obey and abide by all EPA regulations and SWPPP specific for this project. Any damage by a Contractor to the installed protection systems will be the responsibility of the Contractor involved to correct or replace. Each Contractor will be required to attend a SWPPP pre-construction meeting and to sign a SWPPP certification form prior to working on site.

11.0 **Supervision**

11.1 Each Contractor is required to have a competent on-site Supervisor or Foreman approved by the CM’s superintendent. The on-site Supervisor is to be present on-site for all work performed for the Contractor’s bid package. This Supervisor must be able to competently address day-to-day issues and be in contact daily with the CM’s Superintendent. Once approved, this person cannot be changed without prior approval from the CM’s Superintendent.

12.0 **Weekly Progress Meetings**

12.1 All Contractors working on the site will be required to attend a weekly coordination meeting in the CM’s on-site office. These meetings will be essential for scheduling day-to-day work activities and coordination with the other Contractors working on the project. Each weekly meeting will also discuss project safety and storm water pollution prevention.

13.0 **Schedule**

13.1 Time is of the essence for this project. All bids shall be based on the ability to meet the schedule, supply required material, manpower, supervision, and equipment and coordinate with other trades. Your bid proposal shall include any required or needed lead times and special durations for review. Any additional material, labor, supervision, equipment, coordination, and material escalation fees are to be included in bid. All additional costs to accelerate work, material deliveries, or equipment to meet the schedule shall be included in the bid.

13.2 Each Prime Contractor will be required to provide specified scheduling information necessary to maintain the Master Project Schedule and to meet the milestone completion dates as identified on the Bid Form and in each Prime Contract.

13.3 Further coordination and scheduling between Contractors, Suppliers and the CM is required to produce an acceptable schedule to the Owner. Contractor shall guarantee that they will meet all schedule objectives as stated on the bid form; in the master construction schedule; short term look-ahead schedules; coordination meetings; and other written notices.

13.4 The overall schedule of the project will be maintained and updated regularly in the CM’s job site trailer. Schedules will not be sent out to individual Contractors. Project Milestone dates have been included on the Bid Form and are the primary basis for completion dates of selected aspects of the project. Sequencing of the project may be such that Contractors should anticipate multiple mobilizations for their scope of work.

13.5 Each Contractor will be required to keep up with the schedule, which will be discussed during each weekly progress meeting. Contractors that fall behind schedule will be required to take necessary and timely action to improve work progress as per the General Conditions. This action may require
increased work forces, extra equipment, extra shifts, or other actions. Should the Contractor refuse or neglect to take action, the CM may take necessary action at the Contractor’s expense. No time extensions will be given for weather delays.

13.6 Contractors and Suppliers will be strongly encouraged to order materials upon submittal approval to avoid any delays in the supply chain. Coordinate onsite/offsite storage with the CM.

13.7 The owner reserves the right to assess Costs for Damage and/or Recovery to any or all Contractors’ who are unable to maintain the project schedule.

13.8 Those that can’t meet the project schedule should not bid this project.

14.0 Changes/Proposal Requests

14.1 The Scope of Work shall be subject to change by additions, deletions or revisions thereto by the Owner and/or CM. Contractor will be notified of such changes by receipt of additional and/or revised drawings, specifications, exhibits or other written notification.

14.2 If, upon receipt of any notification, Contractor considers that a change is involved that could affect its costs of performing the work or upon the schedule for performance of the work, Contractor is obligated to inform CM in a timely manner and within the timeframe stated within the Contract.

14.3 Contractor shall submit to CM within (5) working days after submission of the notification from CM a detailed takeoff with supporting calculations, documentation and pricing for the change, together with any requested adjustments in the schedule.

14.4 The pricing shall be itemized and shall be in enough detail to permit a detailed analysis of all labor, material and equipment and shall cover all work involved in the change whether such work was deleted, added or modified. Amounts related to subtier/vendor shall be supported in similar detail.

14.5 Lump Sum single price changes will not be accepted.

14.6 Acceptable detail will consist of the following single line items, as they apply to each item identified in the change, supported by the following clear and concise detailed cost information:

14.6.1 Direct Hourly Labor Costs
14.6.2 Direct Material & Equipment Costs
14.6.3 Rental Equipment/Subcontractor Owned Equipment Costs
14.6.4 Subtier/Vendor Costs
14.6.5 Subtotal of the Above
14.6.6 Idaho State Sales/Use Tax
14.6.7 Allowable Mark Ups
14.6.8 Total Proposal Cost

14.7 These items shall be summarized on a Contractor front cover letter to the CM for each change/proposal request. All changes shall be presented in round dollars with no cents.

15.0 Testing & Inspections

15.1 The Owner will retain the services of a Testing Agency to perform testing, special inspections, & document compliance for soils, concrete, and structural steel. Costs of corrective action or retesting due to unsatisfactory work will be the sole responsibility of the Contractor.
15.2 State and local required inspections, outside of the above, shall be by the Contractor. Results shall be forwarded to the CM upon receipt.

15.3 Frontline inspections and quality control procedures remain the direct responsibility of each Contractor for their scope of work.

16.0 Permits & Licensing
16.1 The Owner will purchase the general building permit. All other permits & fees (state, local or other) will be the responsibility of the Contractors and are to be included in their proposals.

16.2 All Contractors will be required to have an Idaho Publics Works Contractors License and Idaho Contractor’s license prior to bidding this project.

17.0 Submittals, O&M Manuals and As-Built Drawings
17.1 All submittals need to be submitted to the CM’s office within 20 days after contract award. All Contractors will be required to e-mail submittals in a digital organized format. Faxed or disorganized submittals will not be accepted. Samples will need to be mailed to the B-H office.

17.2 O&M manuals are not to wait until project completion. These are to be submitted as early on in the project as possible. One hard copy and one digital copy will be required. Organization is a must. Warranties will need to be submitted with O&M manuals, and all warranty periods will not begin until substantial completion as noted in the documents.

17.3 Each Contractor is to maintain a set of as-built drawings for their scope of work. This will also need to be updated in the CM’s on-site job trailer on a regular basis. The CM may ask to review a Contractor’s as-builts at any time, and if found deficient, Contractor’s payment may be held. Be sure to closely review the specifications for submittal and O&M requirements.

18.0 Taxes
18.1 All Contractors and Suppliers are responsible to pay Idaho State sales tax. Sales tax is to be included in their base bid proposal. No change orders will be given for sales tax.

18.2 The Contractors Tax Affidavit included in spec section 000816 will need to be completed as a close-out item prior to any release of retainage.

19.0 Survey & Layout
19.1 The CM shall provide and maintain well-built batter boards at the major building corners and shall establish and safeguard benchmarks in at least two widely separated places. As the work progresses, the CM will establish major building grids only as a guide for other trades.

19.2 All other surveying and layout shall be the responsibility of each Contractor. The cost to provide these services shall be included as part of each Contractor’s base bid cost.

19.3 Contracts to specifically include these services (but are not limited to) are Earthwork, Potable Water Systems, Sanitary Sewage Systems, Fire Water Systems, Storm Sewage Systems and Irrigation Pipe, Asphalt Paving, Portland Cement Concrete Paving, Cast in Place Concrete, Unit Masonry Assemblies, Structural Steel, Framing, Gypsum Board Assemblies, Door and Window, Aluminum Entrances and Storefronts, Plumbing, Mechanical and Electrical subcontractors.
20.0 Qualifications of Personnel
20.1 Contractor shall be responsible for selecting personnel who are well qualified to perform the required Work.

20.2 All Contractor personnel entering the project shall conform to all security regulations and other regulations, rules and law which may be in effect during the period of this Agreement.

20.3 Contractor shall promptly comply with CM’s and/or ITD’s request to remove from the worksite any worker performing work on behalf of the Contractor who is found to be in violation of the terms of this Agreement.

20.4 At all times during the performance of this Agreement and until the Work is completed and accepted, Contractor shall directly supervise its work through a competent on-site foreman who is satisfactory to the CM and who has authority to act for the Contractor.

20.5 Subcontractor agrees that its on-site foreman shall continue to act as such until Contractor’s work is complete and accepted and may not be removed from working on this project without the prior written consent of the CM.

20.6 Contractor agrees that failure of its on-site foreman to attend the weekly Superintendent Coordination Meeting and Safety Meeting will make it subject to the terms of default specified in this Agreement.

21.0 Warranty
21.1 Specific warranty requirements are covered in the specifications and contract documents. It noted here that all warranties will not start before the Substantial Completion Date. The Substantial Completion Date will be the starting point of warranties.

22.0 Right of Joint-Check Payment
22.1 ITD, at its option, may make any payment due by check payable jointly to Contractor and any of its Subcontractors or suppliers who have performed Work or furnished materials under this Agreement.

23.0 Slab Protection
23.1 No satisfactory chemical or cleaning procedure is available to remove petroleum stains from the concrete surface. Prevention is therefore essential. In addition to the food and drink requirements already noted in section 5.3 above, **It shall be the responsibility of all trades to protect the exposed floor slabs** by adhering to the following requirements:

23.1.1 Protect all slabs or finish surfaces from any and all damage. Protect any adjacent surfaces from any damage from work activities.

23.1.2 All hydraulic powered equipment must be diapered and have white non-marking tires to avoid staining of the concrete.

23.1.3 No trade will park vehicles on any inside slabs. If necessary, to complete their scope of work, drop cloths will be placed under vehicles at all times.

23.1.4 No pipe cutting machine will be used on any inside floor slabs.

23.1.5 Steel will not be place on interior slab to avoid rust staining.
23.1.6 Fire line testing (or any other waterline testing) will not be permitted directly onto any slabs or sidewalks.

24.0 ITD Facility Operations
24.1 The ITD Facility will remain in operation during the construction of this project. ITD personnel will remain active with daily yard duties in and out of onsite facilities and each Contractor is expected to work in harmony with ITD operations.

END OF SECTION 000600
SECTION 000710 – EMPLOYMENT PRACTICES

GENERAL: Provisions of the Contract, including General and Special Conditions and other Division 0 Specification Sections, apply to this Section.

EQUAL EMPLOYMENT OPPORTUNITY: During the performance of this Contract each Subcontractor agrees as follows:

1) They will not discriminate against any employee or applicant for employment because of race, creed, color or national origin. They will take affirmative action to ensure that applicants are employed, and that employees are treated during employment, without regard to their race, creed, color or national origin. Such action shall include, but not be limited to, the following: employment, upgrading, demotion or transfer; recruitment or recruitment advertising; layoff or termination; rates of pay or other forms of compensation; and selection for training, including apprenticeship. The Contractor agrees to post in conspicuous places available to employees and applicants for employment, notices to be provided setting forth the provisions of this nondiscrimination clause.

2) Each Subcontractor will, in all solicitations or advertisements for employees placed by or on behalf of the Subcontractor, state that all qualified applicants will receive consideration for employment without regard to race, creed, color or national origin.

3) The Subcontractor will send to each labor union or representative of workers with which he has a collective bargaining agreement or other Contract or understanding, a notice, to be provided by the agency contracting officer, advising the labor union or workers' representative of the Subcontractor's commitments under Section 202 of Executive Order No. 11246 of September 24, 1965, and shall post copies of the notice in conspicuous places available to employees and applicants for employment.

4) The Subcontractor will comply with all provisions of Executive Order No. 11246 of September 24, 1965, and of the rules, regulations and relevant orders of the Secretary of Labor.

5) The Subcontractor will furnish all information and reports required by Executive Order No. 11246 of September 24, 1965, and by the rules, regulations and order of the Secretary of Labor, or pursuant thereto, and will permit access to his books, records and accounts by the contracting agency and the Secretary of Labor for purposes of investigation to ascertain compliance with such rules, regulations and orders.

6) In the event of the Subcontractor's noncompliance with the nondiscrimination clauses of this Contract, or with any of such rules, regulations, or orders, this Contract may be cancelled, terminated or suspended in whole or in part and the Subcontractor may be declared ineligible for further Government contracts in accordance with procedures authorized in Executive Order No. 11246 of September 24, 1965, and such other sanctions may be imposed and remedies invoked as Idaho Falls Event Center 000710 Employment Practices provided Executive Order No. 11246
7) The Subcontractor will include the provisions of Paragraphs (1) through (7) in every subcontract or purchase order unless exempted by rules, regulations, or orders of the Secretary of Labor issued pursuant to Section 204 of Executive Order No. 11246 of September 24, 1965, so that such provisions will be binding upon each subcontractor or vendor. The Subcontractor will take such action with respect to any subcontract or purchase order as the contracting agency may direct as a means of enforcing such provisions, including sanctions for noncompliance; provided, however, that in the event the Subcontractor becomes involved in, or is threatened with, litigation with a subcontractor or vendor as a result of such direction by the contracting agency, the Subcontractor may request the United States to enter into such litigation to protect the interest of the United States.

END OF SECTION 000710
AIA® Document A132™ – 2019

Standard Form of Agreement Between Owner and Contractor, Construction Manager as Adviser Edition

AGREEMENT made as of the {Day} day of {Month} in the year 2024

BETWEEN the Owner:

State of Idaho Transportation Department
11331 W Chinden Blvd
Boise, ID 83714
208-334-8000

and the Contractor:

{Contractor's Company Name}
{Physical Address}
{Physical City, State Zip}
{Office Phone}
{Email}

Contract Number: {FMXXXXX}

for the following Project:

ITD D1 Coeur d'Alene New Testing Laboratory
Project Number: D231130
600 W. Prairie Ave.
Coeur d'Alene, ID 83814

The Construction Manager:

Bateman-Hall, Inc.
1405 Foote Drive
Idaho Falls, ID 83402
208-523-2681

The Architect:

Miller Stauffer Architects
601 E. Front Ave. Ste. 201
Coeur d'Alene, ID 83814
208-664-1773

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.

This document is intended to be used in conjunction with AIA Documents A232™-2019, General Conditions of the Contract for Construction, Construction Manager as Adviser Edition; B132™-2019, Standard Form of Agreement Between Owner and Architect, Construction Manager as Adviser Edition; and C132™-2019, Standard Form of Agreement Between Owner and Construction Manager as Adviser. AIA Document A232™-2019 is adopted in this document by reference. Do not use with other general conditions unless this document is modified.
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**ARTICLE 1  THE CONTRACT DOCUMENTS**

The Contract Documents consist of this Agreement, Conditions of the Contract (General, Supplementary, and other Conditions), Drawings, Specifications, Addenda issued prior to execution of this Agreement, other documents listed in this Agreement, and Modifications issued after execution of this Agreement, all of which form the Contract, and are as fully a part of the Contract as if attached to this Agreement or repeated herein. The Contract represents the entire and integrated agreement between the parties hereto and supersedes prior negotiations, representations, or agreements, either written or oral. An enumeration of the Contract Documents, other than Modifications, appears in Article 9.

**ARTICLE 2  THE WORK OF THIS CONTRACT**

The Contractor shall fully execute the Work described in the Contract Documents, except as specifically indicated in the Contract Documents to be the responsibility of others. Work to include: [Bid Package Scope Description]

**ARTICLE 3  DATE OF COMMENCEMENT AND DATES OF SUBSTANTIAL COMPLETION**

§ 3.1 The date of commencement of the Work shall be:

Commencement date is in accordance with Bid Form Milestone Schedule.

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

§ 3.3 Substantial Completion of the Project or Portions Thereof

§ 3.3.1 Subject to adjustments of the Contract Time as provided in the Contract Documents, the date of Substantial Completion of the Work of all of the Contractors for the Project will be:

Substantial Completion in accordance with Bid Form Milestone Schedule.

§ 3.4 When the Work of this Contract, or any Portion Thereof, is Substantially Complete

§ 3.4.1 Subject to adjustments of the Contract Time as provided in the Contract Documents, the Contractor shall substantially complete the entire Work of this Contract:

Substantial Completion in accordance with Bid Form Milestone Schedule.

§ 3.4.3 If the Contractor fails to substantially complete the Work of this Contract, or portions thereof, as provided in this Section 3.4, liquidated damages, if any, shall be assessed as set forth in Section 4.5.
ARTICLE 4  CONTRACT SUM

§ 4.1 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 4.2 below
- □ Cost of the Work plus the Contractor’s Fee, in accordance with Section 4.3 below
- □ Cost of the Work plus the Contractor’s Fee with a Guaranteed Maximum Price, in accordance with Section 4.4 below

(Based on the selection above, complete Section 4.2, 4.3 or 4.4 below.)

§ 4.2 Stipulated Sum

§ 4.2.1 The Contract Sum shall be \{Written Price\} (\{Contract Price\}), subject to additions and deductions as provided in the Contract Documents.

§ 4.2.2 Alternates

§ 4.2.2.1 Alternates, if any, included in the Contract Sum:

\{Accepted Alternates\}

[Paragraph Deleted]

§ 4.2.3 Allowances, if any, included in the Contract Sum:

\{Allowances\}

§ 4.2.4 Unit prices, if any:

\{Unit Prices\}

§ 4.3 Cost of the Work Plus Contractor’s Fee without a Guaranteed Maximum Price

[Section Deleted due to this being a Stipulated Sum Contract]

§ 4.4 Cost of the Work Plus Contractor’s Fee with a Guaranteed Maximum Price

[Section Deleted due to this being a Stipulated Sum Contract]

§ 4.5 Liquidated damages, if any:

Liquidated Damages are in accordance with the Special Conditions of this contract.

§ 4.6 Other:

[Section Deleted]

ARTICLE 5  PAYMENTS

§ 5.1 Progress Payments

§ 5.1.1 Based upon Applications for Payment submitted to the Construction Manager by the Contractor, and Certificates for Payment issued by the Construction Manager and 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.

§ 5.1.2 The period covered by each Application for Payment shall be one calendar month ending on the last day of the
shall first include:

§ 5.1.3 Applications for Payment are due to the Construction Manager not later than the 20th day of a month. The Owner shall make payment of the certified amount in the Application for Payment to the Contractor according to Idaho Code 67-2302.

§ 5.1.4 Progress Payments Where the Contract Sum is Based on a Stipulated Sum

§ 5.1.4.1 Each Application for Payment shall be based on the most recent schedule of values submitted by the Contractor in accordance with the Contract Documents. The schedule of values shall allocate the entire Contract Sum among the various portions of the Work. The schedule of values shall be prepared in such form, and supported by such data to substantiate its accuracy, as the Construction Manager and Architect may require. This schedule of values shall be used as a basis for reviewing the Contractor’s Applications for Payment

§ 5.1.4.2 Applications for Payment shall show the percentage of completion of each portion of the Work as of the end of the period covered by the Application for Payment.

§ 5.1.4.3 In accordance with AIA Document A232™ – 2019, General Conditions of the Contract for Construction, Construction Manager as Adviser Edition, and subject to other provisions of the Contract Documents, the amount of each progress payment shall be computed as follows:

§ 5.1.4.3.1 The amount of each progress payment shall first include:

.1 That portion of the Contract Sum properly allocable to completed Work;
.2 That portion of the Contract Sum properly allocable to materials and equipment delivered and suitably stored at the site for subsequent incorporation in the completed construction, or, if approved in advance by the Owner, suitably stored off the site at a location agreed upon in writing; and
.3 That portion of Construction Change Directives that the Architect determines, in the Architect’s professional judgment, to be reasonably justified.

§ 5.1.4.3.2 The amount of each progress payment shall then be reduced by:

.1 The aggregate of any amounts previously paid by the Owner;
.2 The amount, if any, for Work that remains uncorrected and for which the Architect has previously withheld a Certificate for Payment as provided in Article 9 of AIA Document A232–2019;
.3 Any amount for which the Contractor does not intend to pay a Subcontractor or material supplier, unless the Work has been performed by others the Contractor intends to pay;
.4 For Work performed or defects discovered since the last payment application, any amount for which the Architect may withhold payment, or nullify a Certificate of Payment in whole or in part, as provided in Article 9 of AIA Document A232–2019; and
.5 Retainage withheld pursuant to Section 5.1.7.

§ 5.1.5 Progress Payments Where the Contract Sum is Based on the Cost of the Work without a GMP

[Section Deleted due to this being a Stipulated Sum Contract]

§ 5.1.6 Progress Payments Where the Contract Sum is Based on the Cost of the Work with a GMP

[Section Deleted due to this being a Stipulated Sum Contract]

§ 5.1.7 Retainage

§ 5.1.7.1 For each progress payment made prior to when the Work of this Contract is substantially complete, the Owner may withhold the following amount, as retainage, from the payment otherwise due:

Retainage will be Five Percent (5%) for Work completed and material suitably stored. Contractor agrees to withhold no more than Five Percent (5%) from its lower tier subcontractors and suppliers. Retainage cannot be released until after substantial completion and all contractual obligations and project closeout document requirements have been

Article 9 of AIA Document A232 – 2019; and

[Section Deleted due to this being a Stipulated Sum Contract]
§ 5.1.7.1 The following items are not subject to retainage:

NA

§ 5.1.7.2 Reduction or limitation of retainage, if any, shall be as follows:

No reduction in retainage will be allowed prior to final completion without written approval of the Owner.

[Paragraph Deleted]

§ 5.2 Final Payment
§ 5.2.1 Final Payment Where the Contract Sum is Based on a Stipulated Sum
§ 5.2.1.1 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 12.2 of AIA Document A232–2019, and to satisfy other requirements, if any, which extend beyond final payment; and

2. a final Certificate for payment or Project Certificate for Payment has been issued by the Architect; such final payment shall be made by the Owner after the issuance of the final Certificate for Payment or Project Certificate for Payment, pursuant to the provision of Idaho Code 67-2302.

§ 5.2.1.2 The Owner’s final payment to the Contractor shall be made according to Idaho Code 67-2302.

§ 5.2.2 Final Payment Where the Contract Sum is Based on the Cost of the Work with or without a GMP

[Section Deleted due to this being a Stipulated Sum Contract]

§ 5.3 Payments due and unpaid under the Contract shall bear interest from the date payment is due according to Idaho Code 67-2302

ARTICLE 6 DISPUTE RESOLUTION
§ 6.1 Initial Decision Maker
The Architect will serve as Initial Decision Maker pursuant to Article 15 of AIA Document A232–2019, unless the parties appoint below another individual, not a party to this Agreement, to serve as Initial Decision Maker.

§ 6.2 Binding Dispute Resolution
[Section Deleted]

ARTICLE 7 TERMINATION OR SUSPENSION
§ 7.1 Where the Contract Sum is a Stipulated Sum
§ 7.1.1 The Contract may be terminated by the Owner or the Contractor as provided in Article 14 of AIA Document A232–2019.

§ 7.1.1.1 If the Contract is terminated for the Owner’s convenience in accordance with Article 14 of AIA Document A232–2019, then the Owner shall pay the Contractor a termination fee as follows:

The Contractor shall be compensated for any and all costs to date and equitable OH&P for the scope of work completed prior to termination.

§ 7.1.2 The Work may be suspended by the Owner as provided in Article 14 of AIA Document A232–2019

§ 7.2 Where the Contract Sum is Based on the Cost of the Work with or without a Guaranteed Maximum Price

[Section Deleted due to this being a Stipulated Sum Contract]
§ 7.3 Suspension
The Work may be suspended by the Owner as provided in Article 14 of AIA Document A232–2019; in such case, the Contract Sum and Contract Time shall be increased as provided in Article 14 of AIA Document A232–2019, except that the term “profit” shall be understood to mean the Contractor’s Fee as described in Section 4.3.2 or 4.4.2, as applicable, of this Agreement.

 ARTICLE 8 MISCELLANEOUS PROVISIONS
§ 8.1 Where reference is made in this Agreement to a provision of AIA Document A232–2019 or another Contract Document, the reference refers to that provision as amended or supplemented by other provisions of the Contract Documents.

| § 8.2 The Owner’s representative: |
| Tony Pirc |
| ITD Facility Project Mgr. |
| PO Box 11 |
| Boise, ID 83707 |
| 208-334-8000 |
| tony.pirc@itd.idaho.gov |

| § 8.3 The Contractor’s representative: |
| TBD |

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

§ 8.5 Insurance and Bonds

§ 8.5.2 The Contractor shall provide bonds as set forth in AIA Document A132™–2019, Exhibit A, and elsewhere in the Contract Documents.

§ 8.6 Notice in electronic format, pursuant to Article 1 of AIA Document A232–2019, may be given in accordance with AIA Document E203™–2013, Building Information Modeling and Digital Data Exhibit, if completed, or as otherwise set forth below:

Distribution of electronic documents (Submittals, Modifications, Project Payment Documents, Plans, Specifications, etc.) will be through a combination of Construction Manager’s collaboration website/program and electronic mail. No free-of-charge hard copy sets of Drawings and/or Project Manuals will be provided to Contractors.

§ 8.7 Relationship of the Parties
[Section Deleted due to this being a Stipulated Sum Contract]

§ 8.8 Other provisions:

§ 8.8.1 The work shall strictly comply with all federal, state, local and municipal laws, rules, regulations, statutes, ordinances and other directives (hereinafter referred to as “Laws”), applicable to the Work on the Project, including, but not limited to, labor, wage, equal opportunity employment, environmental and safety Laws. All work, in addition to that specifically required by this Contract but necessary to fully comply with such Laws, will be furnished by Contractor as part of this Contract without additional compensation. In the event Contractor observes any work on the
§ 8.8.2 Contractor agrees not to assign or sublet Contract or the Work or any right to payment or other Contract right or portion of the Work without the prior written consent of the Owner and Construction Manager.

§ 8.8.3 Contractor hereby certifies that it has an established safety policy as required by the Occupational, Safety and Health Administration (OSHA), which requires regular safety meetings. Contractor agrees to conduct or attend weekly safety meetings regarding its Work under this agreement and shall promptly prepare minutes of such meetings and provide copies of such minutes to Contractor as the Work progresses. Contractor agrees to comply with all requirements of OSHA relating to the Work and shall maintain and provide all applicable material safety data sheets and safety manuals in accordance with OSHA requirements.

§ 8.8.4 All materials delivered by or on account of Contractor and intended to be incorporated into the Project shall become property of the Owner when delivered to the Work Site, but Contractor may repossess himself of any surplus remaining at the completion of the Work of this Contract. All scaffolding, apparatus, tools, equipment, machinery and plans brought onto the Work Site by the

§ 8.8.5 Non-violent union picketing shall not constitute a justified delay in the Project on the part of the Contractor.

§ 8.8.6 If either party shall file suit against the other, and arising out of this Contract, the prevailing party shall be entitled to recover a reasonable sum for attorney fees and costs from the other party, including costs and fees on any appeal. In addition, in the event Owner is required to defend any action arising out of or relating to Contractor’s obligation hereunder, including any suit, arbitration or other legal proceeding, Contractor shall pay Owner its reasonable costs and attorney fees.

§ 8.8.7 The Owner through the Construction Manager may require notarized lien releases form Contractor and its subcontractors and suppliers, or may issue joint checks at Construction Manager’s sole discretion at any time. As a condition for any progress payment or final payment, the Construction Manager may require the Contractor to provide the names and addresses of all of its employees, subcontractors and suppliers providing any labor and/or material for any portion of the Work and shall provide evidence of payment of employee withholding taxes.

§ 8.8.8 Quality Control and Supervision of the Work
§ 8.8.8.1 Continuous control of the quality of the Work is the essence of this Contract. Failure of the Contractor to establish and maintain quality control of the Work shall be a default of this agreement. Contractor shall establish a quality control program satisfactory to the Construction Manager to assure the proper execution of the Work in accordance with this agreement and the Prime Contract.

§ 8.8.8.2 The Work shall be administered and directed by Contractor’s project supervisor experienced in the Work and acceptable to Construction Manager who shall be assigned to the Project upon execution of this agreement. Contractor’s project supervisor shall be present on site at all times Work is performed or materials delivered and Contractor shall not change project supervisors during the Project without Construction Manager’s consent. Failure to maintain proper supervision on site shall constitute default of this agreement.

§ 8.8.8.3 Contractor shall be responsible for the continuous quality control of the Work, protection of the Work and other work at the site and for cleanup and maintenance of the site of the Work. Construction Manager may, at any time, require removal and replacement of Contractor’s project supervisor and Contractor shall be liable for any costs, including overhead costs, incurred by Construction Manager in assuring or maintaining quality control of the Work.

ARTICLE 9 ENUMERATION OF CONTRACT DOCUMENTS
§ 9.1 This Agreement is comprised of the following documents:
1 AIA Document A132™–2019, Standard Form of Agreement Between Owner and Contractor, Construction Manager as Adviser Edition
2 AIA Document A132™–2019, Exhibit A, Insurance and Bonds Exhibit

.4 AIA Document E203™–2013, Building Information Modeling and Digital Data Exhibit, dated as indicated below:

   NA

.5 Drawings

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.6 Specifications

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<td>See Exhibit B - Enumeration of Plans and Specifications</td>
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.7 Addenda, if any:

   [Addenda & Dates]

   [Paragraph Deleted]

.8 Other Exhibits: [Subsection Information Deleted]

   Exhibit B - Enumeration of Plans and Specifications

.9 Other documents, if any, listed below:

   - Contractor’s Executed Bid Form
   - Contractor’s Executed Performance & Payment Bonds

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

State of Idaho Transportation Department

(Signature)

(Contractor’s Company Name)

(Signature)
This Insurance and Bonds Exhibit is part of the Agreement, between the Owner and the Contractor, dated the [Day] day of [Month] in the year 2024. (In words, indicate day, month and year.)

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

ITD D1 Coeur d'Alene New Testing Laboratory
Project Number: D231130
600 W. Prairie Ave.
Coeur d'Alene, ID 83814

THE OWNER:
(Name, legal status and address)

State of Idaho Transportation Department
11331 W Chinden Blvd
Boise, ID 83714
208-334-8000

THE CONTRACTOR:
(Name, legal status, and address)

[Contractor's Company Name]
[Physical Address]
[Physical City, State Zip]
[Office Phone]
[Email]

Contract Number: [FMXXXXX]

TABLE OF ARTICLES

A.1 GENERAL

A.2 OWNER’S INSURANCE

A.3 CONTRACTOR’S INSURANCE AND BONDS

A.4 SPECIAL TERMS AND CONDITIONS
ARTICLE A.1 GENERAL
The Owner and Contractor shall purchase and maintain insurance, and provide bonds, as set forth in this Exhibit. As used in this Exhibit, the term General Conditions refers to AIA Document A232™-2019, General Conditions of the Contract for Construction.

ARTICLE A.2 OWNER’S INSURANCE
§ A.2.1 General
Prior to commencement of the Work, the Owner shall secure the insurance, and provide evidence of the coverage, required under this Article A.2 and, upon the Contractor’s request, provide a copy of the property insurance policy or policies required by Section A.2.3. The copy of the policy or policies provided shall contain all applicable conditions, definitions, exclusions, and endorsements.

§ A.2.2 Liability Insurance
The Owner shall be responsible for purchasing and maintaining the Owner’s usual general liability insurance.

§ A.2.3 Required Property Insurance

[Paragraph Deleted]

[Paragraph Deleted]

[Paragraph Deleted]

[Paragraph Deleted]

§ A.2.3.1.4 Deductibles and Self-Insured Retentions. If the insurance required by this Section A.2.3 is subject to deductibles or self-insured retentions, the Owner shall be responsible for all loss not covered because of such deductibles or retentions.

§ A.2.3.2 Occupancy or Use Prior to Substantial Completion. The Owner’s occupancy or use of any completed or partially completed portion of the Work prior to Substantial Completion shall not commence until the insurance company or companies providing the insurance under Section A.2.3.1 have consented in writing to the continuance of coverage. The Owner and the Contractor shall take no action with respect to partial occupancy or use that would cause cancellation, lapse, or reduction of insurance, unless they agree otherwise in writing.

§ A.2.3.3 Insurance for Existing Structures
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 12.2.2 of the General Conditions, “all-risks” property insurance, on a replacement cost basis, protecting the existing structure against direct physical loss or damage from the causes of loss identified in Section A.2.3.1, notwithstanding the undertaking of the Work. The Owner shall be responsible for all co-insurance penalties.

§ A.2.4 Optional Extended Property Insurance.
[Section Deleted Due To Inapplicability]

§ A.2.5 Other Optional Insurance.
[Section Deleted Due To Inapplicability]

ARTICLE A.3 CONTRACTOR’S INSURANCE AND BONDS
§ A.3.1 General
§ A.3.1.1 Certificates of Insurance. The Contractor shall provide certificates of insurance acceptable to the Owner evidencing compliance with the requirements in this Article A.3 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 commercial 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 periods required by Section A.3.2.1 and Section A.3.3.1. The certificates will show the Owner as an additional insured on the Contractor’s Commercial General Liability and excess or umbrella liability policy or policies.

§ A.3.1.2 Deductibles and Self-Insured Retentions. The Contractor shall disclose to the Owner any deductible or self-insured retentions applicable to any insurance required to be provided by the Contractor.

§ A.3.1.3 Additional Insured Obligations. To the fullest extent permitted by law, the Contractor shall cause the commercial general liability coverage to include (1) the Owner, the Architect and the Architect’s consultants, and the Construction Manager and the Construction Manager’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, and the Construction Manager and the Construction Manager’s consultants, CG 20 32 07 04.

§ A.3.2 Contractor’s Required Insurance Coverage

§ A.3.2.1 The Contractor shall purchase and maintain the following types and limits of insurance 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 12.2.2.

§ A.3.2.2 Commercial General Liability

§ A.3.2.2.1 Commercial General Liability insurance for the Project written on an occurrence form with policy limits of not less than One Million Dollars ($1,000,000.00) each occurrence, Two Million Dollars ($2,000,000.00) general aggregate, and Two Million Dollars ($2,000,000.00) 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 injury 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 3.18 of the General Conditions.

§ A.3.2.2.2 The Contractor’s Commercial General Liability policy under this Section A.3.2.2 shall not contain an exclusion or restriction of coverage for the following:

1. Claims by one insured against another insured, if the exclusion or restriction is based solely on the fact that the claimant is an insured, and there would otherwise be coverage for the claim.
2. Claims for property damage to the Contractor’s Work arising out of the products-completed operations hazard where the damaged Work or the Work out of which the damage arises was performed by a Subcontractor.
3. Claims for bodily injury other than to employees of the insured.
4. Claims for indemnity under Section 3.18 of the General Conditions arising out of injury to employees of the insured.
5. Claims or loss excluded under a prior work endorsement or other similar exclusionary language.
6. Claims or loss due to physical damage under a prior injury endorsement or similar exclusionary language.
7. Claims related to residential, multi-family, or other habitational projects, if the Work is to be performed on such a project.
8. Claims related to roofing, if the Work involves roofing.
.9 Claims related to exterior insulation finish systems (EIFS), synthetic stucco or similar exterior coatings or surfaces, if the Work involves such coatings or surfaces.
.10 Claims related to earth subsidence or movement, where the Work involves such hazards.
.11 Claims related to explosion, collapse and underground hazards, where the Work involves such hazards.

§ A.3.2.3 Automobile Liability covering vehicles owned, and non-owned vehicles used, by the Contractor, with policy limits of not less than One Million Dollars ($1,000,000.00) 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.

§ A.3.2.4 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 the coverages required under Section A.3.2.2 and A.3.2.3, 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.

§ A.3.2.5 Workers’ Compensation at statutory limits.

§ A.3.2.6 Employers’ Liability with policy limits not less than One Million Dollars ($1,000,000.00) each accident, One Million Dollars ($1,000,000.00) each employee, and One Million Dollars ($1,000,000.00) policy limit.

§ A.3.2.7 Jones Act, and the Longshore & Harbor Workers’ Compensation Act, as required, if the Work involves hazards arising from work on or near navigable waterways, including vessels and docks

§ A.3.2.8 The Contractor agrees to indemnify, hold harmless and, not excluding the State of Idaho’s right to participate, defend the State of Idaho its subsidiary, parent, associated and/or affiliated entities, successors, or assigns, its elected officials, trustees, employees, agents, volunteers, and any jurisdiction or agency issuing permits for any work included in the project, hereinafter referred to as indemnitee, from all suits and claims, including attorney’s fees and cost of litigation, actions, loss, damage, expense, cost or claims of any character or any nature arising out of the work done in fulfillment of the terms of this Contract or on account of any act, claim or amount arising or recovered under workers’ compensation law or arising out of the failure of the contractor to conform to any statutes, ordinances, regulation, law or court decree. It is agreed that the Contractor will be responsible for primary loss investigation, defense and judgment costs where this contract of indemnity applies. In consideration of the award of this contract, the Contractor agrees to waive all rights of subrogation against the State of Idaho its subsidiary, parent, associated and/or affiliated entities, successors, or assigns, its elected officials, trustees, employees, agents, and volunteers for losses arising from the work performed by the Contractor for the State of Idaho.

[Paragraph Deleted]

[Paragraph Deleted]

[Paragraph Deleted]

[Paragraph Deleted]

§ A.3.3 Contractor’s Other Insurance Coverage

[Section Deleted Due To Inapplicability]

§ A.3.4 Performance Bond and Payment Bond

The Contractor shall provide surety bonds, from a company or companies lawfully authorized to issue surety bonds in the jurisdiction where the Project is located, as follows:

(Specify type and penal sum of bonds.)
Payment and Performance Bonds shall be AIA Document A312™, Payment Bond and Performance Bond, or contain provisions identical to AIA Document A312™, current as of the date of this Agreement.

**ARTICLE A.4 SPECIAL TERMS AND CONDITIONS**

Special terms and conditions that modify this Insurance and Bonds Exhibit, if any, are as follows:

| NA |
THIS PAGE INTENTIONALLY LEFT BLANK
General Conditions of the Contract for Construction, Construction Manager as Adviser Edition

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

ITD D1 Coeur d'Alene New Testing Laboratory
600 W. Prairie Ave.
Coeur d'Alene, ID 83814

THE CONSTRUCTION MANAGER:
(Name, legal status, and address)

Bateman-Hall, Inc.
1405 Foote Drive
Idaho Falls, ID 83402

THE OWNER:
(Name, legal status, and address)

State of Idaho Transportation Department
11331 W Chinden Blvd.
Boise, ID 83714

THE ARCHITECT:
(Name, legal status, and address)

Miller Stauffer Architects
601 E. Front Ave.
Coeur d'Alene, ID 83814

TABLE OF ARTICLES

1 GENERAL PROVISIONS

2 OWNER

3 CONTRACTOR

4 ARCHITECT AND CONSTRUCTION MANAGER

5 SUBCONTRACTORS

6 CONSTRUCTION BY OWNER OR BY SEPARATE CONTRACTORS

7 CHANGES IN THE WORK

8 TIME

9 PAYMENTS AND COMPLETION

10 PROTECTION OF PERSONS AND PROPERTY

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.

This document is intended to be used in conjunction with AIA Documents A132™—2019, Standard Form of Agreement Between Owner and Contractor, Construction Manager as Adviser Edition; B132™—2019, Standard Form of Agreement Between Owner and Architect, Construction Manager as Adviser Edition; and C132™—2019, Standard Form of Agreement Between Owner and Construction Manager as Adviser.
11 INSURANCE AND BONDS
12 UNCOVERING AND CORRECTION OF WORK
13 MISCELLANEOUS PROVISIONS
14 TERMINATION OR SUSPENSION OF THE CONTRACT
15 CLAIMS AND DISPUTES
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 the Construction Manager or the Construction Manager’s consultants, (3) between the Owner and the Architect or the Architect’s consultants, (4) between the Contractor and the Construction Manager or the Construction Manager’s consultants, (5) between the Owner and a Subcontractor or Sub-subcontractor (6) between the Construction Manager and the Architect, or (7) between any persons or entities other than the Owner and Contractor. The Construction Manager and Architect shall, however, be entitled to performance and enforcement of obligations under the Contract intended to facilitate performance of their 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 other Contractors, and by the Owner’s own forces and Separate Contractors.

§ 1.1.5 Contractors. Contractors are persons or entities, other than the Contractor or Separate Contractors, who perform Work under contracts with the Owner that are administered by the Architect and Construction Manager.

§ 1.1.6 Separate Contractors. Separate Contractors are persons or entities who perform construction under separate contracts with the Owner not administered by the Architect and Construction Manager.

§ 1.1.7 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.

§ 1.1.8 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.

§ 1.1.9 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.

§ 1.1.10 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. Submission 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 Construction Manager and the Architect do 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 Owner 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. Unless otherwise provided under the Contract Documents, the Owner, assisted by the Construction Manager, shall secure and pay for the building permit.

§ 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 The Owner shall retain a construction manager advisor lawfully practicing construction management in the jurisdiction where the Project is located. That person or entity is identified as the Construction Manager in the Agreement and is referred to throughout the Contract Documents as if singular in number.

§ 2.3.4 If the employment of the Construction Manager or Architect terminates, the Owner shall employ a successor construction manager or architect to whom the Contractor has no reasonable objection and whose status under the Contract Documents shall be that of the Construction Manager or Architect, respectively.

§ 2.3.5 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.

§ 2.3.6 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.

§ 2.3.7 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.

§ 2.3.8 The Owner shall forward all communications to the Contractor through the Construction Manager. Other communication shall be made as set forth in Section 4.2.6.

§ 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 review by the Construction Manager and prior approval of the Architect, and the Construction Manager or 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 Construction Manager’s and Architect’s and their respective consultants’ 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 Construction Manager or Architect in their 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 2.3.5, 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 for the purpose of discovering errors, omissions, or inconsistencies in the Contract Documents; however, the Contractor shall promptly report to the Construction Manager and Architect any errors, inconsistencies or omissions discovered by or made known to the Contractor as a request for information submitted to the Construction Manager in the form as the Construction Manager and 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 Construction Manager and Architect any nonconformity discovered by or made known to the Contractor as a request for information submitted to Construction Manager in such form as the Construction Manager and Architect may require.

§ 3.2.4 If the Contractor believes that additional cost or time is involved because of clarifications or instructions on 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, the Construction Manager, and the 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. The Construction Manager shall review the proposed alternative for sequencing, constructability, and coordination impacts on the other Contractors. Unless the Architect or the Construction Manager 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 the Project 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, in consultation with the Construction Manager, 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, Construction Manager, 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 Construction Manager or 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 or portions thereof 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 Owner, assisted by the Construction Manager, shall secure and pay for the building permit. The Contractor shall secure and pay 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, Construction Manager, and the Architect before conditions are disturbed and in no event later than 14 days after first observance of the conditions. The Architect and Construction Manager will promptly investigate such conditions and, if the Architect, in consultation with the Construction Manager, 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, in consultation with the Construction Manager, 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, Construction Manager, and Contractor, stating the reasons. If the Owner or Contractor disputes the Architect’s determination or recommendation, either 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, Construction Manager, 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, through the Construction Manager, of the name and qualifications of a proposed superintendent. Within 14 days of receipt of the information, the Construction Manager may notify the Contractor, stating whether the Owner, the Construction Manager, or the Architect (1) has reasonable objection to the proposed superintendent or (2) require
additional time for review. Failure of the Construction Manager 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, Construction Manager, or Architect has made reasonable and timely objection. The Contractor shall not change the superintendent without the Owner’s consent, which shall not be unreasonably 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, and the Construction Manager’s use in developing the Project schedule, 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. The Contractor shall cooperate with the Construction Manager in scheduling and performing the Contractor’s Work to avoid conflict with, and as to cause no delay in, the work or activities of other Contractors, or the construction or operations of the Owner’s own forces or Separate Contractors.

§ 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 Construction Manager’s and Architect’s approval. The Architect and Construction Manager’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 Construction Manager and 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 participate with other Contractors, the Construction Manager, and the Owner in reviewing and coordinating all schedules for incorporation into the Project schedule that is prepared by the Construction Manager. The Contractor shall make revisions to the construction schedule and submittal schedule as deemed necessary by the Construction Manager to conform to the Project schedule.

§ 3.10.4 The Contractor shall perform the Work in general accordance with the most recent schedules submitted to the Owner, Construction Manager, and Architect, and incorporated into the approved Project schedule.

§ 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 Construction Manager, Architect, and Owner, and delivered to the Construction Manager 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 and Construction Manager is subject to the limitations of Sections 4.2.10 through 4.2.12. Informational submittals upon which the Construction Manager and Architect are 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 Construction Manager or Architect without action.

§ 3.12.5 The Contractor shall review for compliance with the Contract Documents, approve, and submit to the Construction Manager, Shop Drawings, Product Data, Samples, and similar submittals required by the Contract Documents, in accordance with the Project submittal schedule approved by the Construction Manager and Architect or, in the absence of an approved Project submittal schedule, with reasonable promptness and in such sequence as to cause no delay in the Work or in the activities of other Contractors, Separate Contractors, or the Owner’s own forces. The Contractor shall cooperate with the Construction Manager in the coordination of the Contractor’s Shop Drawings, Product Data, Samples, and similar submittals with related documents submitted by other Contractors.

§ 3.12.6 By submitting Shop Drawings, Product Data, Samples, and similar submittals, the Contractor represents to the Owner, Construction Manager, 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 reviewed and 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 Construction Manager and 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 Construction Manager and 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, the Architect, and the Construction Manager 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. The Construction Manager shall review submittals for sequencing, constructability, and coordination impacts on other Contractors.

§ 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 Construction Manager and Architect at the time and in the form specified by the Architect.

§ 3.13 Use of Site
§ 3.13.1 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.

§ 3.13.2 The Contractor shall coordinate the Contractor’s operations with, and secure the approval of, the Construction Manager before using any portion of the site.

§ 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, Separate Contractors, or of other Contractors by cutting, patching, or otherwise altering such construction, or by excavation. The Contractor shall not cut or otherwise alter construction by the Owner, Separate Contractors, or by other Contractors except with written consent of the Construction Manager, Owner, and such other Contractors or Separate Contractors. Consent shall not be unreasonably withheld. The Contractor shall not unreasonably withhold, from the Separate Contractors, other Contractors, or the Owner, 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, or Construction Manager with the Owner’s approval, 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, Construction Manager, 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, Construction Manager, 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, Architect, or Construction Manager. 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 through the Construction Manager.

§ 3.18 Indemnification
§ 3.18.1 To the fullest extent permitted by law, the Contractor shall indemnify and hold harmless the Owner, Construction Manager, Architect, Construction Manager’s and 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 AND CONSTRUCTION MANAGER
§ 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 The Construction Manager is the person or entity retained by the Owner pursuant to Section 2.3.3 and identified as such in the Agreement.

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

§ 4.2 Administration of the Contract
§ 4.2.1 The Construction Manager and Architect will provide administration of the Contract as described in the Contract Documents and will be the Owner's representatives during construction until the date the Architect issues the final Certificate for Payment. The Construction Manager and 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. On the basis of the site visits, the Architect will keep the Owner and the Construction Manager reasonably informed about the progress and quality of the portion of the Work completed, and promptly report to the Owner and Construction Manager known deviations from the Contract Documents and defects and deficiencies observed in the Work.

§ 4.2.3 The Construction Manager shall provide one or more representatives who shall be in attendance at the Project site whenever the Work is being performed. The Construction Manager will determine in general if the Work observed is being performed in accordance with the Contract Documents, will keep the Owner and Architect reasonably informed of the progress of the Work, and will promptly report to the Owner and Architect known deviations from the Contract Documents and the most recent Project schedule, and defects and deficiencies observed in the Work.

§ 4.2.4 The Construction Manager will schedule and coordinate the activities of the Contractor and other Contractors in accordance with the latest approved Project schedule.

§ 4.2.5 The Construction Manager, except to the extent required by Section 4.2.4, and 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, and neither will be responsible for the Contractor's failure to perform the Work in accordance with the requirements of the Contract Documents. Neither the Construction Manager nor the Architect will have control over or charge of, or be responsible for acts or omissions of, the
Contractor, Subcontractors, or their agents or employees, or of any other persons or entities performing portions of the Work.

§ 4.2.8 Communications. The Owner shall communicate with the Contractor and the Construction Manager’s consultants through the Construction Manager about matters arising out of or relating to the Contract Documents. The Owner and Construction Manager 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 Construction Manager 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 other Contractors shall be through the Construction Manager. Communications by and with the Owner’s own forces and Separate Contractors shall be through the Owner. The Contract Documents may specify other communication protocols.

§ 4.2.7 The Construction Manager and Architect will review and certify all Applications for Payment by the Contractor, in accordance with the provisions of Article 9.

§ 4.2.8 The Architect and Construction Manager have authority to reject Work that does not conform to the Contract Documents, and will notify each other about the rejection. Whenever the Construction Manager considers it necessary or advisable, the Construction Manager will have authority to require inspection or testing of the Work in accordance with Sections 13.4.2 and 13.4.3, upon written authorization of the Owner, whether or not the Work is fabricated, installed or completed. The foregoing authority of the Construction Manager will be subject to the provisions of Sections 4.2.18 through 4.2.20 inclusive, with respect to interpretations and decisions of the Architect. However, neither the Architect nor the Construction Manager’s authority to act under this Section 4.2.8 nor a decision made by either of them in good faith either to exercise or not to exercise such authority shall give rise to a duty or responsibility of the Architect or the Construction Manager to the Contractor, Subcontractors, suppliers, their agents or employees, or other persons performing any of the Work.

§ 4.2.9 Utilizing the submittal schedule provided by the Contractor, the Construction Manager shall prepare, and revise as necessary, a Project submittal schedule incorporating information from other Contractors, the Owner, Owner’s consultants, Owner’s Separate Contractors and vendors, governmental agencies, and participants in the Project under the management of the Construction Manager. The Project submittal schedule and any revisions shall be submitted to the Architect for approval.

§ 4.2.10 The Construction Manager will receive and promptly review for conformance with the submittal requirements of the Contract Documents, all submittals from the Contractor such as Shop Drawings, Product Data, and Samples. Where there are other Contractors, the Construction Manager will also check and coordinate the information contained within each submittal received from the Contractor and other Contractors, and transmit to the Architect those recommended for approval. By submitting Shop Drawings, Product Data, Samples, and similar submittals, the Construction Manager represents to the Owner and Architect that the Construction Manager has reviewed and recommended them for approval. The Construction Manager’s actions will be taken in accordance with the Project submittal schedule approved by the Architect or, in the absence of an approved Project submittal schedule, with reasonable promptness while allowing sufficient time to permit adequate review by the Architect.

§ 4.2.11 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. Upon the Architect’s completed review, the Architect shall transmit its submittal review to the Construction Manager.

§ 4.2.12 Review of the Contractor’s submittals by the Construction Manager and Architect 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 Construction Manager and 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 Construction Manager and 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.

§ 4.2.13 The Construction Manager will prepare Change Orders and Construction Change Directives.

§ 4.2.14 The Construction Manager and the Architect will take appropriate action on Change Orders or Construction Change Directives in accordance with Article 7, and the Architect will have authority to order minor changes in the Work as provided in Section 7.4. The Architect, in consultation with the Construction Manager, will investigate and make determinations and recommendations regarding concealed and unknown conditions as provided in Section 3.7.4.

§ 4.2.15 Utilizing the documents provided by the Contractor, the Construction Manager will maintain at the site for the Owner one copy of all Contract Documents, approved Shop Drawings, Product Data, Samples, and similar required submittals, in good order and marked currently to record all changes and selections made during construction. These will be available to the Architect and the Contractor, and will be delivered to the Owner upon completion of the Project.

§ 4.2.16 The Construction Manager will assist the Architect in conducting inspections to determine the date or dates of Substantial Completion and the date of final completion; issue Certificates of Substantial Completion in conjunction with the Architect pursuant to Section 9.8; and receive and forward to the Owner written warranties and related documents required by the Contract and assembled by the Contractor pursuant to Section 9.10. The Construction Manager will forward to the Architect a final Application and Certificate for Payment or final Project Application and Project Certificate for Payment upon the Contractor’s compliance with the requirements of the Contract Documents.

§ 4.2.17 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 Construction Manager of any change in the duties, responsibilities and limitations of authority of the Project representatives.

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

§ 4.2.19 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 so rendered in good faith.

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

§ 4.2.21 The Construction Manager will receive and review requests for information from the Contractor, and forward each request for information to the Architect, with the Construction Manager’s recommendation. The Architect will review and respond in writing, through the Construction Manager, to requests for information about the Contract Documents. The Construction Manager’s recommendation and the Architect’s response to each request 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 other Contractors or Separate Contractors or the subcontractors of other Contractors or Separate Contractors.
§ 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 Construction Manager, for review by the Owner, Construction Manager 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 Construction Manager may notify the Contractor whether the Owner, the Construction Manager or the Architect (1) has reasonable objection to any such proposed person or entity or, (2) requires additional time for review. Failure of the Construction Manager 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, Construction Manager 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, Construction Manager or Architect has reasonable objection to a person or entity proposed by the Contractor, the Contractor shall propose another to whom the Owner, Construction Manager 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 responsibly 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, Construction Manager 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, Construction Manager and Architect. Each subcontract agreement shall preserve and protect the rights of the Owner, Construction Manager 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 the 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 with Own Forces and to Award Other Contracts

§ 6.1.1 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 the Owner performs construction or operations with the Owner’s own forces or Separate Contractors, the Owner shall provide for coordination of such forces and Separate Contractors with the Work of the Contractor, who shall cooperate with them.

§ 6.1.3 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’s own forces, Separate Contractors, Construction Manager and other 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’s own forces, Separate Contractors or other Contractors, the Contractor shall, prior to proceeding with that portion of the Work, promptly notify the Construction Manager and Architect of apparent discrepancies or defects in the construction or operations by the Owner or Separate Contractor or other Contractors that would render it unsuitable for proper execution and results of the Contractor’s Work. Failure of the Contractor to notify the Construction Manager and 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 or other Contractors’ 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 Contractors or other Contractors that are not apparent.

§ 6.2.3 The Contractor shall reimburse the Owner for costs the Owner incurs, including costs that are payable to a Separate Contractor or to other Contractors, 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 delays, improperly timed activities, damage to the Work or defective construction by the Owner’s own forces, Separate Contractors, or other Contractors.

§ 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, Separate Contractors, or other Contractors as provided in Section 10.2.5.

§ 6.2.5 The Owner, Separate Contractors, and other Contractors 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, other 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 Construction Manager, with notice to 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, Construction Manager, Architect and Contractor. A Construction Change Directive requires agreement by the Owner, Construction Manager 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
A Change Order is a written instrument prepared by the Construction Manager and signed by the Owner, Construction Manager, Architect, and Contractor, 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 Construction Manager and signed by the Owner, Construction Manager 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 Construction Manager 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 Construction Manager 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 Construction Manager and 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 Construction Manager 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 Construction Manager and 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 Construction Manager and Architect will make an interim determination for purposes of monthly certification for payment for those costs and certify for payment the amount that the Construction Manager and Architect determine to be reasonably justified. The 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 Construction Manager and 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 Construction Manager shall 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 Construction Manager 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 Construction Manager 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, Architect, Construction Manager, or an employee of any of them, or of the Owner’s own forces, Separate Contractors, or other Contractors; (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, based on the recommendation of the Construction Manager, 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 Construction Manager, 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 Construction Manager and the Architect. This schedule, unless objected to by the Construction Manager or Architect, shall be used as a basis for reviewing the Contractor’s Applications for Payment. The Construction Manager shall forward to the Architect the Contractor’s schedule of values. Any changes to the schedule of values shall be submitted to the Construction Manager and supported by such data to substantiate its accuracy as the Construction Manager and the Architect may require, and unless objected to by the Construction Manager or 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 fifteen days before the date established for each progress payment, the Contractor shall submit to the Construction Manager 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, Construction Manager or
Architect require, such as copies of requisitions, and releases of waivers of lien 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 Construction Manager and 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** Where there is only one Contractor, the Construction Manager will, within seven days after the Construction Manager’s receipt of the Contractor’s Application for Payment, review the Application, certify the amount the Construction Manager determines is due the Contractor, and forward the Contractor’s Application and Certificate for Payment to the Architect. Within seven days after the Architect receives the Contractor’s Application for Payment from the Construction Manager, the Architect will either (1) issue to the Owner a Certificate for Payment, in the full amount of the Application for Payment, with a copy to the Construction Manager; or (2) issue to the Owner a Certificate for Payment for such amount as the Architect determines is properly due, and notify the Construction Manager 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 Construction Manager and Owner of the Architect’s reason for withholding certification in whole as provided in Section 9.5.1. The Construction Manager will promptly forward to the Contractor the Architect’s notice of withholding certification.

**§ 9.4.2** Where there is more than one Contractor performing portions of the Project, the Construction Manager will, within seven days after the Construction Manager receives all of the Contractors’ Applications for Payment: (1) review the Applications and certify the amount the Construction Manager determines is due each of the Contractors; (2) prepare a Summary of Contractors’ Applications for Payment by combining information from each Contractor’s application with information from similar applications for progress payments from the other Contractors; (3) prepare a Project Application and Certificate for Payment; (4) certify the amount the Construction Manager determines is due all Contractors; and (5) forward the Summary of Contractors’ Applications for Payment and Project Application and Certificate for Payment to the Architect.

**§ 9.4.2.1** Within seven days after the Architect receives the Project Application and Project Certificate for Payment and the Summary of Contractors’ Applications for Payment from the Construction Manager, the Architect will either (1) issue to the Owner a Project Certificate for Payment, with a copy to the Construction Manager; or (2) issue to the Owner a Project Certificate for Payment for such amount as the Architect determines is properly due, and notify the Construction Manager 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 Project Application for Payment, and notify the Construction Manager and Owner of the Architect’s reason for withholding certification in whole as provided in
Section 9.5.1. The Construction Manager will promptly forward the Architect's notice of withholding certification to the Contractors.

§ 9.4.3 The Construction Manager's certification of an Application for Payment or, in the case of more than one Contractor, a Project Application and Certificate for Payment, shall be based upon the Construction Manager's evaluation of the Work and the data in the Application or Applications for Payment. The Construction Manager's certification will constitute a representation that, to the best of the Construction Manager'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, or Contractors are, entitled to payment in the amount certified.

§ 9.4.4 The Architect's issuance of a Certificate for Payment or, in the case of more than one Contractor, Project Application and Certificate for Payment, shall be based upon the Architect's evaluation of the Work, the recommendation of the Construction Manager, and data in the Application for Payment or Project Application for Payment. The Architect's certification will constitute a representation 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, or Contractors are, entitled to payment in the amount certified.

§ 9.4.5 The representations made pursuant to Sections 9.4.3 and 9.4.4 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 Construction Manager or Architect.

§ 9.4.6 The issuance of a Certificate for Payment or a Project Certificate for Payment will not be a representation that the Construction Manager or 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 Construction Manager or Architect may withhold a Certificate for Payment or Project Certificate for Payment in whole or in part, to the extent reasonably necessary to protect the Owner, if in the Construction Manager's or Architect's opinion the representations to the Owner required by Section 9.4.3 and 9.4.4 cannot be made. If the Construction Manager or Architect is unable to certify payment in the amount of the Application, the Construction Manager will notify the Contractor and Owner as provided in Section 9.4.1 and 9.4.2. If the Contractor, Construction Manager and Architect cannot agree on a revised amount, the Architect will promptly issue a Certificate for Payment or a Project Certificate for Payment for the amount for which the Architect is able to make such representations to the Owner. The Construction Manager or 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 or Project Certificate for Payment previously issued, to such extent as may be necessary in the Construction Manager's or Architect's opinion to protect the Owner from loss for which the Contractor is responsible, including, loss resulting from the 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 or other 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 or Construction Manager withholds certification for payment under Section 9.5.1, 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 Construction Manager, and both will reflect such payment on the next Certificate for Payment.

§ 9.6 Progress Payments
§ 9.6.1 After the Architect has issued a Certificate for Payment or Project 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 Construction Manager and 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 Construction Manager 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 Owner, Construction Manager and Architect 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, Construction Manager 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 Construction Manager and Architect do not issue a Certificate for Payment or a Project Certificate for Payment, through no fault of the Contractor, within fourteen days after the Construction Manager’s 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 Construction Manager and Architect or awarded
by binding dispute resolution, then the Contractor may, upon seven additional days' notice to the Owner, Construction Manager 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 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 notify the Construction Manager, and the Contractor and Construction Manager shall jointly 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 list, the Architect, assisted by the Construction Manager, 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 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, assisted by the Construction Manager, to determine Substantial Completion.

§ 9.8.4 When the Architect, assisted by the Construction Manager, determines that the Work of all of the Contractors, or designated portion thereof, is substantially complete, the Construction Manager will prepare, and the Construction Manager and Architect shall execute, 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 and Construction Manager shall jointly 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 after consultation with the Construction Manager.

§ 9.9.2 Immediately prior to such partial occupancy or use, the Owner, Construction Manager, 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.
§ 9.10.3 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 completion of the Work, the Contractor shall forward to the Construction Manager a notice that the Work is ready for final inspection and acceptance, and shall also forward to the Construction Manager a final Contractor’s Application for Payment. Upon receipt, the Construction Manager shall perform an inspection to confirm the completion of Work of the Contractor. The Construction Manager shall make recommendations to the Architect when the Work of all of the Contractors is ready for final inspection, and shall then forward the Contractors’ notices and Application for Payment or Project Application for Payment, to the Architect, who will promptly make such inspection. When the Architect finds the Work acceptable under the Contract Documents and the Contract fully performed, the Construction Manager and Architect will promptly issue a final Certificate for Payment or Project Certificate for Payment stating that to the best of their knowledge, information and belief, and on the basis of their 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 Construction Manager’s and Architect’s final Certificate for Payment or Project 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 through the Construction Manager (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 Construction Manager and Architect so confirm, the Owner shall, upon application by the Contractor and certification by the Construction Manager and 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 through the Construction Manager 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. The Contractor shall submit the Contractor’s safety program to the Construction Manager for review and coordination with the safety programs of other Contractors. The Construction Manager’s responsibilities for review and coordination of safety programs shall not extend to direct control over or charge of the acts or omissions of the Contractors, Subcontractors, agents or employees of the Contractors or Subcontractors, or any other persons performing portions of the Work and not directly employed by the Construction Manager.

§ 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;
.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; and
.4 construction or operations by the Owner, Separate Contractors, or other Contractors.

§ 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, 10.2.1.3 and 10.2.1.4 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, 10.2.1.3 and 10.2.1.4. 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, Construction Manager or Architect or anyone directly or indirectly employed by any of them, or by anyone for whose acts any 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, Construction Manager 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

§ 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, Construction Manager 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, Construction Manager 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, the Construction Manager and the Architect will promptly reply to the Owner in writing stating whether or not any of them has reasonable objection to the persons or entities proposed by the Owner. If the Contractor, Construction Manager or Architect has an objection to a person or entity proposed by the Owner, the Owner shall propose another to whom the Contractor, the Construction Manager 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, Construction Manager, Architect, their 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, Construction Manager and Construction Manager’s consultants, and the 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 directly to the Owner, and separately to the Construction Manager, 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 both the Contractor and the Construction Manager, separately and 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 directly to the Contractor, and separately to the Construction Manager, 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, subcontractors, agents, and employees, each of the other; (2) the Construction Manager and Construction Manager’s consultants; (3) the Architect and Architect’s consultants; (4) other Contractors and any of their subcontractors, subcontractors, agents, and employees; and (5) Separate Contractors, if any, and any of their subcontractors, 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 proceed of such insurance. The Owner or Contractor, as appropriate, shall require similar written waivers in favor of the individual and entities identified above from the Construction Manager, Construction Manager’s consultants, Architect, Architect’s consultants, other Contractors, 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, Architect, and Construction Manager for loss of use of the Owner’s property, due to fire or other hazards however caused.

§ 11.5 Adjustment and Settlement of Insurance 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 insured, as their interests may appear, subject to requirements of any applicable mortgage clause and of Section 11.5.2. The Owner shall pay the Construction Manager, Architect and Contractor their just shares of insurance proceeds received by the Owner, and by appropriate agreements the Construction Manager, 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 Construction Manager’s or Architect’s request or to requirements specifically expressed in the Contract Documents, it must, if requested in writing by either, be uncovered for their examination and be replaced at the Contractor’s expense without change in the Contract Time.
§ 12.2.2 If a portion of the Work has been covered that the Construction Manager or Architect has not specifically requested to examine prior to its being covered, the Construction Manager or 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 Construction Manager or 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 Construction Manager’s and 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, Construction Manager 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, Separate Contractors, or other 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, Construction Manager, 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 hereunder, 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 Construction Manager and Architect timely notice of when and where tests and inspections are to be made so that the Construction Manager and 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 Construction Manager, 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 Construction Manager and 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 Construction Manager and Architect of when and where tests and inspections are to be made so that the Construction Manager and 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 Construction Manager’s and 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 Construction Manager for transmittal to the Architect.
§ 13.4.5 If the Construction Manager or Architect is to observe tests, inspections, or approvals required by the
Contract Documents, the Construction Manager or 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 Construction Manager has not certified or 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, 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, Construction Manager 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 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, Construction Manager and 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, after consultation with the Construction Manager,
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 Construction Manager’s and 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, upon application, be certified by the Initial Decision Maker after consultation with the Construction Manager, 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 the 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 this 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 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 Construction Manager and 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.

§ 15.1.5 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, the Construction Manager, 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 of 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.

§ 15.4.2.4 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 A232® – 2019

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 15:20:58 MT on 02/27/2024.

PAGE 1

ITD D1 Coeur d'Alene New Testing Laboratory
600 W Prairie Ave.
Coeur d'Alene, ID 83814

...

Bateman-Hall, Inc.
1405 Foote Drive
Idaho Falls, ID 83402

...

State of Idaho Transportation Department
11331 W Chinden Blvd.
Boise, ID 83714

...

Miller Stauffer Architects
601 E. Front Ave.
Coeur d'Alene, ID 83814
Certification of Document's Authenticity

AIA® Document D401™ – 2003

I, Vanessa Josephson, 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 15:20:58 MT on 02/27/2024 under Order No. 2114431607 from AIA Contract Documents software and that in preparing the attached final document I made no changes to the original text of AIA® Document A232™ – 2019, General Conditions of the Contract for Construction, Construction Manager as Adviser Edition, other than those additions and deletions shown in the associated Additions and Deletions Report.

(Signed)

Vanessa Josephson

(Title)

Project Manager

(Dated)

2-27-24
STATE OF ___________________________ )

COUNTY OF ___________________________ )

Pursuant to the Idaho Code Title 63, Chapter 15, I the undersigned, being duly sworn, depose and certify that all taxes, excises, and license fees due to the State or its taxing units, for which I or my property is liable then due or delinquent, has been paid, or arrangements have been made, before entering into a contract for construction of any public works in the State of Idaho.

{Contractor’s Company Name} - {FMXXXXX}
Name of Contractor

{Mailing Address}
Address

{Mailing City, State Zip}
City and State

By: ____________________________
(Signature)

Subscribed and sworn to before me this ____________ day of __________________ 20____.

____________________________
NOTARY PUBLIC
Residing at: ____________________________
Commission Expires: ____________________________
# Idaho State Tax Commission
## CONTRACTOR’S REQUEST FOR TAX RELEASE

### Date: ______________________

<table>
<thead>
<tr>
<th>PART I -- AWARDING AGENCY INFORMATION:</th>
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<tbody>
<tr>
<td>Name of agency</td>
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<tr>
<td>Idaho Transportation Department</td>
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<tr>
<td>Contact name</td>
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<td>Travis Frei, Contracting Officer</td>
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<th>PART II -- CONTRACTOR INFORMATION:</th>
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<tr>
<td>Name of contractor</td>
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<tr>
<td>{Contractor’s Company Name}</td>
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<tr>
<td>Federal EIN</td>
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Send a copy of the Approved Tax Release to: ☒ Awarding Agency  ☒ Contractor  ☒ Construction Manager

**NOTE:** We will email all copies unless otherwise requested

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<th>PART IV – PROJECT INFORMATION</th>
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<tbody>
<tr>
<td>Name of project</td>
</tr>
<tr>
<td>ITD D1 Coeur d’Alene New Testing Laboratory</td>
</tr>
</tbody>
</table>

Description of Project
Did any government entities supply materials which were installed by this contractor or its subs? □ Yes □ No

If YES, list these materials and their dollar values. (Attach additional information if needed)

<table>
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<tr>
<th>List Materials</th>
<th>List Dollar Values of Materials</th>
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Send to: Contract Desk/Sales Tax Audit
Idaho State Tax Commission
PO Box 36
Boise, ID 83722-0410

Phone: (208) 334-7618
Fax: (208) 332-6619
Email: contractdesk@tax.idaho.gov
RELEASE OF CLAIMS

(TO BE COMPLETED FOR FINAL PAYMENT)

I, __________________________________________ do hereby release the State of Idaho from any and all claims of any character whatsoever arising under and by virtue of contract number {FMXXXXX} dated {Month} {Day}, 2024 as amended, except as herein stated.

{Contractor's Company Name} - {FMXXXXX}

Name of Contractor

By: __________________________

(Signature)

__________________________

Date
CONDITIONS PRECEDENT TO FINAL PAYMENT

Contractor: {Contractor’s Company Name} - {FMXXXXX}

ITD Project No. D231130
Project Title: ITD D1 Coeur d’Alene New Testing Laboratory
Location: 600 W. Prairie Ave. Coeur d’Alene, ID 83814

Send to: State of Idaho
Idaho Transportation Department
11331 W Chinden Blvd
Boise, ID 83714

Copy to: Bateman-Hall, Inc.
Attn: Patti Cole
PO Box 1464 or 1405 Foote Dr.
Idaho Falls, ID 83403 or Idaho Falls, ID 83402

Contractor’s Responsibilities:

As a condition precedent to final payment, the Contractor must furnish the owner, in the form and manner required by Owner, to be submitted to the Construction Manager for approval, the following:

☐ Contractor’s Final Request for Payment Form has been provided;
☐ Release of Claims form has been provided;
☐ Contractor’s Affidavit of Payment of Debts and Claims Form has been provided (AIA G706);
☐ Consent of Surety to Final Payment has been provided (AIA G707);
☐ Confirmation of all required training (DPW’s Training Confirmation Form), product warranties, operating manuals, instruction manuals, and other record documents, drawings and items customarily required of the Contractor has been provided.
☐ Public Works Contract Tax Release from the Idaho Tax Commission has been provided;
☐ NA ITD’s Letter of Completion/Final Inspection Sign-Off (as required);
☐ Project Finalization and Start Up has been provided (as required)

Contractor’s Signature __________________________ Date ____________

Construction Manager’s Approval for Payment:

☐ All Warranties, Guarantees, etc. have been received, approved, and have been provided.
☐ Contractor’s As-Built Drawings have been received, reviewed, approved.
☐ Final punch list with AE’s verification that all items have been completed.
☐ Record Drawings have been completed by AE. All required copies of the Record Documents and electronic media area attached and signed off as complete.

To the best of my knowledge, information, and belief, and on the basis of my observations and inspections, I certify the Work has been completed in accordance with the terms and conditions of the Contract Documents and that the required documentation required by Paragraph 7.13 of the fixed priced contract has been received. The entire balance, as shown on the attached Final Request for Payment, is due and payable.

Construction Manager’s Signature __________________________ Date ____________
Document G706® – 1994

Contractor’s Affidavit of Payment of Debts and Claims

PROJECT:
ITD D1 Coeur d’Alene New Testing Laboratory
600 W. Prairie Ave.
Coeur d’Alene, ID

ARCHITECT’S PROJECT NUMBER: [Arch’s Project #]

OWNER: □
ARCHITECT: □
CONTRACTOR: □
SURETY: □
OTHER: □

ARCHITECT:
CONTRACTOR:
SURETY:
OTHER:

TO OWNER:
Idaho Transportation Department
11331 W Chinden Blvd
Boise, ID 83714

OWNERS: □
ARCHITECT: □
CONTRACTOR: □
SURETY: □
OTHER: □

CONTRACT FOR: [Short Description]

OVERALL DATED: [Month] [Day], 2024

STATE OF: __________________________
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:

SUPPOURING DOCUMENTS ATTACHED HERETO:

CONTRACTOR:
[Contractor’s Company Name]
[Physical Address]
[Physical City, State Zip]

BY:

[Signature of authorized representative]

(Printed name and title)

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

Indicate Attachment: □ Yes □ No

2. Separate Releases of Waivers of Liens from Subcontractors and material and equipment suppliers, to the extent required by the Owner, accompanied by a list thereof

Subscribed and sworn to before me on this date:

Notary Public:

My Commission Expires:
Contractor’s Affidavit of Release of Liens

PROJECT: ITD D1 Coeur d’Alene New Testing Laboratory
600 W. Prairie Ave.
Coeur d’Alene, ID

ARCHITECT’S PROJECT NUMBER: {Arch’s Project #}

TO OWNER: Idaho Transportation Department
11331 W Chinden Blvd
Boise, ID 83714

OWNER: ☐
ARCHITECT: ☐

CONTRACT FOR: {Short Description}

CONTRACT DATED: {Month} {Day}, 2024

CONTRACTOR: ☐
SURETY: ☐
OTHER: ☐

STATE OF: __________________________
COUNTY OF: __________________________

The undersigned hereby certifies that to the best of the undersigned’s knowledge, information and belief, except a 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 the 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:

{Contractor's Company Name}
{Physical Address}
{Physical City, State Zip}

BY:

(Signature of authorized representative)

(Printed name and title)

Subscribed and sworn to before me on this date:

Notary Public:

My Commission Expires:
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Certificate of Substantial Completion, Construction Manager as Adviser Edition

PROJECT: D231130 - ITD D1 Coeur d'Alene New Testing Laboratory  
600 W. Prairie Ave.  
Coeur d'Alene, ID

CONTRACT INFORMATION:  
Contract For: [Short Description]  
Date: [Month] [Day], 2024

CERTIFICATE INFORMATION:  
Certificate Number: [FMXXXXX]  
Date: March 11, 2024

OWNER: Idaho Transportation Department  
11331 W Chinden Blvd  
Boise, ID 83714

ARCHITECT: Miller Stauffer Architects  
601 E. Front Ave. Ste. 201  
Coeur d'Alene, ID 83814

CONSTRUCTION MANAGER: Bateman-Hall, Inc.  
1405 Foote Drive  
Idaho Falls, ID 83402

CONTRACTOR(S):  
{Contractor's Company Name} ([FMXXXXX])  
{Mailing Address}  
{Mailing City, State Zip}

The Work identified below has been reviewed and found, to the Construction Manager’s and Architect’s best knowledge, information and belief, to be substantially complete. Substantial Completion is the state in the progress of the Work when the Work of all the Contractors 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. The date of Substantial Completion of the Project, or portion thereof designated below, is the date established by this Certificate

Bid Package {Bid Pkg #} - [Short Description]

For all Contractors, the date of Substantial Completion of the Project, or portion thereof, is:

{Substantial Completion Date}

Bateman-Hall, Inc.  
CONSTRUCTION MANAGER  
SIGNATURE  
PRINTED NAME AND TITLE  
DATE

Miller Stauffer Architects  
ARCHITECT  
SIGNATURE  
PRINTED NAME AND TITLE  
DATE

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:

{Warranties that have dates other than Substantial Date - G734-2019}

WORK TO BE COMPLETED OR CORRECTED
A list of items to be completed or corrected by each of the Contractors, including a cost estimate, is attached hereto or transmitted as agreed upon by the parties, and identified as follows:

{List or Reference to list of items needing completed or corrected - G734-2019}
The failure to include any items on such list does not alter the responsibility of a 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 lists will be the date of issuance of the final Certificate of Payment or the date of final payment, whichever occurs first. Each Contractor will complete or correct the Work on the appropriate list of items attached hereto within sixty (30) days from the above date of Substantial Completion.

As of the date of Substantial Completion, the Owner shall be responsible for security, maintenance, heat, utilities, damage to the Work, and insurance, except as noted below:

{Contractor's Remaining Responsibilities - G734-2019}

[Contractor's Company Name]

CONTRACTOR

SIGNATURE

PRINTED NAME AND TITLE

DATE

Idaho Transportation Department

OWNER

SIGNATURE

PRINTED NAME AND TITLE

DATE

Idaho Transportation Department

OWNER

SIGNATURE

PRINTED NAME AND TITLE

DATE
SECTION 011100 – SUMMARY OF WORK

Part 1. GENERAL

Section 1.01 SECTION INCLUDES

A PROJECT SCOPE
B PHASES OF PROJECT
C CONTRACT RELATIONSHIP
D LOCATION
E OWNER SUPPLIED PRODUCTS
F CONTRACTOR USE OF SITE
G EXISTING SERVICES, STRUCTURES, AND UNDERGROUND FACILITIES
H PROTECTION OF WORK AND IMPROVEMENTS
I SCHEDULES AND WORK SEQUENCE
J OWNER OCCUPANCY

Section 1.02 PROJECT SCOPE

A The project is to build a new Asphalt and Concrete Testing Laboratory on the District #1 Campus. The proposed facility is a single-story facility that is separated into four primary sections: office space, D-1 lab area, a residency lab area, and storage area. The facility is to be constructed out of Concrete Masonry Construction and Light wood frame construction. The facility has concrete slab-on-grade floors and low sloped roofs. The roofs are single ply roofing and metal roofing.

B Due to the nature of the facility, there is a high amount of mechanical and electrical work needed for the project. Significant coordination is needed to facilitate these constructions. It shall be the responsibility of the contractors to coordinate their work with other contractors that will interface with their work.

Section 1.03 PHASES OF PROJECT

A There will be two phases of this project as defined by the construction manager as advisor.

   (i) Phase I – Site Utilities, Site Clearing, Excavation
   (ii) Phase II – Building Construction & Finalization of Site Improvements

Section 1.04 CONTRACT RELATIONSHIP

A This project will be delivered through multiple prime contracts with the owner. The owner has procured the services of a construction manager as advisor for the duration of the project. The construction manager will provide coordination services during the project. The construction manager will bid the various contract scopes on behalf of the owner. All communications must go through the construction manager.

B The CMa will coordinate the activities of the multiple contractors.
C The CMa will provide contract administration services in conjunction with the Architect.

D The CMa will not be responsible for the physical construction of the project and will only provide administrative services to provide a concise, well-delivered project to the owner. Providing expertise in planning, managing, and coordinating the project from start to finish.

E Owner contracted contractors and sub-contractors are responsible for construction.

(i)

Section 1.05 LOCATION

A 600 W. Prairie Ave. Coeur d’Alene, Idaho 83815 – Project Site is located West of the Main Administrative building.

Section 1.06 OWNER SUPPLIED PRODUCTS

A Lab Equipment – Refer to Equipment Plan

B Furniture

(i) Cubicles

(ii) Office Chairs

(iii) Kitchen Appliances

(iv) Computers and Printers

Section 1.07 CONTRACTORS USE OF SITE

A The contractors shall have limited use of the site during construction. The construction site will be designated by construction fencing and secured.

Section 1.08 EXISTING SERVICES, STRUCTURES, AND UNDERGROUND FACILITIES

A EXISTING SERVICES

(i) The Site has several utilities already on the site. It shall be the responsibility of the contractors to locate and analyze the existing construction and construction by other contractors to complete their scope of work. The contractors will be responsible for coordinating with the construction advisor and other prime contractors to complete their scope of work.

B STRUCTURES

(i) There are several facilities and improved asphalt parking lot areas. Contractors are to take care to protect the existing improvements and constructions.

C UNDERGROUND FACILITIES

(i) There are several existing underground facilities around the project site. Care is to be taken to not damage construction that is intended to stay. Damage to the existing construction that is not intended to be removed will be the responsibility of the contractor to repair or replace.

(ii) The contractor is responsible for calling for all underground facility locations.
(iii) An Alta Survey has been performed on the site. This information will be provided to the contractor. It shall be the responsibility of the contractors to review this information if it will impact their work.

Section 1.09 PROTECTION OF WORK AND IMPROVEMENTS

A All Contractors shall be responsible for the protection of their work. If a contractor damages another contractor’s work, they shall be responsible for the cost of repairing or replacing the damaged work.

B Every Contractor shall be responsible for informing the Construction Manager as Advisor if a portion of work has been damaged.

Section 1.10 SCHEDULES AND WORK SEQUENCE

A The construction advisor will provide an overall construction schedule to give the multiple prime contractors the information and timeframe necessary to complete their work. The work sequence will be coordinated by the Construction Advisor.

B Every prime contractor is required to provide a detailed schedule denoting their scope of work. They will be required to provide a 3-week look ahead for their scope of work that is to be submitted bimonthly.

Section 1.11 OWNER OCCUPANCY

A Owner shall have access to site throughout the term of the project. A designated area around the future structure and site improvements will be fenced off to limit access to the job site from the owner and users. The owner will coordinate access of owner vendors and personnel with the Construction Advisor.

Part 2. PRODUCTS

Section 2.01 NOT APPLICABLE

Part 3. EXECUTION

Section 3.01 NOT APPLICABLE

END OF SECTION 011100
SECTION 011116 – WORK BY OWNER

Part 1. GENERAL

Section 1.01 SECTION INCLUDES

A OWNER FURNISHED EQUIPMENT
B OWNER INSTALLED EQUIPMENT

Section 1.02 OWNER FURNISHED EQUIPMENT

A All Furniture and Lab Equipment will be supplied by owner, unless noted otherwise. Refer to equipment schedule for equipment to be installed by contractor.

Section 1.03 OWNER INSTALLED EQUIPMENT

(i) The owner will supply and install all IT Hardware for Data except the IT Cabinet and Patch Panels.
1) The electrical contractor will be responsible for running all Data cabling and terminating ends at patch panel and data jacks. Electrical contractor to provide Data Rack.

Part 2. PRODUCTS

Section 2.01 NOT APPLICABLE

Part 3. EXECUTION

Section 3.01 NOT APPLICABLE

END OF SECTION 011116
SECTION 011400 – WORK RESTRICTIONS

Part 1. GENERAL

Section 1.01 SECTION INCLUDES

A USE OF SITE
B COORINATION WITH OCCUPANTS
C WORK RESTRICTIONS
D STORAGE

Section 1.02 USE OF SITE

A General: Contractors shall have limited use of the site for construction operations during the entire construction period.

(i) The site area will be secured with temporary fencing.

B Use of the Site: Contractor will be required to work within designated areas. If work needs to occur outside the designated area please notify the construction manager 24 hours prior. The contractor will be required to notify the construction manager if the site fencing needs to be modified.

(i) Driveways, Walkways and Entrances: Keep driveways, walkways, loading areas and entrances serving the site clear and available to Idaho Transportation Department. The Construction entrances are not to be blocked unless prior approval has been given. Notify Construction Manager if entrances are going to be blocked. Store all materials in the designated areas.

(ii) Limits: Confine construction operations to the areas that have been approved by the owner and construction manager.

(iii) Owner Use of Site: The owner will continue operations outside of the construction enclosure. The contractors are to not impede the owners’ operations unless prior coordination has been completed. The Owner will not access the construction site unless prior approved by the construction manager. The Construction Manager will make contractors aware of site visits.

(iv) Routes of ingress and egress to areas where work is being performed shall be subject to restrictions and instructions of the Owner.

a) Schedule deliveries to minimize use of driveways and entrances by construction operations.

b) Schedule deliveries to minimize space and time requirements for storage of materials and equipment on-site.

C Existing Buildings

(i) None of the Existing Buildings will be accessible to contractors unless prior approval has been given. If access to an existing building is needed to complete the contractor’s work, notify the construction manager.

(ii) Protect all buildings and occupants during the construction period.
Section 1.03 COORDINATION WITH OCCUPANTS

A Full Site Occupancy: Idaho Transportation Department will occupy the site around the construction site, including existing buildings during the entire construction period. Cooperate with Construction Manager and Owner during construction operations to minimize conflicts and facilitate both the contractors and the owner’s usage. Perform the work so as not to interfere with Idaho Transportation Department Day to day operations. If after normal hour construction operations are required to complete the contractors work, notify the construction manager and owner to minimize disturbance. After-hours work to be done at NO Cost to the Owner.

B Notify the Construction Manager and the Owner not less than 72 hours in advance of activities that will affect the Idaho Transportation Department’s operations.

Section 1.04 WORK RESTRICTIONS

A On-Site Work Hours, General: Work shall be generally performed during normal working hours and days.

(i) Workdays: Monday through Friday

(ii) Work Hours: 7:00am to 5:00pm Local Time

a) Weekend Hours: Coordinate with Construction Manager, Owner and Authorities having jurisdiction.

b) Early Morning Hours: Coordinate with Construction Manager, Owner and Authorities having jurisdiction.

c) Hours for Utility Shutdowns: Coordinate with Construction Manager, Owner and Authorities having jurisdiction.

d) Comply with all requirements and restrictions for use in public right of ways. Provide traffic control plans and traffic control to complete the contractors scope of work in the public right of way. Coordinate all work with construction manager, owner, and authorities having jurisdiction.

B Existing Utility Interruptions: Do not interrupt utilities serving existing facilities occupied by owner or others unless permitted by the construction manager, owner and authorities having jurisdiction. Contractor must receive written approval.

C Noise, Vibration, and Odors: Coordinate operations that may result in high levels of noise, vibration, odors, or disruptions to the owner occupancy with the construction manager and owner.

D The site is a drug free zone. Drug use of any kind will not be permitted. Zero Tolerance will be used if use is found.

E The site is Non-Smoking. Smoking is prohibited.

Section 1.05 STORAGE

A In the event that, it is necessary for the Contractor to stockpile or store quantities of material or equipment on the job site, the contractor shall inform the construction manager and owner of such necessity. The construction manager shall offer available space. The Contractor shall use said space only for such purpose. Any and all materials which may be brough onto the job site at any time by the Contractor shall be left at the Contractor’s sole risk. The Owner shall not be responsible to the Contractor for loss of or damage to said materials or equipment for any cause whatsoever. It is expressly understood and agreed that the Contractor assumes all risk of loss or damage to such materials and equipment. The owner will not provide a watchman. The contractor shall take necessary measures to protect any such storage area and shall be responsible for any and all damages.

B The Contractor shall confine storage of materials to limits approved by the Construction Manager and by the Owner. The Contractor shall not necessarily encumber the premises or overload any portion of it with materials to
a greater extent than is calculated to bear. The Contractor shall not store hazardous materials, such as solvents, paints, thinners, etc. unless in approved containers and quantities.

Part 2.  
PRODUCTS

Section 2.01  NOT APPLICABLE

Part 3.  
EXECUTION

Section 3.01  NOT APPLICABLE

END OF SECTION 011400
SECTION 012000 – Allowances, Unit Prices, & Alternates

Part 1. GENERAL

Section 1.01 SECTION INCLUDES
   A ALLOWANCES
   B UNIT PRICES
   C ALTERNATES

Section 1.02 ALLOWANCES
   A There are no allowances on this project. Not applicable.

Section 1.03 UNIT PRICES
   A There are no allowances on this project. Not Applicable.

Section 1.04 ALTERNATES
   A There are no alternative scopes of work on this project. Not applicable.

Part 2. PRODUCTS

Section 2.01 NOT APPLICABLE

Part 3. EXECUTION

Section 3.01 NOT APPLICABLE

END OF SECTION 012000
SECTION 012500 – POST BID SUBSTITUTION PROCEDURES

Part 1. GENERAL

Section 1.01 SECTION INCLUDES

A DEFINITIONS
B ACTION SUBMITTALS
C QUALITY ASSURANCE
D PROCEDURES
E SUBSTITUTIONS

Section 1.02 DEFINITIONS

A Substitutions: Changes in products, materials, equipment, and methods of construction from those required by the Contract Documents and proposed by Contractor.

(i) 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.

(ii) 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.

Section 1.03 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.

(i) Substitution Request Form: Use form provided in Section 012501.

(ii) Documentation: Show compliance with requirements for substitutions and the following, as applicable:

a) Statement indicating why specified product or fabrication or installation method cannot be provided, if applicable.

b) Coordination of 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 substitutions 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 as well as 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 substitutions 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.

(iii) Architect's Action: If necessary, Architect will request additional information or documentation for evaluation within 3 Business days of receipt of a request for substitution. Architect will notify Contractor of acceptance or rejection of proposed substitution within 5 Business days of receipt of request, or 3 Business 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.

Section 1.04 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.

Section 1.05 PROCEDURES

A Coordination: Revise or adjust affected work as necessary to integrate work of the approved substitutions.

Section 1.06 SUBSTITUTIONS

A Substitutions for Cause: Submit requests for substitution immediately on discovery of need for change, but not later than 7 Business days prior to time required for preparation and review of related submittals.

(i) 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.

(ii) Substitutions for Convenience: Architect will consider requests for substitution if received within 60 days after the Notice to Proceed. Requests received after that time may be considered or rejected at discretion of Architect.

(iii) 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 2. PRODUCTS

Section 2.01 NOT APPLICABLE

Part 3. EXECUTION

Section 3.01 NOT APPLICABLE
END OF SECTION 012500
SECTION 012501 – POST BID SUBSTITUTION FORM

Part 1. GENERAL

TO: ____________________________________________________________

PROJECT: ______________________________________________________

SPECIFIED ITEM:

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
<th>Paragraph</th>
<th>Description</th>
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The undersigned requests consideration of the following.

PROPOSED SUBSTITUTION: ____________________________________________

Attached data includes product description, specifications, drawings, photographs, performance and test data adequate for evaluation of the request; applicable portions of the data are clearly identified.

Attached data also includes description of changes to Contract Documents which proposed substitution will require for its proper installation.

The undersigned states that the following paragraphs, unless modified on attachments, are correct:

1. The proposed substitution does not affect dimensions shown on the drawings.

2. The undersigned will pay for changes to the building design, including engineering design, detailing and construction costs caused by the requested substitution.

3. The proposed substitution will have no adverse effect on other trades, the construction schedule, or specified warranty requirements.

4. Maintenance and service parts are locally available for the proposed substitution.

The undersigned further states that the function, appearance, and quality of the proposed substitution are equivalent or superior to the Specified item.

Submitted by:

Signature ____________________________  For use by Architect:

Firm ________________________________  Accepted  Accepted as Noted
Address ______________________________  Not Accepted  Received Too Late
Date ________________________________  By ________________________________
Telephone __________________________  Date ________________________________
Fax _________________________________  Remarks ________________________________

Attachments:
Part 2. PRODUCTS

Section 2.01 NOT APPLICABLE

Part 3. EXECUTION

Section 3.01 NOT APPLICABLE

END OF SECTION 012501
SECTION 013100 – PROJECT MANAGEMENT AND COORDINATION

Part 1. GENERAL

Section 1.01 SECTION INCLUDES

A DEFINITIONS
B INFORMATIONAL SUBMITTALS
C GENERAL COORDINATION PROCEDURES
D COORDINATION DRAWINGS
E REQUEST FOR INFORMATION (RFI’s)
F PROJECT MEETINGS

Section 1.02 DEFINITIONS

A RFI: Request For Information from Owner, Architect, or Contractor seeking information required by or clarifications of the Contract Documents.

Section 1.03 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:

(i) Name, Address, and Telephone number of entity performing subcontract or supplying products.

(ii) Number and title of specification section covered by subcontract.

(iii) Drawing number and detail references, as appropriate, covered by subcontract.

B Key Personnel Names: Within 5 days of starting construction operations, submit a list of key personnel assignments, including foreman and other personnel in attendance at Project site. Identify individuals and their duties and responsibilities. Keep Construction Manager updated of all changes.

Section 1.04 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.

(i) 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.

(ii) Coordinate installation of different components to ensure maximum performance and accessibility for required maintenance, service, and repair.

(iii) Make adequate provisions to accommodate items scheduled for later installation.

601 E. Front Ave. Ste. 201 Coeur d’Alene, Idaho 83814 Ph: 208.664.1773 Email: koln@millerstauffer.com
B Prepare memoranda for distribution to each party involved, outlining special procedures required for coordination. Provide a copy of memoranda to the construction manager. Include such items as required notices, reports, and list of attendees at meetings.

C Administrative Procedures: Coordinate Scheduling and timing of required administrative procedures with other construction activities to avoid conflicts and to ensure orderly progress of the Work. Such administrative activities include, but are not limited to, the following:

(i) Preparation of Contractor’s construction schedule.
(ii) Preparation of the schedule of values.
(iii) Installation and removal of necessary temporary facilities and controls for contractors and subcontractors’ scope of work.
(iv) Delivery and processing of Submittals.
(v) Progress meetings will be coordinated and conducted by the construction manager.
(vi) Preinstallation conferences.
(vii) Project closeout activities.
(viii) 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.

Section 1.05 COORDINATION DRAWINGS

A All contractors are responsible for coordination of all drawings. It is the responsibility of all contractors to review other contractors’ related scopes of work. Information is not limited to the contractors’ drawings and contractors are required to review other contractors’ scopes of work and drawings.

B All contractors are responsible for notifying the construction manager of all deviations from the contract documents. All contractors are responsible for maintaining a construction set. Contractors are responsible for providing the construction manager with a copy of the contractors’ record construction drawings with redline mark-ups.

Section 1.06 REQUEST FOR INFORMATION (RFI’s)

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 by the Construction Manager.

(i) All RFI’s must be submitted to the Construction Manager. All RFI’s received directly from the contractor will be returned with no response.

(ii) Coordinate and submit RFI’s 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:

(i) Project Name

(ii) Project Number
(iii) Date

(iv) Name of Contractor

(v) Name of Architect

(vi) RFI Number, numbered Sequentially.

(vii) RFI Subject

(viii) Specification Section number and title and related paragraphs, as appropriate.

(ix) Drawing number and detail references, as appropriate

(x) Field Dimensions and conditions, as appropriate.

(xi) Contractor’s suggested resolution. If Contractor’s suggested resolution impacts the Contract Time or the Contract Sum, Contractor shall state impact in the RFI.

(xii) Contractor’s Signature

(xiii) Attachments as needed to explain the requested information or question, including but not limited to materials, dimensions, thicknesses, and assemblies.

C Architect’s Action: Architect will review each RFI, determine action required, and respond. Allow five working days for Architect’s response for each RFI. RFI’s received after 1:00p.m. will be considered as received the following working day.

(i) The following Contractor generated RFI’s will be returned without action.

a) Request for approval of Submittals.

b) Request for approval of Substitutions.

c) Request for approval of Contractor’s means and methods.

d) Requests for coordination information already indicated in the Contract Documents.

e) Request for adjustment in the Contract Time or the Contract Sum.

f) Request for interpretation of Architect’s actions on Submittals.

g) Incomplete RFI’s or inaccurately prepared RFI’s

D Architect’s action may include a request for additional information, in which case architects time for response will date from time of receipt of additional information.

E An architect’s action on RFI’s that may result in a change to the Contract Time, or the Contract sum may be eligible for Contractor to submit Change Proposal. If architects action results in change in contractor time or sum the contractor must notify the construction manager and owner of cost or time change before execution of work. The Contractor is to not proceed with out an approved change order. If the contractor fails to notify the Architect, Owner, and construction manager of cost or time impact and the contractor proceeds then it is assumed there is no cost or time impact. No post approval of a change order will be granted, and the contractor assumes responsibility for cost or time impacts.
(i) Contractor must notify the Architect, Owner, and Construction Manager of impact within 5 days of receipt of RFI’s response.

F RFI Log: Each contractor will be responsible for maintaining a log of their RFI’s. The Construction Manager will maintain a Master Log of all submitted RFI’s.

G The Construction Manager will maintain the response of all RFI’s. Contractor must send back receipt of response within 5 days of receipt.

Section 1.07 PROJECT MEETINGS

A General: The Construction Manager will be responsible for all Owner, Architect, and Contractor meetings. If a meeting is needed to coordinate work, it is the responsibility of the contractor to request said meeting. An agenda must be submitted to the Construction Manager. The agenda must be submitted 3 business days prior to the meeting.

(i) The agenda must include requested attendees and subjects for consideration. The agenda must be submitted to the construction manager.

(ii) The Construction Manager will maintain the minutes of the meeting. The construction manager will distribute the meeting minutes.

B Preconstruction Conference: Contractor is responsible to schedule all preconstruction meetings with the construction manager. The construction manager will coordinate the attendee invites. Preconstruction meetings must be notified 10 days prior to meeting.

(i) Each Contractor must perform a preconstruction meeting before the start of the work. No work can be executed before a preconstruction meeting can be performed. The contractor must describe and explain their scope of work. The contractor must notify the construction manager daily if there are changes to their work.

(ii) If coordination of multiple contractors’ work is required, it is the responsibility of the contractor to contact all coordinating trades and coordinate meetings with the construction manager.

C Safety Meeting: All Contractors are responsible for attending a construction safety meeting weekly. The meeting will be held by the construction manager with the collaboration of the contractor. All contractors are responsible for adherence to all safety standards and guidelines.

Part 2. PRODUCTS

Section 2.01 NOT APPLICABLE

Part 3. EXECUTION

Section 3.01 NOT APPLICABLE

END OF SECTION 013100
SECTION 013300 – SUBMITTAL PROCEDURES

Part 1. GENERAL

Section 1.01 SECTION INCLUDES

A SUMMARY
B DEFINITIONS
C SUBMITTAL SCHEDULE
D SUBMITTAL FORMATS
E SUBMITTAL PROCEDURES
F SUBMITTAL REQUIREMENTS
G DELEGATED DESIGN SERVICES (IF APPLICABLE)
H CONTRACTORS REVIEW
I ARCHITECTS REVIEW

Section 1.02 SUMMARY

A Section Includes:

(i) Submittal schedule requirements.

(ii) Administrative and procedural requirements for submittals.

Section 1.03 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."

Section 1.04 SUBMITTAL SCHEDULE

A Submittal Schedule: Submit, as an action submittal, a list 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.

Section 1.05 SUBMITTAL FORMATS

A Submittal Information: Include the following information in each submittal:

(i) Project name.
(ii) Date.

(iii) Name of Architect.

(iv) Name of Contractor.

(v) Name of firm or entity that prepared submittal.

(vi) Names of subcontractor, manufacturer, and supplier.

(vii) Unique submittal number, including revision identifier. Include Specification Section number with sequential alphanumeric identifier, and alphanumeric suffix for resubmittals.

(viii) Category and type of submittal.

(ix) Submittal purpose and description.

(x) Number and title of Specification Section, with paragraph number and generic name for each of multiple items.

(xi) Drawing number and detail references, as appropriate.

(xii) Indication of full or partial submittal.

(xiii) Location(s) where product is to be installed, as appropriate.

(xiv) Other necessary identification.

(xv) Remarks.

(xvi) Signature of transmitter.

B Options: Identify options requiring selection by Architect.

C Deviations and Additional Information: On each submittal, clearly indicate deviations from requirements in the Contract Documents, including minor variations and limitations; include relevant additional information and revisions, other than those requested by Architect on previous submittals. Indicate by highlighting on each submittal or noting on attached separate sheet.

D Submittals for Utilizing Web-Based Project Management Software: Prepare submittals as PDF files, or other format indicated by Project management software.

Section 1.06 SUBMITTAL PROCEDURES

A Prepare and submit submittals required by individual Specification Sections. Types of submittals are indicated in individual Specification Sections.

(i) Web-Based Project Management Software: Prepare submittals in PDF form, and upload to web-based Project management software website. Enter required data in web-based software site to fully identify submittal.

B Coordination: Coordinate preparation and processing of submittals with performance of construction activities.

(i) Coordinate each submittal with fabrication, purchasing, testing, delivery, other submittals, and related activities that require sequential activity.

(ii) Submit all submittal items required for each Specification Section concurrently unless partial submittals for portions of the Work are indicated on approved submittal schedule.
(iii) Submit action submittals and informational submittals required by the same Specification Section as separate packages under separate transmittals.

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.

(i) Initial Review: Allow 5 business 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.

(ii) Resubmittal Review: Allow 5 business days for review of each resubmittal.

D Resubmittals: Make resubmittals in same form and number of copies as initial submittal.

E 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.

F 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.

Section 1.07 SUBMITTAL REQUIREMENTS

A Product Data: Collect information into a single submittal for each element of construction and type of product or equipment.

(i) If information must be specially prepared for submittal because standard published data are unsuitable for use, submit as Shop Drawings, not as Product Data.

(ii) Mark each copy of each submittal to show which products and options are applicable.

(iii) Include the following information, as applicable:
   
a) Manufacturer's catalog cuts.
   
b) Manufacturer's product specifications.
   
c) Standard color charts.
   
d) Statement of compliance with specified referenced standards.
   
e) Testing by recognized testing agency.
   
f) Application of testing agency labels and seals.
   
g) Notation of coordination requirements.
   
h) Availability and delivery time information.

B For equipment, include the following in addition to the above, as applicable:

(i) Wiring diagrams that show factory-installed wiring.

(ii) Printed performance curves.
(iii) Operational range diagrams.

(iv) Clearances required to other construction, if not indicated on accompanying Shop Drawings.

(v) Submit Product Data before Shop Drawings, and before or concurrent with Samples.

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.

(i) 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.

D Samples: Submit Samples for review of kind, color, pattern, and texture for a check of these characteristics with other materials.

(i) Transmit Samples that contain multiple, related components such as accessories together in one submittal package.

(ii) Identification: Permanently attach label on unexposed side of Samples that includes the following:

a) Project name and submittal number.

b) Generic description of Sample.

c) Product name and name of manufacturer.

d) Sample source.

e) Number and title of applicable Specification Section.

f) Specification paragraph number and generic name of each item.

(iii) Web-Based Project Management Software: Prepare submittals in PDF form, and upload to web-based Project software website. Enter required data in web-based software site to fully identify submittal.

(iv) Disposition: Maintain sets of approved Samples at Project site, available for quality-control comparisons throughout the course of construction activity. Sample sets may be used to determine final acceptance of construction associated with each set.
a) Samples that may be incorporated into the Work are indicated in individual Specification Sections. Such Samples must be in an undamaged condition at time of use.

b) Samples not incorporated into the Work, or otherwise designated as Owner's property, are the property of Contractor.

(v) 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 (1) full sets 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.

(vi) 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 one (1) sets of Samples. Architect will retain one (1) Sample sets; remainder will be returned. Mark up and retain one returned Sample set as a project record Sample.

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 (3) sets of paired units that show approximate limits of variations.

E Product Schedule: As required in individual Specification Sections, prepare a written summary indicating types of products required for the Work and their intended location. Include the following information in tabular form:

F 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.

G Design Data: Prepare and submit written and graphic information indicating compliance with indicated performance and design criteria in individual Specification Sections. Include list of assumptions and summary of loads. Include load diagrams if applicable. Provide name and version of software, if any, used for calculations. Number each page of submittal.

H Certificates:

(i) Certificates and Certifications Submittals: Submit a statement that includes signature of entity responsible for preparing certification. Certificates and certifications shall be signed by an officer or other individual authorized to sign documents on behalf of that entity. Provide a notarized signature where indicated.

(ii) 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.

a) 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.

b) Material Certificates: Submit written statements on manufacturer's letterhead certifying that material complies with requirements in the Contract Documents.
c) **Product Certificates:** Submit written statements on manufacturer’s letterhead certifying that product complies with requirements in the Contract Documents.

d) **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.

I **Test and Research Reports:**

(i) **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 substrate preparation and primers required.

(ii) **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.

(iii) **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.

(iv) **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.

(v) **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.

(vi) **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:

a) Name of evaluation organization.

b) Date of evaluation.

c) Time period when report is in effect.

d) Product and manufacturers’ names.

e) Description of product.

f) Test procedures and results.

g) Limitations of use.

Section 1.08 **DELEGATED DESIGN SERVICES (IF APPLICABLE)**

A **Performance and Design Criteria:** Where professional design services or certifications by a design professional are specifically required of Contractor by the Contract Documents, provide products and systems complying with specific performance and design criteria indicated.

(i) If criteria indicated are insufficient to perform services or certification required, submit a written request for additional information to Architect.
B. Delegated Design Services Certification: In addition to Shop Drawings, Product Data, and other required submittals, submit an electronic copy of certificate, signed and sealed by the responsible design professional, for each product and system specifically assigned to Contractor to be designed or certified by a design professional.

1. Indicate that products and systems comply with performance and design criteria in the Contract Documents. Include list of codes, loads, and other factors used in performing these services.

Section 1.09 CONTRACTOR'S REVIEW

B. Action Submittals 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.

C. Contractor's Approval: Indicate Contractor's approval for each submittal with indication in web-based Project management software. Include 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.

1. Architect will not review submittals received from Contractor that do not have Contractor's review and approval.

Section 1.10 ARCHITECT'S REVIEW

D. Action Submittals: Architect will review each submittal, indicate corrections or revisions required.

1. Submittals by Web-Based Project Management Software: Architect will indicate, on Project management software website, the appropriate action.

   a. Actions taken by indication on Project management software website have the following meanings:

   (i) 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.

E. Partial submittals prepared for a portion of the Work will be reviewed when use of partial submittals has received prior approval from Architect.

F. Incomplete submittals are unacceptable, will be considered nonresponsive, and will be returned for resubmittal without review.

G. Architect will return without review submittals received from sources other than Contractor.

H. Submittals not required by the Contract Documents will be returned by Architect without action.

Part 2. PRODUCTS

Section 2.01 NOT APPLICABLE

Part 3. EXECUTION

Section 3.01 NOT APPLICABLE

END OF SECTION 013300
SECTION 013301 – SCHEDULE OF SUBMITTALS

Part 1. GENERAL

Section 1.01 SECTION INCLUDES

A SUMMARY
B GENERAL
C SCHEDULE OF SUBMITTALS

Section 1.02 SUMMARY

A Section Includes:
   (i) General Submittal Information
   (ii) Schedule of Submittals

Section 1.03 DEFINITIONS

A Submit all schedules per section 013300 – Submittal Procedures.
B This schedule is intended to provide a list of major elements requiring submittals but is not a comprehensive list. Review submittal section of all specifications to identify all required data & shop drawings for each product or trade.

Section 1.04 SCHEDULE OF SUBMITTALS

A SPECIAL INSPECTION REPORTS AND TEST
B CONSTRUCTION SCHEDULE FOR EACH SCOPE OF WORK
C SCHEDULE OF VALUE FOR EACH TRADE
   (i) Provide Material and Labor cost divided into separate categories for each material/scope.
D INSURANCE CERTIFICATES
E BONDS
F COPY OF LICENSES
G LIST OF VENDORS & SUPPLIERS
H CONCRETE MIX – PRODUCT DATA
I REBAR – SHOP DRAWINGS
J CONCRETE FINISH MATERIALS - PRODUCT DATA
K CONCRETE ADDITIVES (If required) – PRODUCT DATA
L MASONRY - PRODUCT & TESTING DATA
M MASONRY & GROUT - COLOR SAMPLES
N MASONRY SEALERS & FILLERS - PRODUCT DATA
O PRECAST CONCRETE - SHOP DRAWINGS
P STEEL - SHOP DRAWINGS
Q STEEL FABRICATOR CERTIFICATE
R GLULAM BEAM - PRODUCT DATA
S WOOD TRUSS - SHOP DRAWINGS (STAMPED) AND STRUCTURAL CALCULATIONS
T SHEATHING - PRODUCT DATA
U  PLASTIC LAMINATE CASEWORK & TRIM - SHOP DRAWINGS
V  BUILDING WRAP – PRODUCT DATA
W  FOUNDATION DAMPPROOFING – PRODUCT DATA
X  BELOW SLAB VAPOR BARRIER – PRODUCT DATA
Y  INSULATION (ABOVE GRADE & BELOW GRADE) – PRODUCT DATA
Z  METAL SIDING – PRODUCT DATA & COLOR SAMPLE
AA METAL ROOFING - PRODUCT DATA & COLOR SAMPLE
BB SINGLE PLY ROOFING - PRODUCT DATA
CC GYPSUM WALL BOARD - PRODUCT DATA
DD TAPING & GYPSUM TRIM – PRODUCT DATA
EE PAINT - PRODUCT DATA
FF PAINT COLOR DRAW DOWNS
GG METAL FLASHING PRODUCT DATA
HH ACCESS PANELS – PRODUCT DATA
II ACCESS HATCHES – PRODUCT DATA
JJ SEALANTS, FIRE STOPPING, AND CAULKS – PRODUCT DATA
KK STOREFRONT WINDOW - SHOP DRAWINGS & PRODUCT DATA
LL GLAZING & MIRROR - SHOP DRAWINGS
MM DOOR & FRAME - SHOP DRAWINGS & PRODUCT DATA
NN DOOR HARDWARE SCHEDULE & PRODUCT DATA
OO OVERHEAD COILING DOOR DATA
PP LOUVER & VENT SHOP DRAWING & DATA
QQ TILE - PRODUCT DATA & SAMPLES
RR FLOORING – PRODUCT DATA & SAMPLES
SS FIBERGLASS REINFORCED PANEL - PRODUCT DATA
TT ACOUSTICAL CEILING – PRODUCT DATA & SHOP DRAWING
UU FLOORING & TRANSITION – PRODUCT DATA
VV SIGNAGE - SHOP DRAWINGS & PRODUCT DATA
WW BATHROOM ACCESSORIES - PRODUCT DATA & SCHEDULE
XX FIRE EXTINGUISHER AND CABINETS - PRODUCT DATA & SCHEDULE
YY APPLIANCE (GARBAGE DISPOSAL) - PRODUCT DATA
ZZ WINDOW SHADES - PRODUCT DATA
AAA STAINLESS STEEL CASEWORK & COUNTERS - PRODUCT DATE & SHOP DRAWINGS
BBB FIRE SUPPRESSION SYSTEM - PRODUCT DATE & ENGINEERED SHOP DRAWINGS
   (i) APPROVAL OF STATE FIRE MARSHALL
CCC FIRE ALARM – SHOP DRAWING & DATA
DDD HVAC – PRODUCT DATA
   (i) PIPING
   (ii) FURNACES, HEAT PUMPS, AND CADET HEATERS
   (iii) DUCT WORK
   (iv) VENT HOODS
   (v) EXHAUST FANS
EEE PLUMBING – PRODUCT DATA
   (i) FIXTURES
   (ii) HOT WATER HEATERS
   (iii) BACKFLOW DEVICES
   (iv) BELOW GRADE PIPING (DOMESTIC, SANITARY, AND NATURAL GAS)
   (v) ABOVE GRADE PIPING (DOMESTIC, SANITARY, AND NATURAL GAS)
FFF ELECTRICAL
(i) ELECTRICAL (POWER) - PRODUCT DATA
   a) WIRING, FIXTURES, AND PLATES
   b) GENERATOR & ATS
   c) SWITCH GEAR
   d) GROUNDING SYSTEM
(ii) ELECTRICAL (LIGHTING) – PRODUCT DATA & SCHEDULE
    a) SWITCHS & FIXTURES
    b) LIGHTING CONTROL
(iii) LOW VOLTAGE & DATA – PRODUCT DATA
    a) WIRING, FIXTURES, AND PLATES
    b) DATA CABINETS & PATCH PANELS
GGG    ACCESS CONTROL - PRODUCT DATA & SHOP DRAWINGS
HHH    IRRIGATION – PRODUCT DATA & SHOP DRAWINGS
III    PLANTING – PRODUCT DATA & SCHEDULES / PLAN
JJJ    GROUNDCOVER – PRODUCT DATA
KKK    SOIL AMENDMENT – PRODUCT DATA
LLL    ASPHALT & STRIPPING – PRODUCT DATA
MMM    FENCES AND GATES – PRODUCT DATA
NNN    VERTICAL PIVOT GATE - SHOP DRAWING & PRODUCT DATA

Part 2. PRODUCTS
Section 2.01 NOT APPLICABLE

Part 3. EXECUTION
Section 3.01 NOT APPLICABLE

END OF SECTION 013301
SECTION 013300 – QUALITY REQUIREMENTS

Part 1. GENERAL

Section 1.01 SECTION INCLUDES

A SUMMARY
B DEFINITIONS
C CONFLICTING REQUIREMENTS
D INFORMATIONAL SUBMITTALS
E REPORTS AND DOCUMENTS
F QUALITY ASSURANCE
G QUALITY CONTROL
H SPECIAL TESTS AND INSPECTIONS

Section 1.02 SUMMARY

A Section includes administrative and procedural requirements for quality assurance and quality control.

B Testing and inspection 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.

(i) Specified tests, inspections, and related actions do not limit Contractor's other quality-assurance and quality-control procedures that facilitate compliance with the Contract Document requirements.

(ii) Requirements for Contractor to provide quality-assurance and quality-control services required by Architect, Owner, or authorities having jurisdiction are not limited by provisions of this Section.

(iii) Specific test and inspection requirements are specified in this section.

(iv) The Contractor is responsible to provide quality control testing for this project from a certified testing agency. Contractor is responsible for the costs and contract with the certified testing agency.

Section 1.03 DEFINITIONS

A Experienced: When used with an entity or individual, "experienced" unless otherwise further described means having successfully completed a minimum of five (5) 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.

B Field Quality-Control Tests and Inspections: Tests and inspections that are performed on-site for installation of the Work and for completed Work.

C 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, assembly, and similar operations.
(i) Use of trade-specific terminology in referring to a Work result does not require that

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. Unless otherwise indicated, copies of reports of tests or inspections performed for other than the Project do not meet this definition.

E Source Quality-Control Tests and Inspections: Tests and inspections that are performed at the source; for example, plant, mill, factory, or shop.

F Testing Agency: An entity engaged to perform specific tests, inspections, or both. The term "testing laboratory" has the same meaning as the term “testing agency."

G 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.

H 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. Contractor's quality-control services do not include contract administration activities performed by Architect.

Section 1.04 CONFLICTING REQUIREMENTS

A Conflicting Standards and Other Requirements: If compliance with two or more standards or requirements is specified and the standards or requirements establish different or conflicting requirements for minimum quantities or quality levels, inform the Architect regarding the conflict and obtain clarification prior to proceeding with the Work. Refer conflicting requirements that are different, but apparently equal, to Architect for clarification before proceeding.

B Minimum Quantity or Quality Levels: The quantity or quality level shown or specified is 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.

Section 1.05 INFORMATIONAL SUBMITTALS

A Contractor's Statement of Responsibility: When required by authorities having jurisdiction, submit copy of written statement of responsibility submitted to authorities having jurisdiction before starting work on the following systems:

(i) Seismic-force-resisting system, designated seismic system, or component listed in the Statement of Special Inspections.

(ii) Main wind-force-resisting system or a wind-resisting component listed in the Statement of Special Inspections.

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.

B. Permits, Licenses, and Certificates: For Owner's record, 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.
Section 1.06 REPORTS AND DOCUMENTS

A Test and Inspection Reports: Prepare and submit certified written reports specified in other Sections. Include the following:

(i) Date of issue.
(ii) Project title and number.
(iii) Name, address, telephone number, and email address of testing agency.
(iv) Dates and locations of samples and tests or inspections.
(v) Names of individuals making tests and inspections.
(vi) Description of the Work and test and inspection method.
(vii) Identification of product and Specification Section.
(viii) Complete test or inspection data.
(ix) Test and inspection results and an interpretation of test results.
(x) Record of temperature and weather conditions at time of sample taking and testing and inspection.
(xi) Comments or professional opinion on whether tested or inspected Work complies with the Contract Document requirements.
(xii) Name and signature of laboratory inspector.
(xiii) 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:

(i) Statement on condition of substrates and their acceptability for installation of product.
(ii) Statement that products at Project site comply with requirements.
(iii) Summary of installation procedures being followed, whether they comply with requirements and, if not, what corrective action was taken.
(iv) Results of operational and other tests and a statement of whether observed performance complies with requirements.
(v) 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:

(i) Statement that equipment complies with requirements.
(ii) Results of operational and other tests and a statement of whether observed performance complies with requirements.
(iii) Other required items indicated in individual Specification Sections.
D Permits, Licenses and Certificates: For Owners records, submit copies of permits, licenses, certifications, inspections 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.

Section 1.07 QUALITY ASSURANCE

A 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. As applicable, procure products from manufacturers able to meet qualification requirements, warranty requirements, and technical or factory-authorized service representative requirements.

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, applying, 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 and Inspecting Agency Qualifications: An NRTL, an NVLAP, or an independent agency with the experience and capability to conduct testing and inspection indicated, as documented according to ASTM E329; and with additional qualifications specified in individual Sections; and, where required by authorities having jurisdiction, that is acceptable to authorities.

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, demonstrate, repair, and perform service on installations of manufacturer's products that are similar in material, design, and extent to those indicated for this Project.

I Preconstruction Testing: Where testing agency is indicated to perform preconstruction testing for compliance with specified requirements for performance and test methods, comply with the following:

J Contractor responsibilities include the following:

(i) Provide test specimens representative of proposed products and construction.

(ii) Submit specimens in a timely manner with sufficient time for testing and analyzing results to prevent delaying the Work.

(iii) When testing is complete, remove test specimens and test assemblies, mockups; do not reuse products on Project.

K Testing Agency Responsibilities: Submit a certified written report of each test, inspection, and similar quality-assurance service to Architect with copy to Contractor. Interpret tests and inspections and state in each report whether tested and inspected work complies with or deviates from the Contract Documents.
Section 1.08 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.

(i) Owner will furnish Contractor with names, addresses, and telephone numbers of testing agencies engaged and a description of types of testing and inspection they are engaged to perform.

(ii) 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, and the Contract Sum will be adjusted by Change Order.

B Contractor Responsibilities: Tests and inspections not explicitly assigned to Owner are Contractor’s responsibility. Perform additional quality-control activities, whether specified or not, to verify and document that the Work complies with requirements.

(i) Engage a qualified testing agency to perform quality-control services.

   a) Contractor will not employ same entity engaged by Owner, unless agreed to in writing by Owner.

(ii) Notify testing agencies at least 48 hours in advance of time when Work that requires testing or inspection will be performed.

(iii) Where quality-control services are indicated as Contractor’s responsibility, submit a certified written report, in duplicate, of each quality-control service.

(iv) Testing and inspection requested by Contractor and not required by the Contract Documents are Contractor’s responsibility.

(v) Submit additional copies of each written report directly to authorities having jurisdiction, when they so direct.

C 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.


(i) Notify Architect and Contractor promptly of irregularities or deficiencies observed in the Work during performance of its services.

(ii) Determine the locations from which test samples will be taken and in which in-situ tests are conducted.

(iii) Conduct and interpret tests and inspections and state in each report whether tested and inspected Work complies with or deviates from requirements.

(iv) Submit a certified written report, in duplicate, of each test, inspection, and similar quality-control service through Contractor.

(v) Do not release, revoke, alter, or increase the Contract Document requirements or approve or accept any portion of the Work.

(vi) Do not perform duties of Contractor.
E    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 013300 "Submittal Procedures."

F    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.

G    Contractor's Associated Requirements and Services: Cooperate with agencies and representatives 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:

(i) Access to the Work.

(ii) Incidental labor and facilities necessary to facilitate tests and inspections.

(iii) Adequate quantities of representative samples of materials that require testing and inspection. Assist agency in obtaining samples.

(iv) Facilities for storage and field curing of test samples.

(v) Preliminary design mix proposed for use for material mixes that require control by testing agency.

(vi) Security and protection for samples and for testing and inspection equipment at Project site.

H    Coordination: Coordinate sequence of activities to accommodate required quality-assurance and quality-control services with a minimum of delay and to avoid necessity of removing and replacing construction to accommodate testing and inspection.

(i) Schedule times for tests, inspections, obtaining samples, and similar activities.

Section 1.09 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, as indicated in the Statement of Special Inspections attached to this Section, and as follows:

(i) Verifying that manufacturer maintains detailed fabrication and quality-control procedures and reviewing the completeness and adequacy of those procedures to perform the Work. Contractor to provide all necessary installation instructions to owner, construction manager, and architect as requested.

(ii) Notifying Architect, Owner, and Construction Manager promptly of irregularities and deficiencies observed in the Work during performance of its services.

(iii) The third party testing agency will submit a certified written report of each test, inspection, and similar quality-control service to Architect with copy to Owner, Construction Manager, and to authorities having jurisdiction.

(iv) Submitting a final report of special tests and inspections at Substantial Completion, which includes a list of unresolved deficiencies.

(v) Interpreting tests and inspections and stating in each report whether tested and inspected work complies with or deviates from the Contract Documents.

(vi) Retesting and reinspecting corrected Work are the responsibility of the contractor.
Part 2. PRODUCTS

Section 2.01 NOT APPLICABLE

Part 3. EXECUTION

Section 3.01 SUMMARY

A TEST AND INSPECTION LOG

B REPAIR AND PROTECTION

Section 3.02 TEST AND INSPECTION LOG

A Test and Inspection Log: Prepare a record of tests and inspections. Include the following:

(i) Date test or inspection was conducted.

(ii) Description of the Work tested or inspected.

(iii) Date test or inspection results were transmitted to Architect.

(iv) 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 authorities' having jurisdiction reference during normal working hours.

(i) Submit log at Project closeout as part of Project Record Documents.

Section 3.03 REPAIR AND PROTECTION

A General: On completion of testing, inspection, sample taking, and similar services, repair damaged construction and restore substrates and finishes.

(i) 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 017300 "Execution."

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

b) Repair and protection are Contractor's responsibility, regardless of the assignment of responsibility for quality-control services.

END OF SECTION 014000
SECTION 015000 – TEMPORARY FACILITIES AND CONTROLS

Part 1. GENERAL

Section 1.01 SECTION INCLUDES

A SUMMARY

B USE CHARGES

C INFORMATIONAL SUBMITTALS

D QUALITY ASSURANCE

E PROJECT CONDITIONS

Section 1.02 SUMMARY

A Section includes requirements for temporary utilities, support facilities, and security and protection facilities.

Section 1.03 USE CHARGES

A Installation, removal, and use charges for temporary facilities shall be included in the Contract Sum unless otherwise indicated. Allow other entities engaged in the Project to use temporary services and facilities without cost, including, but not limited to, Owner’s construction forces, Architect, testing agencies, and authorities having jurisdiction.

Section 1.04 INFORMATIONAL SUBMITTALS

A Site Utilization Plan: Show temporary facilities, temporary utility lines and connections, staging areas, construction site entrances, vehicle circulation, and parking areas for construction personnel.

B Project Identification and Temporary Signs: Show fabrication and installation details, including plans, elevations, details, layouts, typestyles, graphic elements, and message content.

C Fire-Safety Program: Show compliance with requirements of NFPA 241 and authorities having jurisdiction. Indicate Contractor personnel responsible for management of fire-prevention program.

D Moisture- and Mold-Protection Plan: Describe procedures and controls for protecting materials and construction from water absorption and damage and mold. Describe delivery, handling, storage, installation, and protection provisions for materials subject to water absorption or water damage.

(i) Indicate procedures for discarding water-damaged materials, protocols for mitigating water intrusion into completed Work, and requirements for replacing water-damaged Work.

(ii) Indicate sequencing of work that requires water, such as sprayed fire-resistive materials, plastering, and terrazzo grinding, and describe plans for dealing with water from these operations. Show procedures for verifying that wet construction has dried sufficiently to permit installation of finish materials.

(iii) Indicate methods to be used to avoid trapping water in finished work.

Section 1.05 QUALITY ASSURANCE
A Electric Service: Comply with NECA, NEMA, and UL standards and regulations for temporary electric service. Install service to comply with NFPA 70.

B Tests and Inspections: Arrange for authorities having jurisdiction to test and inspect each temporary utility before use. Obtain required certifications and permits.

Section 1.06 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

Section 2.01 SECTION INCLUDES

A TEMPORARY FACILITIES

B EQUIPMENT

Section 2.02 TEMPORARY FACILITIES

A Field Offices: Prefabricated or mobile units with serviceable finishes, temperature controls, and foundations adequate for normal loading.

(i) Contractors can provide any field offices as necessary to perform their scope of work. These field offices must be coordinated with the construction manager prior to installation to determine location and available room. The Construction Manager will give final approval for installation.

(ii) If a contractor desires to have a field office on site, contact the construction manager.

B Field Storage Containers: Prefabricated or mobile storage units for storage of materials and tools will be allowed.

(i) Contact the Construction Manager for approval of installation and location.

(ii) Storage Containers must be in good condition and working order.

(iii) The contractor/sub-contractor will be responsible for security of container and locking.

Section 2.03 EQUIPMENT

A Fire Extinguishers: Portable, UL rated; with class and extinguishing agent as required by locations and classes of fire exposures.

B HVAC Equipment: Provide vented, self-contained, liquid-propane-gas or fuel-oil heaters with individual space thermostatic control.

(i) Use of gasoline-burning space heaters, open-flame heaters, or salamander-type heating units is prohibited.

(ii) Heating, Cooling, and Dehumidifying 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.

C Air-Filtration Units as Required: Primary and secondary HEPA-filter-equipped portable units with four-stage filtration. Provide single switch for emergency shutoff. Configure to run continuously.
Part 3. EXECUTION

Section 3.01 SECTION INCLUDES

A  TEMPORARY FACILITIES, GENERAL
B  INSTALLATION GENERAL
C  TEMPORARY UTILITY INSTALLATION
D  SUPPORT FACILITIES INSTALLATION

Section 3.02 TEMPORARY FACILITIES, GENERAL

A  Conservation: Coordinate construction and use of temporary facilities with consideration given to conservation of energy, water, and materials. Coordinate use of temporary utilities to minimize waste.

Section 3.03 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.
C  Isolation of Work Areas on site: Prevent dust, fumes, and odors from entering occupied areas.

Section 3.04 TEMPORARY UTILITY INSTALLATION

A  General: Install temporary service.

(i)  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: Usage of Owner existing water service is allowed.
C  Sanitary Facilities: Provide temporary toilets, wash facilities, safety shower and eyewash 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  Temporary 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.

(i)  Provide temporary dehumidification systems when required to reduce ambient and substrate moisture levels to level required to allow installation or application of finishes and their proper curing or drying.
E  Electric Power Service: Provide electric power service and 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.
(i) Install and operate temporary lighting that fulfills security and protection requirements without operating the entire system.

G Electronic Communication Service: Provide secure WiFi wireless connection to the internet with provisions for access by Architect and Owner.

Section 3.05 SUPPORT FACILITIES INSTALLATION

A Comply with the following:

(i) Provide construction for temporary field offices, shops, and sheds located within construction area or within 30 feet (9 m) of building lines that is noncombustible according to ASTM E136. Comply with NFPA 241.

(ii) 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 the Owner.

B Temporary Roads and Paved Areas as needed: Construct and maintain temporary roads and paved areas adequate for construction operations. Locate temporary roads and paved areas as indicated within construction limits indicated on Drawings.

(i) Provide dust-control treatment that is nonpolluting and non-tracking. Reapply treatment as required to minimize dust.

C Traffic Controls as needed: Comply with requirements of authorities having jurisdiction.

(i) Protect existing site improvements to remain including curbs, pavement, and utilities.

(ii) Maintain access for fire-fighting equipment and access to fire hydrants.

D Parking: Use designated areas on site for parking areas for construction personnel.

E Storage and Staging: Use designated areas of project site for storage and staging needs.

F Dewatering Facilities and Drains: Comply with requirements of authorities having jurisdiction. Maintain Project site, excavations, and construction free of water.

(i) Dispose of rainwater in a lawful manner that will not result in flooding Project or adjoining properties or endanger permanent Work or temporary facilities.

(ii) Remove snow and ice as required to minimize accumulations.

G Waste Disposal Facilities: Comply with local jurisdiction requirements.

H Lifts and Hoists: Provide facilities necessary for hoisting materials and personnel.

(i) Truck cranes and similar devices used for hoisting materials are considered "tools and equipment" and not temporary facilities.

I Temporary Stairs: Until permanent stairs are available, provide temporary stairs where ladders are not adequate.

J Temporary Use of Permanent Stairs: Use of new stairs for construction traffic will be permitted, provided stairs are protected and finishes restored to new condition at time of Substantial Completion.

Section 3.06 SECURITY AND PROTECTION FACILITIES INSTALLATION
A Protection of Existing Facilities: Protect existing vegetation, equipment, structures, utilities, and other improvements at Project site and on adjacent properties, except those indicated to be removed or altered. Repair damage to existing facilities.

(i) Where access to adjacent properties is required in order to affect protection of existing facilities, obtain written permission from adjacent property owner to access property for that purpose.

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.

C Temporary Erosion and Sedimentation Control: Provide measures to prevent soil erosion and discharge of soil-bearing water runoff and airborne dust to undisturbed areas and to adjacent properties and walkways, according to requirements of EPA Construction General Permit or authorities having jurisdiction, whichever is more stringent.

(i) Verify that flows of water redirected from construction areas or generated by construction activity do not enter or cross tree- or plant-protection zones.

(ii) Inspect, repair, and maintain erosion- and sedimentation-control measures during construction until permanent vegetation has been established.

(iii) Clean, repair, and restore adjoining properties and roads affected by erosion and sedimentation from Project site during the Project duration.

(iv) Remove erosion and sedimentation controls and restore and stabilize areas disturbed during removal.

D Stormwater Control: Comply with requirements of authorities having jurisdiction. Provide barriers in and around excavations and subgrade construction to prevent flooding by runoff of stormwater from heavy rains.

E Pest Control: Engage pest-control service to recommend practices to minimize attraction and harboring of rodents, roaches, and other pests and to perform extermination and control procedures at regular intervals so Project will be free of pests and their residues at Substantial Completion. Perform control operations lawfully, using materials approved by authorities having jurisdiction.

F Site Enclosure Fence: Before construction operations begin, furnish, and install site enclosure fence in a manner that will prevent people from easily entering site except by entrance gates.

(i) Extent of Fence: As required to enclose entire Project site or portion determined sufficient to accommodate construction operations.

(ii) Maintain security by limiting the number of keys and restricting distribution to authorized personnel. Owner, Architect, Contractor to provide pad lock on contractor’s common chain.

a) 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 workday.

b) Barricades, Warning Signs, and Lights: Comply with requirements of authorities having jurisdiction for erecting structurally adequate barricades, including warning signs and lighting.

c) 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.

(iii) Where heating or cooling is needed and permanent enclosure is incomplete, insulate temporary enclosures.
Section 3.07 MOISTURE AND MOLD CONTROL

A  Moisture and Mold Protection: Protect stored materials and installed Work in accordance with Moisture and Mold Protection Plan.

B  Exposed Construction Period: Before installation of weather barriers, when materials are subject to wetting and exposure and to airborne mold spores, protect as follows:
   (i) Protect porous materials from water damage.
   (ii) Protect stored and installed material from flowing or standing water.
   (iii) Keep porous and organic materials from coming into prolonged contact with concrete.
   (iv) Remove standing water from decks.
   (v) Keep deck openings covered or dammed.

C  Partially Enclosed Construction Period: After installation of weather barriers but before full enclosure and conditioning of building, when installed materials are still subject to infiltration of moisture and ambient mold spores, protect as follows:
   (i) Do not load or install drywall or other porous materials or components, or items with high organic content, into a partially enclosed building.
   (ii) Keep interior spaces reasonably clean and protected from water damage.
   (iii) Periodically collect and remove waste containing cellulose or other organic matter.
   (iv) Discard or replace water-damaged material.
   (v) Do not install material that is wet.
   (vi) Discard and replace stored or installed material that begins to grow mold.
   (vii) Perform work in a sequence that allows wet materials adequate time to dry before enclosing the material in gypsum board or other interior finishes.

D  Controlled Construction Period: After completing and sealing of the building enclosure but prior to the full operation of permanent HVAC systems, maintain as follows:
   (i) Control moisture and humidity inside building by maintaining effective dry-in conditions.
   (ii) Use temporary or permanent HVAC system to control humidity within ranges specified for installed and stored materials.
   (iii) Comply with manufacturer's written instructions for temperature, relative humidity, and exposure to water limits.

Section 3.08 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.
(i) 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 the 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.

(i) Materials and facilities that constitute temporary facilities are property of Contractor. The owner reserves right to take possession of Project identification signs.

(ii) At Substantial Completion, repair, renovate, and clean permanent facilities used during construction period. Comply with final cleaning requirements specified in Section 017700 “Closeout Procedures.”

END OF SECTION 015000
SECTION 017300 – EXECUTION

Part 1. GENERAL

Section 1.01 SECTION INCLUDES

A SUMMARY
B DEFINITIONS
C QUALITY ASSURANCE

Section 1.02 SUMMARY

A Section includes general administrative and procedural requirements governing execution of the Work, including, but not limited to, the following:

(i) Construction layout.
(ii) Field engineering and surveying.
(iii) Installation of the Work.
(iv) Progress cleaning.
(v) Starting and adjusting.
(vi) Protection of installed construction.
(vii) Correction of the Work.

Section 1.03 DEFINITIONS

A Patching: Fitting and repair work required to restore construction to original conditions after installation of subsequent work.

Section 1.04 QUALITY ASSURANCE

A Land Surveyor Qualifications: A professional land surveyor who is legally qualified to practice in jurisdiction where Project is located and who is experienced in providing land-surveying services of the kind indicated.

B Manufacturer's Installation Instructions: Obtain and maintain on-site manufacturer's written recommendations and instructions for installation of specified products and equipment.

Part 2. PRODUCTS

Section 2.01 SECTION INCLUDES

A MATERIALS

Section 2.02 MATERIALS

A Comply with requirements specified in other Sections.
(i) For projects requiring compliance with sustainable design and construction practices and procedures, use products for patching that comply with sustainable design requirements.

B 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.

(ii) Use cleaning products that comply with Green Seal's GS-37, or if GS-37 is not applicable, use products that comply with the California Code of Regulations maximum allowable VOC levels.

C Install all products per manufacturer recommendations. If there is a conflict between the contract documents and the manufacturer recommendations, contact construction manager and architect for clarification.

Part 3. EXECUTION

Section 3.01 SECTION INCLUDES

A EXAMINATION

B PREPARATION

C CONSTRUCTION LAYOUT

D INSTALLATION

E PROGRESS CLEANING

F STARTING AND ADJUSTING

G PROTECTION OF INSTALLED CONSTRUCTION

H CORRECTION OF WORK

Section 3.02 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.

(i) Before construction, verify the location and invert elevation at points of connection of sanitary sewer, storm sewer, gas service piping, and water-service piping; underground electrical services; and other utilities.

(ii) 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.

(i) Examine roughing-in for mechanical and electrical systems to verify actual locations of connections before equipment and fixture installation.

(ii) Examine walls, floors, and roofs for suitable conditions where products and systems are to be installed.

(iii) Verify compatibility with and suitability of substrates, including compatibility with existing finishes or primers.
Section 3.03 PREPARATION

A Existing Utility Information: Furnish information to local utility that is necessary to adjust, move, or relocate existing utility structures, utility poles, lines, services, or other utility appurtenances located in or affected by construction. Coordinate with authorities having jurisdiction.

B Field Measurements: Take field measurements as required to fit the Work properly. Recheck measurements before installing each product. Where portions of the Work are indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication. Coordinate fabrication schedule with construction progress to avoid delaying the Work.

C Space Requirements: Verify space requirements and dimensions of items shown diagrammatically on Drawings.

D Review of Contract Documents and Field Conditions: Immediately on discovery of the need for clarification of the Contract Documents, submit a request for information to Architect in accordance with requirements in Section 013100 "Project Management and Coordination."

Section 3.04 CONSTRUCTION LAYOUT

A Verification: Before proceeding to lay out the Work, verify layout information shown on Drawings, in relation to the property survey and existing benchmarks and existing conditions. If discrepancies are discovered, notify Architect promptly.

B As needed engage a land surveyor experienced in laying out the Work, using the following accepted surveying practices:

(i) The owner, with the aid of the construction manager will establish benchmarks and control points for the contractor’s surveyor to establish bearing and heights. It is the responsibility of the contractor to coordinate and layout all work.

(ii) Establish limits on use of Project site.

(iii) Establish dimensions within tolerances indicated. Do not scale Drawings to obtain required dimensions.

(iv) Inform installers of lines and levels to which they must comply.

(v) Check the location, level and plumb, of every major element as the Work progresses.

(vi) Notify Architect when deviations from required lines and levels exceed allowable tolerances.

(vii) Close site surveys with an error of closure equal to or less than the standard established by authorities having jurisdiction.

C Site Improvements: Locate and lay out site improvements, including pavements, grading, fill and topsoil placement, utility slopes, and rim and invert elevations.

D Building Lines and Levels: Locate and lay out control lines and levels for structures, building foundations, column grids, and floor levels, including those required for mechanical and electrical work. Transfer survey markings and elevations for use with control lines and levels. Level foundations and piers from two or more locations.

E Record Log: Maintain a log of layout control work. Record deviations from required lines and levels. Include beginning and ending dates and times of surveys, weather conditions, name and duty of each survey party member, and types of instruments and tapes used. Make the log available for reference by Architect.
Section 3.05 INSTALLATION

A Locate the Work and components of the Work accurately, in correct alignment and elevation, as indicated.

(i) Make vertical work plumb and make horizontal work level.

(ii) Where space is limited, install components to maximize space available for maintenance and ease of removal for replacement.

(iii) 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 satisfactory results as judged by Architect. 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 of type expected for Project.

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: Select tools or equipment that minimize production of excessive 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 portions of the 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 with manufacturer.

(i) Mounting Heights: Where mounting heights are not indicated, mount components at heights directed by Architect.

(ii) Allow for building movement, including thermal expansion and contraction.

(iii) 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, as judged by Architect. Fit exposed connections together to form hairline joints.

Section 3.06 PROGRESS CLEANING

A Clean Project site and work areas daily, including common areas. Enforce requirements strictly. Dispose of materials lawfully.

(i) Comply with requirements in NFPA 241 for removal of combustible waste materials and debris.

(ii) Do not hold waste materials more than seven days during normal weather or three days if the temperature is expected to rise above 80 deg F (27 deg C).
(iii) 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.

   (i) Remove liquid spills promptly.

   (ii) 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: Clean exposed surfaces and protect as necessary to ensure freedom from damage and deterioration at time of Substantial Completion.

G Waste Disposal: Do not bury or burn waste materials on-site. Do not wash waste materials down sewers or into waterways. Comply with waste disposal requirements in Section 017419 "Construction Waste Management and Disposal."

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 ensure that no part of the construction, completed or in progress, is subject to harmful, dangerous, damaging, or otherwise deleterious exposure during the construction period.

Section 3.07 STARTING AND ADJUSTING

A Coordinate startup and adjusting of equipment and operating components with requirements in Section 019113 "General Commissioning Requirements."

B Start equipment and operating components to confirm proper operation. Remove malfunctioning units, replace with new units, and retest.

C Adjust equipment for proper operation. Adjust operating components for proper operation without binding.

D Test each piece of equipment to verify proper operation. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

E Manufacturer's Field Service: Comply with qualification requirements in Section 014000 "Quality Requirements."

Section 3.08 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. Protection of Existing Items: Provide protection and ensure that existing items to remain undisturbed by construction are maintained in condition that existed at commencement of the Work.

C. Comply with manufacturer's written instructions for temperature and relative humidity.

Section 3.09 CORRECTION OF THE WORK

A. Repair or remove and replace damaged, defective, or nonconforming Work. Restore damaged substrates and finishes.

   (i) Repairing includes replacing defective parts, refinishing damaged surfaces, touching up with matching materials, and properly adjusting operating equipment.

B. Repair Work previously completed and subsequently damaged during construction period. Repair to like-new condition.

C. Restore permanent facilities used during construction to their specified condition.

D. Remove and replace damaged surfaces that are exposed to view if surfaces cannot be repaired without visible evidence of repair.

E. Repair components that do not operate properly. Remove and replace operating components that cannot be repaired.

F. Remove and replace chipped, scratched, and broken glass or reflective surfaces.

END OF SECTION 017300
SECTION 017700 – CLOSEOUT PROCEDURE

Part 1. GENERAL

Section 1.01 SECTION INCLUDES

A SUMMARY

B ACTION SUBMITTALS

C CLOSEOUT SUBMITTALS

D SUBSTANTIAL COMPLETION PROCEDURES

E FINAL COMPLETION PROCEDURES

F LIST OF INCOMPLETE ITEMS

G SUBMITTAL OF PROJECT WARRANTIES

Section 1.02 SUMMARY

A Section includes administrative and procedural requirements for Contract closeout, including, but not limited to, the following:

(i) Substantial Completion procedures.

(ii) Final completion procedures.

(iii) Warranties.

(iv) Final cleaning.

Section 1.03 ACTION SUBMITTALS

A Contractor's List of Incomplete Items: Initial submittal at Substantial Completion.

B Certified List of Incomplete Items: Final submittal at Final Completion.

Section 1.04 CLOSEOUT SUBMITTALS

A Certificates of Release: From authorities having jurisdiction.

B Certificate of Insurance: For continuing coverage.

C Field Report: For pest-control inspection.

Section 1.05 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 5 business days prior to requesting inspection for determining date of Substantial Completion. List items below that are incomplete at time of request.

(i) 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.

(ii) Submit closeout submittals specified in other Division 01 Sections, including Project Record Documents, operation and maintenance manuals, damage or settlement surveys, property surveys, and similar final record information.

(iii) Submit closeout submittals specified in individual Sections, including specific warranties, workmanship bonds, maintenance service agreements, final certifications, and similar documents.

(iv) 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.

(v) Submit testing, adjusting, and balancing records.

(vi) Submit sustainable design submittals not previously submitted.

(vii) Submit changeover information related to Owner's occupancy, use, operation, and maintenance.

C Procedures Prior to Substantial Completion: Complete the following a minimum of 5 business days prior to requesting inspection for determining date of Substantial Completion. List items below that are incomplete at time of request.

(i) Advise Owner of pending insurance changeover requirements.

(ii) Make final changeover of permanent locks and deliver keys to Owner. Advise Owner's personnel of changeover in security provisions.

(iii) Complete startup and testing of systems and equipment.

(iv) Perform preventive maintenance on equipment used prior to Substantial Completion.

(v) Instruct Owner's personnel in operation, adjustment, and maintenance of products, equipment, and systems. Submit demonstration and training video recordings specified in Section 017900 "Demonstration and Training."

(vi) Advise Owner of changeover in utility services.

(vii) Participate with Owner in conducting inspection and walkthrough with local emergency responders.

(viii) Terminate and remove temporary facilities from Project site, along with mockups, construction tools, and similar elements.

(ix) Complete final cleaning requirements.

(x) Touch up paint 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 7 calendar 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.
Section 1.06 FINAL COMPLETION PROCEDURES

A Submittals Prior to Final Completion: Before requesting final inspection for determining Final Completion, complete the following:

(i) Submit a final Application for Payment in accordance with Section 012900 "Payment Procedures."

(ii) 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.

(iii) Certificate of Insurance: Submit evidence of final, continuing insurance coverage complying with insurance requirements.

(iv) Submit pest-control final inspection report.

B Inspection: Submit a written request for final inspection to determine acceptance a minimum of 10 days prior to the 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.

Section 1.07 LIST OF INCOMPLETE ITEMS

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.

(i) Organize list of spaces in sequential order, [starting with exterior areas first] [and] [proceeding from lowest floor to highest floor], listed by room or space number.

(ii) Organize items applying to each space by major element, including categories for ceilings, individual walls, floors, equipment, and building systems.

(iii) 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.

(iv) Submit list of incomplete items in the following format:

a) Web-Based Project Software Upload: Utilize software feature for creating and updating list of incomplete items (punch list).

Section 1.08 SUBMITTAL OF PROJECT WARRANTIES
A  Time of Submittal: Submit written warranties on request of Architect for designated portions of the Work where warranties are indicated to commence on dates other than date of Substantial Completion, 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.

C  Warranty Electronic File: Provide warranties and bonds in PDF format. Assemble complete warranty and bond submittal package into a single electronic PDF file with bookmarks enabling navigation to each item. Provide bookmarked table of contents at beginning of document.

   (i) Submit by uploading to web-based project software site.

D  Warranties in Paper Form:

   (i) Provide one paper copy to be retained at the project site.

   (ii) Bind warranties and bonds in heavy-duty, three-ring, vinyl-covered, loose-leaf binders, thickness as necessary to accommodate contents, and sized to receive 8-1/2-by-11-inch (215-by-280-mm) paper.

       a) Provide additional copies of each warranty to include in operation and maintenance manuals.

Part 2.  PRODUCTS

Section 2.01 SECTION INCLUDES

A  MATERIALS

Section 2.02 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.

   (i) Use cleaning products that comply with Green Seal’s GS-37, or if GS-37 is not applicable, use products that comply with the California Code of Regulations maximum allowable VOC levels.

Part 3.  EXECUTION

Section 3.01 SECTION INCLUDES

A  FINAL CLEANING

B  REPAIR OF WORK

Section 3.02 FINAL CLEANING

A  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.

   (i) 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 of rubbish, waste material, litter, and other foreign substances.

b) Clean exposed exterior and interior hard-surfaces 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.

c) Remove debris and surface dust from limited-access spaces, including roofs, plenums, shafts, trenches, equipment vaults, manholes, attics, and similar spaces.

d) Clean flooring, removing debris, dirt, and staining; clean according to manufacturer's recommendations.

e) Vacuum and mop concrete.

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, elevator 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.

m) Clean HVAC system in compliance with NADCA ACR.

n) Clean luminaires, lamps, globes, and reflectors to function with full efficiency.

o) Clean strainers.

p) Leave Project clean and ready for occupancy.

C Pest Control: Comply with pest control requirements in Section 015000 "Temporary Facilities and Controls." Prepare written report.

D Construction Waste Disposal: Comply with waste-disposal requirements in Section 017419 "Construction Waste Management and Disposal."

Section 3.03 REPAIR OF THE WORK

A Complete repair and restoration operations required by Section 017300 "Execution" before requesting inspection for determination of Substantial Completion.

END OF SECTION 017700
SECTION 017823 – OPERATION AND MAINTENANCE DATA

Part 1. GENERAL

Section 1.01 SECTION INCLUDES

A SUMMARY
B ACTION SUBMITTALS
C CLOSEOUT SUBMITTALS
D FORMAT OF OPERATION AND MAINTENANCE MANUALS
E REQUIREMENTS FOR EMERGENCY, OPERATION, AND MAINTENANCE MANUALS
F EMERGENCY MANUALS
G SYSTEMS AND EQUIPMENT MANUALS
H SYSTEMS AND EQUIPMENT MAINTENANCE MANUALS
I PRODUCT MAINTENANCE MANUALS

Section 1.02 SUMMARY

A Section includes administrative and procedural requirements for preparing operation and maintenance manuals, including the following:

(i) Operation and maintenance documentation directory manuals.
(ii) Emergency manuals.
(iii) Systems and equipment operation manuals.
(iv) Systems and equipment maintenance manuals.
(v) Product maintenance manuals.

Section 1.03 CLOSEOUT SUBMITTALS

A Submit operation and maintenance manuals indicated. Provide content for each manual as specified in individual Specification Sections, and as reviewed and approved at the time of Section submittals. Submit reviewed manual content formatted and organized as required by this Section.

(i) Architect will comment on whether content of operation and maintenance submittals is acceptable.
(ii) Where applicable, clarify and update reviewed manual content to correspond to revisions and field conditions.

B Format: Submit operation and maintenance manuals in the following format:

(i) Submit by uploading to web-based project software site. Enable reviewer comments on draft submittals.
(ii) Submit one (1) paper copies. Architect will return one (1) copy.
C Final Manual Submittal: Submit each manual in final form prior to requesting inspection for Substantial Completion and at least 3 business days before commencing demonstration and training. Architect will return copy with comments.

(i) Correct or revise each manual to comply with Architect's comments. Submit copies of each corrected manual within five (5) days of receipt of Architect's comments and prior to commencing demonstration and training.

D Comply with Section 017700 "Closeout Procedures" for schedule for submitting operation and maintenance documentation.

Section 1.04 FORMAT OF OPERATION AND MAINTENANCE MANUALS

A Manuals, Electronic Files: Submit manuals in the form of a multiple file composite electronic PDF file for each manual type required.

(i) Electronic Files: Use electronic files prepared by manufacturer where available. Where scanning of paper documents is required, configure scanned file for minimum readable file size.

(ii) File Names and Bookmarks: Bookmark individual documents based on file names. Name document files to correspond to system, subsystem, and equipment names used in manual directory and table of contents. Group documents for each system and subsystem into individual composite bookmarked files, then create composite manual, so that resulting bookmarks reflect the system, subsystem, and equipment names in a readily navigated file tree. Configure electronic manual to display bookmark panel on opening file.

B Manuals, Paper Copy: Submit manuals in the form of hard copy, bound and labeled volumes.

(i) Binders: Heavy-duty, three-ring, vinyl-covered, post-type binders, in thickness necessary to accommodate contents, sized to hold 8-1/2-by-11-inch (215-by-280-mm) paper; with clear plastic sleeve on spine to hold label describing contents and with pockets inside covers to hold folded oversize sheets.

(ii) 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.

Section 1.05 REQUIREMENTS FOR EMERGENCY, OPERATION, AND MAINTENANCE MANUALS

A Organization of Manuals: 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:

(i) Title page.

(ii) Table of contents.

(iii) Manual contents.

B Title Page: Include the following information:

(i) Subject matter included in manual.

(ii) Name and address of Project.
(iii) Name and address of Owner.

(iv) Date of submittal.

(v) Name and contact information for Contractor.

(vi) Name and contact information for Construction Manager.

(vii) Name and contact information for Architect.

(viii) Name and contact information for Commissioning Authority.

(ix) Names and contact information for major consultants to the Architect that designed the systems contained in the manuals.

(x) Cross-reference to related systems in other operation and maintenance manuals.

C Table of Contents: List each product included in manual, identified by product name, indexed to the content of the volume, and cross-referenced to Specification Section number in Project Manual.

D Manual Contents: Organize into sets of manageable size. Arrange contents alphabetically by system, subsystem, and equipment. If possible, assemble instructions for subsystems, equipment, and components of one system into a single binder.

E 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."

Section 1.06 EMERGENCY MANUALS

A Emergency Manual: Assemble a complete set of emergency information indicating procedures for use by emergency personnel and by Owner’s operating personnel for types of emergencies indicated.

B Content: Organize manual into a separate section for each of the following:

(i) Type of emergency.

(ii) Emergency instructions.

(iii) Emergency procedures.

C Type of Emergency: Where applicable for each type of emergency indicated below, include instructions and procedures for each system, subsystem, piece of equipment, and component:

(i) Fire.

(ii) Flood.

(iii) Gas leak.

(iv) Water leak.

(v) Power failure.

(vi) Water outage.
(vii) System, subsystem, or equipment failure.

(viii) Chemical release or spill.

D Emergency Instructions: Describe and explain warnings, trouble indications, error messages, and similar codes and signals. Include responsibilities of Owner’s operating personnel for notification of Installer, supplier, and manufacturer to maintain warranties.

E Emergency Procedures: Include the following, as applicable:

(i) Instructions on stopping.

(ii) Shutdown instructions for each type of emergency.

(iii) Operating instructions for conditions outside normal operating limits.

(iv) Required sequences for electric or electronic systems.

(v) Special operating instructions and procedures.

Section 1.07 SYSTEMS AND EQUIPMENT OPERATION MANUALS

A Systems and Equipment Operation Manual: Assemble a complete set of data indicating operation of each system, subsystem, and piece of equipment not part of a system. Include information required for daily operation and management, operating standards, and routine and special operating procedures.

B Content: In addition to requirements in this Section, include operation data required in individual Specification Sections and the following information:

(i) System, subsystem, and equipment descriptions. Use designations for systems and equipment indicated on Contract Documents.

(ii) Performance and design criteria if Contractor has delegated design responsibility.

(iii) Operating standards.

(iv) Operating procedures.

(v) Operating logs.

(vi) Wiring diagrams.

(vii) Control diagrams.

(viii) Piped system diagrams.

(ix) Precautions against improper use.

(x) License requirements including inspection and renewal dates.

C Descriptions: Include the following:

(i) Product name and model number. Use designations for products indicated on Contract Documents.

(ii) Manufacturer’s name.
(iii) Equipment identification with serial number of each component.

(iv) Equipment function.

(v) Operating characteristics.

(vi) Limiting conditions.

(vii) Performance curves.

(viii) Engineering data and tests.

(ix) Complete nomenclature and number of replacement parts.

D Operating Procedures: Include the following, as applicable:

(i) Startup procedures.

(ii) Equipment or system break-in procedures.

(iii) Routine and normal operating instructions.

(iv) Regulation and control procedures.

(v) Instructions on stopping.

(vi) Normal shutdown instructions.

(vii) Seasonal and weekend operating instructions.

(viii) Required sequences for electric or electronic systems.

(ix) Special operating instructions and procedures.

E Systems and Equipment Controls: Describe the sequence of operation, and diagram controls as installed.

F Piped Systems: Diagram piping as installed, and identify color coding where required for identification.

Section 1.08 SYSTEMS AND EQUIPMENT MAINTENANCE MANUALS

A Systems and Equipment Maintenance Manuals: Assemble a complete set of data indicating maintenance of each system, subsystem, and piece of equipment not part of a system. Include manufacturers' maintenance documentation, preventive maintenance procedures and frequency, repair procedures, wiring and systems diagrams, lists of spare parts, and warranty information.

B 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 warranties and bonds, as described below.

C Manufacturers' Maintenance Documentation: Include the following information for each component part or piece of equipment:

(i) Standard maintenance instructions and bulletins; 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.

a) 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.

(ii) Drawings, diagrams, and instructions required for maintenance, including disassembly and component removal, replacement, and assembly.

(iii) Identification and nomenclature of parts and components.

(iv) List of items recommended to be stocked as spare parts.

D Maintenance Procedures: Include the following information and items that detail essential maintenance procedures:

(i) Test and inspection instructions.

(ii) Troubleshooting guide.

(iii) Precautions against improper maintenance.

(iv) Disassembly; component removal, repair, and replacement; and reassembly instructions.

(v) Aligning, adjusting, and checking instructions.

(vi) Demonstration and training video recording, if available.

E Maintenance and Service Schedules: Include service and lubrication requirements, list of required lubricants for equipment, and separate schedules for preventive and routine maintenance and service with standard time allotment.

F Spare Parts List and Source Information: Include lists of replacement and repair parts, with parts identified and cross-referenced to manufacturers’ maintenance documentation and local sources of maintenance materials and related services.

G Warranties and Bonds: Include copies of warranties and bonds and lists of circumstances and conditions that would affect validity of warranties or bonds.

(i) Include procedures to follow and required notifications for warranty claims.

H 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.

Section 1.09 PRODUCT MAINTENANCE MANUALS

A Product Maintenance Manual: Assemble a complete set of maintenance data indicating care and maintenance of each product, material, and finish incorporated into the Work.

B 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.

C Product Information: Include the following, as applicable:
(i) Product name and model number.

(ii) Manufacturer's name.

(iii) Color, pattern, and texture.

(iv) Material and chemical composition.

(v) Reordering information for specially manufactured products.

D Maintenance Procedures: Include manufacturer's written recommendations and the following:

(i) Inspection procedures.

(ii) Types of cleaning agents to be used and methods of cleaning.

(iii) List of cleaning agents and methods of cleaning detrimental to product.

(iv) Schedule for routine cleaning and maintenance.

(v) Repair instructions.

E Repair Materials and Sources: Include lists of materials and local sources of materials and related services.

F Warranties and Bonds: Include copies of warranties and bonds and lists of circumstances and conditions that would affect validity of warranties or bonds.

(i) Include procedures to follow and required notifications for warranty claims.

Part 2. PRODUCTS

Section 2.01 NOT APPLICABLE

Part 3. EXECUTION

Section 3.01 NOT APPLICABLE

END OF SECTION 017823
SECTION 017839 – PROJECT RECORD AND DOCUMENTATION

Part 1. GENERAL

Section 1.01 SECTION INCLUDES

A SUMMARY

B CLOSEOUT SUBMITTALS

C RECORD DRAWINGS

D RECORD SPECIFICATIONS

E MAINTENANCE OF RECORD DOCUMENTS

Section 1.02 SUMMARY

A Section includes administrative and procedural requirements for Project Record Documents, including the following:

(i) Record Drawings.

(ii) Record specifications.

(iii) Record Product Data.

Section 1.03 CLOSEOUT SUBMITTALS

A Record Drawings: Comply with the following:

(i) Number of Copies: Submit three (3) set(s) of marked-up record prints.

(ii) Number of Copies: Submit copies of Record Drawings as follows:

B Final Submittal:

(i) Submit PDF electronic files of scanned record prints and two (2) sets of file prints.

(ii) Architect will indicate whether general scope of changes, additional information recorded, and quality of drafting are acceptable.

C Record Specifications: Submit annotated PDF electronic files and two (2) paper copies of Project's Specifications, including addenda and Contract modifications.

Section 1.04 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.

(i) 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 photographic documentation.

(ii) Content: Types of items requiring marking include, but are not limited to, the following:

a) Dimensional changes to Drawings.

b) Revisions to details shown on Drawings.

c) Depths of foundations.

d) Locations and depths of underground utilities.

e) Revisions to routing of piping and conduits.

f) Revisions to electrical circuitry.

g) Actual equipment locations.

h) Duct size and routing.

i) Locations of concealed internal utilities.

j) Changes made by Change Order or construction Change Directive.

k) Changes made following Architect's written orders.

l) Details not on the original Contract Drawings.

m) Field records for variable and concealed conditions.

n) Record information on the Work that is shown only schematically.

(iii) Mark the Contract Drawings and Shop Drawings completely and accurately. Use personnel proficient at recording graphic information in production of marked-up record prints.

(iv) Mark record prints with erasable, red-colored pencil. Use other colors to distinguish between changes for different categories of the Work at same location.

(v) Mark important additional information that was either shown schematically or omitted from original Drawings.

(vi) Note Construction Change Directive numbers, alternate numbers, Change Order numbers, and similar identification, where applicable.

B Format: Identify and date each Record Drawing; include the designation "PROJECT RECORD DRAWING" in a prominent location.
(i) Record Prints: Organize record prints into manageable sets. Bind each set with durable paper cover sheets. Include identification on cover sheets.


(iii) Record Digital Data Files: Organize digital data information into separate electronic files that correspond to each sheet of the Contract Drawings. Name each file with the sheet identification. Include identification in each digital data file.

(iv) Identification: As follows:
   a) Project name.
   b) Date.
   c) Designation "PROJECT RECORD DRAWINGS."
   d) Name of Architect
   e) Name of Contractor.

Section 1.05 RECORD SPECIFICATIONS

A Preparation: Mark Specifications to indicate the actual product installation, where installation varies from that indicated in Specifications, addenda, and Contract modifications.

(i) Give particular attention to information on concealed products and installations that cannot be readily identified and recorded later.

(ii) Mark copy with the proprietary name and model number of products, materials, and equipment furnished, including substitutions and product options selected.

(iii) Record the name of manufacturer, supplier, Installer, and other information necessary to provide a record of selections made.

(iv) For each principal product, indicate whether Record Product Data has been submitted in operation and maintenance manuals instead of submitted as Record Product Data.

(v) Note related Change Orders and Record Drawings where applicable.

B Format: Submit record specifications as scanned PDF electronic file(s) of marked-up paper copy of Specifications.

Section 1.06 MAINTENANCE OF RECORD DOCUMENTS

A Maintenance of Record Documents: Store Record Documents 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.

Part 2. PRODUCTS

Section 2.01 NOT APPLICABLE

Part 3. EXECUTION
Section 3.01 NOT APPLICABLE

END OF SECTION 017839
SECTION 017900 – DEMOSTRATION AND TRAINING

Part 1. GENERAL

Section 1.01 SECTION INCLUDES

A SUMMARY
B INFORMATIONAL SUBMITTALS
C CLOSEOUT SUBMITTALS
D QUALITY ASSURANCE
E COORDINATION
F INSTRUCTION PROGRAM
G PREPARATION
H INSTRUCTION
I DEMONSTRATION AND TRAINING VIDEO RECORDINGS

Section 1.02 SUMMARY

A Section includes administrative and procedural requirements for instructing Owner's personnel, including the following:

(i) Instruction in operation and maintenance of systems, subsystems, and equipment.

(ii) Demonstration and training video recordings.

Section 1.03 INFORMATIONAL SUBMITTALS

A Instruction Program: Submit outline of instructional program for demonstration and training, including a list of training modules and a schedule of proposed dates, times, length of instruction time, and instructors' names for each training module. Include learning objective and outline for each training module.

(i) Indicate proposed training modules using manufacturer-produced demonstration and training video recordings for systems, equipment, and products in lieu of video recording of live instructional module.

Section 1.04 CLOSEOUT SUBMITTALS

A Demonstration and Training Video Recordings: Submit one copy (1) within seven (7) days of end of each training module.

(i) At completion of training, submit complete training manual(s) for Owner's use prepared in same paper and PDF file format required for operation and maintenance manuals specified in Section 017823 "Operation and Maintenance Data."
Section 1.05 QUALITY ASSURANCE

A Facilitator Qualifications: A firm or individual experienced in training or educating maintenance personnel in a training program similar in content and extent to that indicated for this Project, and whose work has resulted in training or education with a record of successful learning performance.

B Instructor Qualifications: A factory-authorized service representative, complying with requirements in Section 014000 "Quality Requirements," experienced in operation and maintenance procedures and training.

C Pre-instruction Conference: Conduct conference at Project site to comply with in Section 013100 "Project Management and Coordination."

Section 1.06 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.

C Coordinate content of training modules with content of approved emergency, operation, and maintenance manuals. Do not submit instruction program until operation and maintenance data have been reviewed and approved by Design Professional.

Section 1.07 INSTRUCTION PROGRAM

A Program Structure: Develop an instruction program that includes individual training modules for each system and for equipment not part of a system, as required by individual Specification Sections.

B Training Modules: Develop a learning objective and teaching outline for each module. Include a description of specific skills and knowledge that participant is expected to master. For each module, include instruction for the following as applicable to the system, equipment, or component:

(i) 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.

(ii) Documentation: Review the following items in detail:
   a) Emergency Manuals

601 E. Front Ave. Ste. 201 Coeur d'Alene, Idaho 83814 Ph: 208.664.1773 Email: koln@millerstauffer.com
b) Systems and equipment operation manuals.

c) Product maintenance manuals.

d) Project Record Documents.

e) Identification systems.

f) Warranties and bonds

g) Maintenance service agreements and similar continuing commitments.

(iii) 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.

(iv) 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 for stopping.

h) Normal shutdown instructions.

i) Operating procedures for emergencies.

j) Operating procedures for system, subsystem, or equipment failure.

k) Seasonal and weekend operations.

l) Required sequences for electric or electronic systems.

m) Special operating instructions and procedures.

(v) Adjustments: Include the following, as applicable:
a) Alignments
b) Checking adjustments
c) Noise and Vibration adjustments
d) Economy and efficiency adjustments

(vi) Troubleshooting: Include the following, as applicable:
   a) Diagnostic Instructions
   b) Testing and inspection procedures.

(vii) Maintenance: Include the following, as applicable:
   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.

(viii) Repairs: Include the following, as applicable:
   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.

Section 1.08 PREPARATION

A Assemble educational materials necessary for instruction, including documentation and training module. Assemble training modules into a training manual organized in coordination with requirements in Section 017823 "Operation and Maintenance Data."

B Set up instructional equipment at the instructional location.

Section 1.09 INSTRUCTION

A Facilitator: Engage a qualified facilitator to prepare instruction program and training modules, to coordinate instructors, and to coordinate between Contractor and Owner for number of participants, instruction times, and location.
B Engage qualified instructors to instruct Owner's personnel to adjust, operate, and maintain systems, subsystems, and equipment not part of a system.

C Scheduling: Provide instruction at mutually agreed-on times. For equipment that requires seasonal operation, provide similar instruction at start of each season.

(i) Schedule training with Agency through Design Professional with at least ten (10) days' advance notice.

D 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.

E Cleanup: Collect used and leftover educational materials and remove from Project. Remove instructional equipment. Restore systems and equipment to condition existing before initial training use.

Section 1.10 DEMONSTRATION AND TRAINING VIDEO RECORDINGS

A General: Record each training module separately. Include classroom instructions and demonstrations, board diagrams, and other visual aids, but not student practice.

(i) At beginning of each training module, record each chart containing learning objective and lesson outline.

B Digital Video Recordings: Provide high-resolution, digital video.

(i) Submit video recordings on USB thumb drive.

C Recording: Display continuous running time.

D Preproduced Video Recordings: Provide video recordings used as a component of training modules in same format as recordings of live training.

Part 2. PRODUCTS

Section 2.01 NOT APPLICABLE

Part 3. EXECUTION

Section 3.01 NOT APPLICABLE

END OF SECTION 017900
SECTION 025001 – SITE PHOTOS

Part 1. GENERAL

Section 1.01 SECTION INCLUDES

A. PHOTOGRAPHS OF SITE

Section 1.02 PHOTOS
ITD District 1
Coeur D Alene

Photo 1

Photo 2

Photo 3

Photo 4

Photo 5 – Electrical line runs next to sidewalk

Photo 6 – Underground Fuel Tank
Photo 7 – Trees to be removed

Photo 8 – Utility line markings

Photo 9 – Trees to be removed

Photo 10 – Pole to be removed

Photo 11 – Protect existing underground utilities

Photo 12
Part 2. PRODUCTS
Section 2.01 NOT APPLICABLE

Part 3. EXECUTION
Section 3.01 NOT APPLICABLE

END OF SECTION 025001
SECTION 03 30 00  
CAST IN PLACE CONCRETE

Part 1. GENERAL

Section 1.01 RELATED DOCUMENTS

A Drawings and general provisions of the Contract, including Division 1 Specification Sections, apply to this Section.

B Refer to Owner’s Invitation to Bid & Instructions to Bidder (ITB) for additional project requirements.

Section 1.02 summary

A Section Includes:

(i) Cast-in-concrete, including formwork, reinforcement, concrete materials, mixture design, placement procedures, and finishes.

Section 1.03 action submittals:

A Product Date: For each type of product indicated.

B Design Mixtures: For each concrete mixture.

C Steel Reinforcement Shop Drawings: Placing drawings that detail fabrication, bending, and placement.

D Cold weather curing procedures per ACI 308.1 section 1.5.4

Section 1.04 quality assurance

A Manufacture 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.

(i) Manufacture certified according to NRMCA’s “Certification of Ready Mixed Concrete Production Facilities.”

B Testing Agency Qualifications: An independent agency, qualified according to ASTM C 1077 and ASTM E 329 for testing indicated.

C ACI Publications: Comply with the following unless modified by requirements in the Contract Documents:

(i) ACI 301, “Specifications for Structural Concrete,” Sections 1 through 5.

(ii) ACI 117, “Specifications for Tolerances for Concrete Construction and Materials.”

(iii) ACI 308.1 “Standard Specifications for Curing Concrete”

D Concrete Testing Service: Owner to engage a qualified independent testing agency to perform material evaluation tests.

Part 2. Products

Section 2.01 form-facing materials
A Smooth-Rubbed 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. Coordinate concrete form joints with concrete control joints.

(i) Phenolic coated plywood

B Rough-Formed Finished Concrete: Plywood, Lumber, Metal, or Another approved material. Provide lumber dressed on at least two edges and one side for tight fit.

Section 2.02 Steel Reinforcement

A Refer to Structural Engineers General Notes & Specifications.

Section 2.03 Concrete Mixtures

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 and ACI 318-11 with exposure class S3.

B Cementitious Materials: Use fly ash, pozzolan, ground granulated blast-furnace slag, and silica fume as specified in ACI 318-11 table 4.3.1. and the specified concrete type based on availability. Coordinate with concrete supplier and engineer to select mix design to ensure S3 exposure requirements.

Section 2.04 Concrete Schedule

A Concrete Stem Wall & Pilasters:

(i) Design Mixtures:

a. Refer to Structural General Notes

(ii) Cementitious Material: to be of the same type, brand, and source, throughout Project:

a. Refer to Structural General Notes

(iii) Reinforcement:

a. Standard Steel Reinforcement: Refer to Structural General Notes

(iv) Aggregates: to be of the same type, brand, and source, throughout Project

a. Refer to Structural General Notes

(v) Water:

a. Refer to Structural General Notes

(vi) Admixtures:

a. Refer to Structural General Notes

(vii) Color:

a. Standard Gray

(viii) Finish:
a. As specified in Section 03 35 00.

B Concrete Footings:

(i) Design Mixtures:
   a. Refer to Structural General Notes

(ii) Cementitious Material: to be of the same type, brand, and source, throughout Project:
   a. Refer to Structural General Notes

(iii) Reinforcement:
   a. Deformed Steel: Refer to Structural General Notes

(iv) Aggregates: to be of the same type, brand, and source, throughout Project
   a. Refer to Structural General Notes

(v) Water:
   a. Refer to Structural General Notes

(vi) Admixtures:
   a. Refer to Structural General Notes

(vii) Finish and Color:
   a. Rough-Formed Finished Concrete, and Standard Gray

C Interior Concrete Flatwork:

(i) Design Mixtures:
   a. Refer to Structural General Notes

(ii) Cementitious Material: to be of the same type, brand, and source, throughout Project:
   a. Refer to Structural General Notes

(iii) Reinforcement:
   a. Deformed Steel: Refer to Structural General Notes

(iv) Aggregates: to be of the same type, brand, and source, throughout Project
   a. Refer to Structural General Notes

(v) Water:
   a. Refer to Structural General Notes

(vi) Admixtures:
a. Refer to Structural General Notes

(vii) Finish:
   a. As specified in Section 03 35 00.

(viii) Color:

Section 2.05 Curing Materials

A Evaporation Retarder: Waterborne, monomolecular film forming, manufactured for application to fresh concrete.

B Absorptive Cover: AASHTO M 182, Class 2, burlap cloth made from jute or kenaf, weighing approximately 9 oz./sq. yd. when dry.

C Moisture-Retaining Cover: ASTMC 171, polyethylene film or white burlap-polyethylene sheet.

D Water: Potable

E Clear, Waterborne, Membrane-Forming Curing Compound: ASTM C 309, Type 1, Class B, Dissipating.

F Clear, Solvent-Borne, Membrane-Forming Curing and Sealing Compound: ASTM C 1315, Type 1, Class A.
   (i) VOC Content: Curing and sealing compounds shall have a VOC content of 200 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

Part 3. Execution

Section 3.01 fabricating reinforcement

A Fabricate steel reinforcement according to CRSI’s “Manual of Standard Practice”

Section 3.02 Concrete Mixing

A Ready-Mixed Concrete: Measure, batch, mix, and deliver concrete according to ASTMC 94/C 94M and ASTMC 1116/C 1116/M and furnish batch ticket information.
   (i) 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.

Section 3.03 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 Construction formwork so concrete members and structures are of size, shape, alignment, elevation, and position indicated, with tolerance limits of ACI 117.

C Chamfer all exterior corners and edges of permanently exposed concrete.

Section 3.04 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.

Section 3.05 Vapor Retarders

A Sheet Vapor Retarders: Place, protect, and repair sheet vapor retarder according to ASTM E 1643 and manufacture’s written instructions.

(i) Lap joints 6” (inches) and seal with manufacture’s recommended tape.

Section 3.06 Steel Reinforcement

A General: Comply with CRSI’s “Manual of Standard Practice” for placing reinforcement.

Section 3.07 Joints

A General: Construct joint 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.

(i) All construction joints to be filled.

C Contraction Joints in Slabs-on-Grade: Form Weakened-plane contraction joints sectioning concrete into areas as indicated and approved by Architect. Construct contraction joints for a depth equal to at least one-fourth of concrete thickness as follows:

(i) Sawed Joints: Form contraction joints with power saws equipped with shatterproof abrasive or diamond-rimmed blades. Cut 1/8” (Inch) wide joints into concrete when cutting action will not tear, abrade, or otherwise damage surface and before concrete develops random contraction cracks

a. All joints are to be filled.

D Isolation Joints in Slabs-on-Grade: After removing formwork, install Fibre joint-filler strips at slab junctions with vertical surfaces, such as column pedestals, foundation walls, grade beams, and other locations, as indicated.

a. Fibre joint-filler strips should be install ½” below top of concrete and filled with joint filler

Section 3.08 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 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.

(i) Consolidate placed concrete with mechanical vibrating equipment according to ACI 301.

C Cold-Weather Placement: comply with ACI 306.1

D Hot-Weather Placement: Comply with ACI 301

Section 3.09 Finishing Formed Surfaces
A Rough-Formed Finish: As-cast concrete texture imparted by form-facing material with tie holes and defects repaired and patched. Remove fins and other projections that exceed specified limits on formed-surface irregularities.

(i) Apply to concrete surfaces not exposed to public view.

B Related Unformed Surfaces: At Tops of walls, horizontal offsets, and similar unformed surfaces adjacent to formed surfaces, strike off smooth and finish with a texture matching adjacent formed surfaces. Continue final surface treatment of formed surfaces uniformly across adjacent unformed surfaces unless otherwise indicated.

C Light Broom Finish: Apply a light broom to all horizontal concrete platforms, steps, and ramps, unless indicated otherwise.

Section 3.10 concrete protecting and curing

A General: Protect freshly placed concrete from pre-mature 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 Cure concrete according to ACI 308.1 section 1.7 “Curing in cold weather”. Follow submittal procedure in ACI 308.1 section 1.5.4: Submit cold weather curing procedures at least 1 month prior to cold weather concreting.

(i) Curing and Sealing Compound: Apply uniformly to floors and slabs indicated in a continuous operation by power spray or roller according to manufacturer’s written instructions. Recoat areas subject to heavy rainfall within three hours after initial application. Repeat the process 24 hours later and apply a second coat. Maintain continuity of coating and repair damage during curing period.

Section 3.11 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.

Section 3.12 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 033000
SECTION 011100 – SUMARY OF WORK

Part 1. GENERAL

Section 1.01 SECTION INCLUDES

A CONCRETE FINISHING SCHEDULE

Section 1.02 REFERENCES

A The following is a list of standards which may be referenced in this section:
   (i) American Concrete Institute (ACI):
      a. 116, Cement and Concrete Terminology.
      b. 121, Quality Assurance Systems for Concrete Construction.
      d. 309, Identification and Control of Consolidation-Related Surface Defects in Formed Concrete.
      e. 311, Guide for Inspection of Concrete.
   (ii) ASTM International (ASTM):

Section 1.01 Submittals

B Provide product data for all finishing agents needed to achieve the requested concrete finishes.

Section 1.02 Delivery, Storage, and Handling

A This project will be delivered through multiple prime contracts with the owner. The owner has procured the services of a construction manager as advisor for the duration of the project. The construction manager will provide coordination services during the project. The construction manager will bid the various contract scopes on behalf of the owner. All communications must go through the construction manager.

Part 2. PRODUCTS

Section 2.01 Tools and Equipment

A The Contractor shall furnish all materials, tools, equipment, facilities, and services as required for performing the required concrete-finishing work.

Section 2.02 Repair and Finishing Materials

A Portland Cement: ASTM C150, Type II, of same brand as used in the work. Furnish white Portland cement where required to produce color matching color of surrounding concrete.

B Aggregate:
   (i) For Bonding Grout: ASTM C33, washed clean sand passing a No. Sieve.
   (ii) For Patching Mortar: ASTM C33, washed clean, graded fine aggregate of suitable size for areas to be repaired. Clean course aggregate up to Size No. 8 may be added for repair of larger pockets and voids.
Section 2.03 Sealers

A Penetrating Concrete Sealer: Non-topical, Penetrating, Water-Based, Silane/Siloxane Sealer, Spray Applied and Back Rolled, ASTM D6886, no gloss or shine., Low VOC, dry clear, non-flammable.

Section 2.04 Joint Filler

A Concrete Slab Joint Filler: Polyurea Joint Filler: semi-rigid, 100% Solids, No VOC’s, Can be Polished, Self-Leveling, Mix Ratio 1:1, 1100 Tensile Strength, Chemical Resistant: ASTM D-1308 @ 72 Deg.

Section 2.05 Concrete Densifier

A Concrete Densifier: Hybrid Silicate Densifier, Water-Based, Low VOC, Non-Flammable, Enhances polished color, gloss, and clarity.

(i) Hardens deep withing the slab to improve durability even after grinding.

(ii) Spray Applied

Section 2.06 Curing Materials

A Damp Curing Materials:

(i) Waterproof Sheet Materials: ASTM C171, waterproof paper with white paper face, polyethylene film pigmented white, or white burlap-polyethylene sheeting.

(ii) Burlap: AASHTO M182, of class or weight suitable for the use and location. Do not use burlap where concrete is exposed to direct sunlight.

B Curing Compound: ASTM C309, liquid membrane-forming curing compound, Type 1, Class A or B as appropriate for the use or location.

(i) Where concrete surfaces will receive architectural finishes, such as resilient floor coverings or paint, or membrane waterproofing, membrane-forming curing compound shall not leave a coating or residue that will impair bond of adhesives, paints, and coatings with concrete.

Section 2.07 Schedule of Finishes

A Exposed Exterior Concrete Walls and Stem Walls

(i) All exposed concrete stem walls to be sacked and patched to finish with a smooth finish.

B Below grade Concrete Stem Walls

(i) All below grade concrete stem walls to receive an asphaltic spray applied waterproofing system down to top of footing.

C Conceal above grade Exterior Concrete Walls

(i) All concealed above grade concrete walls to be left as a formed finished with rock pockets less than 1/4” to be left as is. Rock pockets greater than 1/4” in size to be filled and repaired.

(ii) Concealed Walls to be spray applied with one coat of penetrating concrete sealer on the exterior side of wall prior to installation of finish materials.
(iii) The interior side of wall to receive finish as specified in the room finish schedule.

D Exposed Interior Walls
(i) Exposed Interior Walls to be sacked and patched to a smooth finish.
(ii) Wall to be finished per specified finish in the room finish schedule.

E Exterior Exposed Concrete Slab on Grades
(i) Exterior exposed concrete slab on grades to be a light broom finish with two coats penetrating sealer.

F Interior Exposed Lab Concrete Slabs
(i) All Interior Exposed Lab Concrete Slabs receive a hard trowel burnished finish with one coat of concrete densifier and two coats penetrating concrete sealer.

G Interior Exposed Storage and Mechanical Room Concrete Slabs
(i) All Interior Exposed Storage and Mechanical Room Concrete slabs receive a hard trowel finish with one coat of concrete densifier and two coats penetrating concrete sealer.

H Interior Concealed Office Area Concrete Slabs
(i) All Interior Concealed Office Area Concrete Slabs are to receive a hard trowel finish with one coat densifier.

I Exterior Sidewalks and Concrete Slabs on Grades
(i) Exterior Sidewalks and Concrete Slabs on Grade to be a light broom finish with one coat penetrating sealer.

J Exterior Concrete Curbs
(i) All Exterior Concrete Curbs receive a light broom finish with one coat of spray applied penetrating sealer.

Part 3. EXECUTION

Section 3.01 Repair of Surface Defects

A Repair Standards: Repair of surface defects shall conform with applicable requirements of ACI 301. When using epoxy mortar, conform with applicable requirements of ACI 503.4.

B Surface Defects:
(i) Repair of surface defects shall begin immediately after form removal. For repair with epoxy mortar, concrete shall be dry.

(ii) Surface defects are defined to include form-tie holes, air voids or pockets, bug holes with nominal diameter or greater depth greater than 1/4-inch, honeycombed areas, rock pockets, visible construction joints, fins and burrs.

(iii) Repair of surface defects shall be tightly bonded and shall result in concrete surfaces of uniform color and texture, matching adjacent surfaces, and free of shrinkage cracks.

C Repair Work:
(i) Remove honeycombed and other defective concrete down to sound concrete. Saw-cut the edges perpendicular to the surface or slightly undercut. Featheredges will not be permitted. Dampen the area to be patched and an area at least 6 inches wide surrounding it to prevent absorption of water from the patching mortar.

(ii) Where rock pockets or similar defects or voids exposed steel reinforcement, cutout to solid surface behind the reinforcing steel to provide suitable key-lock for patching mortar. Patching mortar shall envelope the exposed reinforcing bar.
(iii) Bond patching mortar to concrete with bonding grout or epoxy adhesive. Bonding grout shall consist of 1 part Portland cement to 1 part No. 30 mesh sand, mixed to the consistency of thick cream, and then well brushed onto the concrete. Bond commercial patching mortar to concrete in accordance with the manufacturer’s instructions.

(iv) Make the patching mortar of the same materials and of approximately the same proportions as used for the concrete, except omit the coarse aggregate. Use not more than 1 part Portland cement to 2 ½ parts sand by damp loose volume and substitute white Portland cement for a portion of the regular gray Portland cement to produce patching mix matching the surrounding concrete in color when dry. Determine the proportion of white Portland cement by trial mixes and test areas, prior to repair of actual defective areas.

(v) After surface water has evaporated from the area to be patched, brush the bond coat well into the surface. When the bond coat begins to lose the water sheen, apply the patching mortar. Compact the mortar into place and strike off so as to leave the patch slightly higher than the surrounding surface. To permit initial shrinkage, leave the patch undisturbed for at least 1 hour before being finally finished. Keep the patch area damp for 7 days.

(vi) Patching of honeycombed areas or rock pockets that are too large and unsatisfactory for mortar patching shall be cut out to solid surface, keyed, and packed solid with matching concrete to produce firm bond and flush surface. Patching shall match texture of adjacent surfaces where exposed in the finished work.

(vii) Repair work in exposed locations that does not match the texture and color of surrounding adjacent surfaces or that was not well performed shall be removed and performed again until the repair work conforms with specification requirements.

(viii) Surfaces to receive membrane waterproofing shall have fins and loose material removed, and voids and cracks patched flush with adjacent surfaces.

(ix) Completed repairs shall be cured as herein specified under section 3.04, Curing.

Section 3.02 Finishing of Formed Surfaces

A Unexposed Surfaces:

(i) Concrete that will not be exposed in the completed structure shall be any form finish as specified.

(ii) Concrete to receive membrane or spray applied waterproofing shall receive a “smooth form finish” in accordance with ACI 301.

B Exposed Surfaces: Unless indicated otherwise, concrete that will be exposed in the complete structure shall receive the following finish:

(i) Smooth Rubbed Finish: Conform to ACI 301.

C Sand Blast Finish

(i) There are no sand blasted finishes. Not Applicable, unless modified by change of scope.

Section 3.03 Finishing of Slabs and Flatwork

A Placement and Finishing Standards: Slabs and flatwork shall be placed, consolidated, and finished in accordance with applicable requirements of ACI 301. Coordinate with Section 03 30 00 – Cast-in-Place Concrete and structural general notes.

(i) High Volume Fly Ash Concrete (HVFAC) exhibits little or no bleed water. Commence finishing as soon as power screeding is complete and commence initial curing as soon as finishing has been completed.

B Placement:

(i) Slabs and flatwork shall be place and finished monolithically, strike off and screed slabs to true, plane surfaces at required elevations, and thoroughly compact concrete with vibrators, floats, and tampers to force aggregate below the surface. Finish slab within four hours of concrete placement.
(ii) Whether indicated or not, in areas where drains occur, slope finished slab to drains. Slope shall be a minimum of 1/8 inch per foot unless otherwise indicated.

C Slab Finishes: Unless indicated otherwise, slabs and flatwork shall receive the following finishes as indicated:

(i) Light & Broom Finish: All broom finishes to conform to ACI 301.

(ii) Troweled Finish: All troweled finished to conform to ACI 301.

(iii) Unspecified Finish: When finish is not indicated or specified, provide finishes as specified in ACI 301.

D Surface Tolerances: As Specified herein:

(i) Flat Tolerance: Slabs and flatwork with “Troweled Finish”.

(ii) Strightedge Tolerance: Slabs and flatwork with light (Fine) “Broom Finish”.

E Joints:

(i) Construction, expansion, isolation, and contraction joints shall be located as indicated. Construction joints shall act as contraction joints. Where additional contraction joints are required to prevent shrinkage cracks, saw-cut such joints. All joints shall be straight and true to line.

(ii) All Interior control joints to be saw cut 1/8” width.

(iii) All Construction and expansion joints receive fibre expansion material to allow movement of concrete, unless otherwise specified.

(iv) All exterior slabs and flatwork to receive ¼” radius using a curved edging tool, neat and true to line, uniform throughout.

(v) All Interior control joints and construction joints to be filled with joint filler.

Section 3.04 Curing

A Curing Standards: Curing of concrete shall conform with applicable requirements of ACI 301 and ACI 308. Curing with earth, sand, sawdust, straw, and hay will not be permitted.

B Curing Requirements:

(i) Concrete shall be cured with waterproof sheet materials, damp burlap, or curing compounds.

(ii) Curing compounds shall not be used on top of ballasted aerial structures and on surfaces when their use may be detrimental to bonding of concrete, mortar, membrane waterproofing, caulking and sealants, adhesives, plaster, paint, or the specified surface finish or coating.

C Damp Curing:

(i) Vertical surfaces shall be cured by keeping the forms wet at all times and by leaving the forms in place as long as possible. After removal of forms, concrete shall be kept continuously damp by fog spraying or otherwise washing down the concrete in an accepted manner until seven days after placing. Protect exposed surfaces by covering them with sheet materials or burlap kept continuously moist.

(ii) Horizontal surfaces shall be cured and protected by covering the finished surfaces with waterproofing sheet materials or damp burlap, left in place for a minimum of seven days and kept continuously moist.

(iii) Fog Spray freshly placed slabs until finishing operations commence. Allow no slabs to become dry until finishing operations are complete.

(iv) Adhere to all standards and procedures to protection of concrete work to limit exposure to freezing when temperatures are expected to be 40 degrees or below. Blanket all concrete construction if daily temperatures are expected to be below 40 degrees. Provide temporary heat when temperatures are expected to be below 35 degrees.
Section 3.05 Protection

A  Protect exposed concrete surfaces, including flatwork, as required to prevent damage from impact or strains.

B  Protect fresh concrete from drying winds, rain, damage, or soiling.

Section 3.06 Tolerances

A  Formed Surfaces: Conform with applicable requirements of ACI 117.

   (i) Where elastomeric bearing pads are required or indicated, the level plan upon which bearing pads are placed shall not vary more than 1/16 inch from a 10 foot straightedge placed in any direction across the area and the area shall extend a minimum of 1 inch beyond the limits of the pads.

   (ii) Bearing surfaces of grinders on a slope or grinders with a camber shall be finished on a horizontal/level plane so that loads are uniformly distributed over the entire surface of the elastomeric bearing pads.

   (iii) The finished plane shall not vary more than 1/8 inch from the elevation or dimension indicated.

B Slabs and Flatwork: Conform with applicable classification requirements of ASTM E1155, as follows:

   (i) Very Flat Tolerance: \( F_{FR} \geq 50, F_{FR} \leq 30 \). True Plane with maximum variation of 1/8 inch in 10 feet when measured with a 10 foot straightedge placed anywhere on the slab in any direction.

   (ii) Flat Tolerance: \( F_{FR} \geq 30, F_{FR} \leq 20 \). True Plane with maximum variation of 3/16 inch in 10 feet when measured with a 10 foot straightedge placed anywhere on the slab in any direction.

   (iii) Straightedge Tolerance: \( F_{FR} \geq 20, F_{FR} \leq 15 \). True Plane with maximum variation of 5/16 inch in 10 feet when measured with a 10 foot straightedge placed anywhere on the slab in any direction.

   (iv) Bullfloated Tolerance: \( F_{FR} \geq 15, F_{FR} \leq 13 \). True Plane with maximum variation of 1/2 inch in 10 feet when measured with a 10 foot straightedge placed anywhere on the slab in any direction.

END OF SECTION 033500
SECTION 03 45 00
CAST IN PLACE CONCRETE

Part 1. GENERAL

Section 1.01 SUMMARY

A Section Includes:
(i) Architectural precast concrete cladding units.

Section 1.02 DEFINITIONS

A Design Reference Sample: Sample of approved architectural precast concrete color, finish and texture, preapproved by Architect.

Section 1.03 ACTION SUBMITTALS

A Product Data: For each type of product.
B Design Mixtures: For each precast concrete mixture. Include compressive strength and water-absorption tests.
C Shop Drawings:
(i) Detail fabrication and installation of architectural precast concrete units.
(ii) Indicate locations, plans, elevations, dimensions, shapes, and cross sections of each unit.
(iii) Indicate joints, reveals, drips, chamfers, and extent and location of each surface finish.
(iv) Indicate details at building corners.
D Samples: Provide a 2” x 2” x 2” sample representative of the color and texture of all precast architectural concrete.

Section 1.04 COORDINATION

A Precast connections to be designed by supplier.
(i) Note: Substrate is wood sheathing.

Part 2. PRODUCTS

Section 2.01 PERFORMANCE REQUIREMENTS

A Structural Performance: Provide architectural precast concrete units and connections capable of withstanding IBC design loads.

Section 2.02 REINFORCING MATERIALS

A Reinforcing Bars: ASTM A615/A615M, Grade 60 (Grade 420), deformed.
B Supports: Suspend reinforcement from back of mold or use bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars and welded wire reinforcement in place according to PCI MNL 117.

Section 2.03 CONCRETE MATERIALS

A Portland Cement: ASTM C150/C150M, Type I or Type III, gray with standard integral color. Color TBD.
B Normal-Weight Aggregates: Except as modified by PCI MNL 117, ASTM C33/C33M, with coarse aggregates complying with Class 5S. Stockpile fine and coarse aggregates for each type of exposed finish from a single source (pit or quarry) for Project.
(i) Face-Mixture-Coarse Aggregates: Selected, hard, and durable; free of material that reacts with cement or causes staining; to match selected finish sample.

(ii) Gradation: Uniformly graded.

(iii) Face-Mixture-Fine Aggregates: Selected, natural or manufactured sand compatible with coarse aggregate; to match approved finish sample.

C Coloring Admixture: ASTM C979/C979M, synthetic or natural mineral-oxide pigments or colored water-reducing admixtures, temperature stable, and nonfading.

D Water: Potable; free from deleterious material that may affect color stability, setting, or strength of concrete and complying with chemical limits of PCI MNL 117.

E Air-Entraining Admixture: ASTM C260, certified by manufacturer to be compatible with other required admixtures.

F Chemical Admixtures: Certified by manufacturer to be compatible with other admixtures and to not contain calcium chloride, or more than 0.15 percent chloride ions or other salts by weight of admixture.

Section 2.04 STEEL CONNECTION MATERIALS

A Carbon-Steel Shapes and Plates: ASTM A36/A36M.

B Carbon-Steel-Headed Studs: ASTM A108, AISI 1018 through AISI 1020, cold finished, AWS D1.1/D1.1M, Type A or Type B, with arc shields and with minimum mechanical properties of PCI MNL 117, Table 3.2.3.

C Carbon-Steel Plate: ASTM A283/A283M, Grade C.

D Deformed-Steel Wire or Bar Anchors: ASTM A496/A496M or ASTM A706/A706M.

E Carbon-Steel Bolts and Studs: ASTM A307, Grade A or ASTM F1554, Grade 36 (ASTM F568M, Property Class 4.6); carbon-steel, hex-head bolts and studs; carbon-steel nuts, ASTM A563 (ASTM A563M); and flat, unhardened steel washers, ASTM F844.

F Zinc-Coated Finish: For exterior steel items and items indicated for galvanizing, apply zinc coating by hot-dip process according to ASTM A123/A123M or ASTM A153/A153M.

(i) Galvanizing Repair Paint: High-zinc-dust-content paint with dry film containing not less than 94 percent zinc dust by weight, and complying with DOD-P-21035B or SSPC-Paint 20.

Section 2.05 GROUT MATERIALS

A Sand-Cement Grout: Portland cement, ASTM C150/C150M, Type I, and clean, natural sand, ASTM C144 or ASTM C404. Mix at ratio of 1 part cement to 2-1/2 to 3 parts sand, by volume, with minimum water required for placement and hydration. Water-soluble chloride ion content less than 0.06 percent by weight of cement when tested according to ASTM C1218/C1218M.

Section 2.06 CONCRETE MIXTURES

A Prepare design mixtures for each type of precast concrete required.

B Limit use of fly ash and ground granulated blast-furnace slag to 20 percent of portland cement by weight; limit metakaolin and silica fume to 10 percent of portland cement by weight.

C Design mixtures may be prepared by a qualified independent testing agency or by qualified precast plant personnel at architectural precast concrete fabricator's option.

D Limit water-soluble chloride ions to maximum percentage by weight of cement permitted by ACI 318 (ACI 318M) or PCI MNL 117 when tested according to ASTM C1218/C1218M.

E Normal-Weight Concrete Mixtures: Proportion mixtures by either laboratory trial batch or field test data methods according to ACI 211.1, with materials to be used on Project, to provide normal-weight concrete with the following properties:
(i) Compressive Strength (28 Days): 3000 psi minimum.

F Water Absorption: 6 percent by weight or 14 percent by volume, tested according to ASTM C642, except for boiling requirement.

G Add air-entraining admixture at manufacturer's prescribed rate to result in concrete at point of placement having an air content complying with PCI MNL 117.

H When included in design mixtures, add other admixtures to concrete mixtures according to manufacturer's written instructions.

Section 2.07 FABRICATION

A Cast-in Anchors, Inserts, Plates, Angles, and Other Anchorage Hardware: Fabricate anchorage hardware with sufficient anchorage and embedment to comply with design requirements. Accurately position for attachment of loose hardware, and secure in place during precasting operations. Locate anchorage hardware where it does not affect position of main reinforcement or concrete placement.

(i) Weld-headed studs and deformed bar anchors used for anchorage according to AWS D1.1/D1.1M and AWS C5.4, "Recommended Practices for Stud Welding."

B Furnish loose hardware items including steel plates, clip angles, seat angles, anchors, dowels, cramps, hangers, and other hardware shapes for securing architectural precast concrete units to supporting and adjacent construction.

C Cast-in reglets, slots, holes, and other accessories in architectural precast concrete units as indicated on the Contract Drawings.

D Reinforcement: Comply with recommendations in PCI MNL 117 for fabricating, placing, and supporting reinforcement.

E Reinforce architectural precast concrete units to resist handling, transportation, and erection stresses and specified in-place loads.

F Comply with requirements in PCI MNL 117 and requirements in this Section for measuring, mixing, transporting, and placing concrete. After concrete batching, no additional water may be added.

G Place face mixture to a minimum thickness after consolidation of the greater of 1 inch (25 mm) or 1.5 times the maximum aggregate size, but not less than the minimum reinforcing cover specified.

H Place concrete in a continuous operation to prevent cold joints or planes of weakness from forming in precast concrete units.

(i) Place backup concrete mixture to ensure bond with face-mixture concrete.

I Thoroughly consolidate placed concrete by internal and external vibration without dislocating or damaging reinforcement and built-in items, and minimize pour lines, honeycombing, or entrapped air voids on surfaces. Use equipment and procedures complying with PCI MNL 117.

J Comply with PCI MNL 117 for hot- and cold-weather concrete placement.

K Cure concrete, according to requirements in PCI MNL 117, by moisture retention without heat or by accelerated heat curing using low-pressure live steam or radiant heat and moisture. Cure units until compressive strength is high enough to ensure that stripping does not have an effect on performance or appearance of final product.

L Discard and replace architectural precast concrete units that do not comply with requirements, including structural, manufacturing tolerance, and appearance, unless repairs meet requirements in PCI MNL 117 and Architect's approval.

Section 2.08 FABRICATION TOLERANCES

A Fabricate architectural precast concrete units to shapes, lines, and dimensions indicated so each finished unit complies with PCI MNL 117 product tolerances as well as position tolerances for cast-in items.
Section 2.09 FINISHES

A Exposed faces to be free of joint marks, grain, and other obvious defects. Corners, including false joints to be uniform, straight, and sharp. Finish exposed-face surfaces of architectural precast concrete units to match approved [design reference sample]

(i) PCI's "Architectural Precast Concrete - Color and Texture Selection Guide," of plate numbers indicated.

(ii) Abrasive-Blast Finish: Use abrasive grit, equipment, application techniques, and cleaning procedures to expose aggregate and surrounding matrix surfaces.

B All exposed surfaces to match.

Part 3. EXECUTION

Section 3.01 INSTALLATION

A Install clips, hangers, bearing pads, and other accessories required for connecting architectural precast concrete units to supporting members and backup materials.

B Erect architectural precast concrete level, plumb, and square within specified allowable tolerances. Provide temporary supports and bracing as required to maintain position, stability, and alignment of units until permanent connections are completed.

(i) Maintain horizontal and vertical joint alignment and uniform joint width as erection progresses.

(ii) Unless otherwise indicated, maintain uniform joint widths of 1/4 inch.

C Connect architectural precast concrete units in position by bolting, welding, grouting, or as otherwise indicated on Shop Drawings. Remove temporary shims, wedges, and spacers as soon as practical after connecting and grouting are completed.

D Welding: Comply with applicable requirements in AWS D1.1/D1.1M and AWS D1.4/D1.4M for welding, welding electrodes, appearance, quality of welds, and methods used in correcting welding work.

E At bolted connections, use lock washers, tack welding, or other approved means to prevent loosening of nuts after final adjustment.

F Grouting or Dry-Packing Connections and Joints: Grout connections where required or indicated. Retain flowable grout in place until hard enough to support itself. Alternatively, pack spaces with stiff dry-pack grout material, tamping until voids are completely filled. Place grout and finish smooth, level, and plumb with adjacent concrete surfaces. Promptly remove grout material from exposed surfaces before it affects finishes or hardens. Keep grouted joints damp for not less than 24 hours after initial set.

Section 3.02 ERECTION TOLERANCES

A Erect architectural precast concrete units level, plumb, square, and in alignment without exceeding the noncumulative erection tolerances of PCI MNL 117, Appendix I.

Section 3.03 REPAIRS

A Repair architectural precast concrete units if permitted by Architect. Architect reserves the right to reject repaired units that do not comply with requirements.

B Mix patching materials and repair units so cured patches blend with color, texture, and uniformity of adjacent exposed surfaces and show no apparent line of demarcation between original and repaired work, when viewed in typical daylight illumination from a distance of 20 feet (6 m).

C Prepare and repair damaged galvanized coatings with galvanizing repair paint according to ASTM A780/A780M.

D Remove and replace damaged architectural precast concrete units when repairs do not comply with requirements.
Section 3.04 CLEANING

A. Clean surfaces of precast concrete units exposed to view.

B. Clean mortar, plaster, fireproofing, weld slag, and other deleterious material from concrete surfaces and adjacent materials immediately.

C. Clean exposed surfaces of precast concrete units after erection and completion of joint treatment to remove weld marks, other markings, dirt, and stains.

   (i) Perform cleaning procedures, if necessary, according to precast concrete fabricator’s recommendations. Protect other work from staining or damage due to cleaning operations.

   (ii) Do not use cleaning materials or processes that could change the appearance of exposed concrete finishes or damage adjacent materials.

END OF SECTION 034500
SECTION 04 22 00
CONCRETE UNIT MASONRY

Part 1. GENERAL

Section 1.01 SUMMARY

A. Section Includes:
   (i) Concrete masonry units.
   (ii) Mortar and grout materials.
   (iii) Reinforcement.
   (iv) Ties and anchors.
   (v) Embedded flashing.
   (vi) Accessories.
   (vii) Mortar and grout mixes.

Section 1.02 ACTION SUBMITTALS

A. Product Data: For each type of product.
B. Shop Drawings: For reinforcing steel: Indicate bending, lap lengths, and placement of unit masonry reinforcing bars. Comply with ACI 315R.
C. Samples: For each type and color of exposed masonry unit and colored mortar.

Section 1.03 INFORMATIONAL SUBMITTALS

A. Material Certificates: For each type and size of product and for masonry units.
B. Mix Designs: For each type of mortar and grout. Include description of type and proportions of ingredients.
   (i) Include test reports for mortar mixes required to comply with property specification. Test in accordance with ASTM C109/C109M for compressive strength, ASTM C1506 for water retention, and ASTM C91/C91M for air content.
   (ii) Include test reports, in accordance with ASTM C1019, for grout mixes required to comply with compressive strength requirement.

Section 1.04 QUALITY ASSURANCE

(i) Owner to provide periodic special inspection of masonry construction. An inspection must be conducted prior to the pouring of each masonry lift and prior to concrete fill of cavities. Contractor must notify construction manager, owner, and inspector 24 hours prior to cavity fill placement.

Section 1.05 FIELD CONDITIONS
A Cold-Weather Requirements: Do not use frozen materials or materials mixed or coated with ice or frost. Do not build on frozen substrates. Remove and replace unit masonry damaged by frost or by freezing conditions. Comply with cold-weather construction requirements contained in TMS 602.

B Hot-Weather Requirements: Comply with hot-weather construction requirements contained in TMS 602.

Part 2. PRODUCTS

Section 2.01 UNIT MASONRY, GENERAL

A Decorative Concrete Masonry Units: ASTM C 90; Weight Classification, Medium Weight.

(i) Finish: Exposed faces with split-face finish with integral color, color Standard Gray & Charcoal.

(ii) Integral Water Repellent: [Grace Construction Products, a unit of W. R. Grace & Co. - Conn.; Dry-Block].

(iii) Special shapes for lintels, corners, jambs, sash, control joints, and other special conditions. Chamfer units for exposed outside corners unless otherwise indicated.

B Defective Units: Referenced masonry unit standards may allow a certain percentage of units to contain chips, cracks, or other defects exceeding limits stated. Do not use units where such defects are exposed in the completed Work.

C Fire-Resistance Ratings: Comply with requirements for fire-resistance-rated assembly designs indicated.

(i) Where fire-resistance-rated construction is indicated, use the equivalent thickness method for masonry units in accordance with ACI 216.1.

D All units to be a minimum average net-area compressive strength of 2000 psi, unless otherwise indicated in structural general notes.

Section 2.02 CONCRETE MASONRY UNITS

A Shapes: Provide shapes indicated and as follows, with exposed surfaces matching exposed faces of adjacent units unless otherwise indicated.

(i) Provide special shapes for lintels, corners, jambs, sashes, movement joints, headers, bonding, and other special conditions, unless noted otherwise.

B All Exterior exposed CMU to be Split Faced texture with color as designated on exterior building elevations.

C Decorative CMUs: ASTM C90, normal weight

(i) CMU Type I (Interior Wythe)

a. Unit Compressive Strength: Refer to Structural General Notes.

b. Dimensions: 8” x 8” x 16” Smooth Block, Standard Gray (Natural)

c. Location: Interior Wythe

d. Interior Finish: Block Filled & Painted


(ii) CMU Type II (Exterior Veneer Wythe - Charcoal)
a. Unit Compressive Strength: Refer to Structural General Notes.

b. Dimension: 4" x 8" x 16" Split Faced, Color: Charcoal

c. Location: Exterior Split Faced Veneer, Refer to Building Elevations for exact location.

(iii) CMU Type III (Exterior Single Wythe Split Face, Standard Gray (Natural)

a. Unit Compressive Strength: Refer to Structural General Notes

b. Dimension: 8" x 8" x 16" Split Faced, Color: Natural

c. Location: Exterior Split Faced, Refer to Building Elevations

(iv) Refer to Building Exterior elevations for locations of different colors and textures.

Section 2.03 MORTAR AND GROUT MATERIALS

A Mortar: Refer to Structural General Notes.

B Grout: Refer to Structural General Notes.

Section 2.04 REINFORCEMENT

A Uncoated-Steel Reinforcing Bars: Refer to Structural General Notes.

B Masonry-Joint Reinforcement, General: Refer to Structural General Notes.

C Masonry-Joint Reinforcement for Veneers Anchored with Seismic Masonry-Veneer Anchors: Refer to Structural General Notes.

Section 2.05 TIES AND ANCHORS

A General: Refer to Structural General Notes.

B Materials: Provide ties and anchors as specified on Structural Drawings.

Section 2.06 EMBEDDED FLASHING AND WEEP HOLES

A Install embedded flashing and weep holes in masonry at shelf angles, lintels, ledges, other obstructions to the downward flow of water in the wall and where indicated.

B Place through-wall flashing on sloping bed of mortar and cover with mortar. Seal penetrations in flashing before covering with mortar.

(i) Extend flashing 4 inches (100 mm) into masonry at each end and turn up 2 inches (50 mm) to form a pan.

Section 2.07 ACCESSORIES

A Refer to Structural General Notes.

B Proprietary Acidic Masonry Cleaner: Manufacturer's standard-strength cleaner designed for removing mortar/grout stains, efflorescence, and other new construction stains from new masonry without discoloring or damaging masonry surfaces. Use product expressly approved for intended use by cleaner manufacturer and manufacturer of masonry units being cleaned.
Section 2.08 MORTAR AND GROUT MIXES

A Refer to Structural General Notes

Section 2.09 SEALERS & ANTI-GRAFFITI COATING

A Anti-Graffiti Coating: Water Based Silicone/Siloxane Emulsion, 15% solids, UV Stable, Hydrophobic, Penetrating (Double Coat)

B Sealer: Penetrating, Water Based Silicone/Siloxane Emulsion, 10% solids, UV Stable, Hydrophobic (Single Coat)

Section 2.10 BLOCK FILLER

A Block Filler, Interior / Exterior, Latex, Sherwin Williams PrepRite Block Filler or Approved Equal.

Part 3. EXECUTION

Section 3.01 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.

B Select and arrange units for exposed unit masonry to produce a uniform blend of colors and textures. Mix units from several pallets or cubes as they are placed.

C Use smooth block with color matching adjacent masonry to allow for flush installation of the following elements:
   (i) Steel Canopies, Exterior Lights, Exterior Outlets, and other elements that need a smooth mounting surface.
   (ii) Signage to be excluded. Signage is intended to be installed with stand-off bolts with epoxy adhesive. Signage to be held proud to allow for high and low elements of the split face cmu.
   (iii) Split Face and Smooth Block to be coordinated and cut to allow for minimal exposure of smooth CMU. Mason to coordinate with construction manager to limit exposed smooth block on the exterior.
   (iv) Where smooth cmu is required for mounting, the block is to match color of adjacent split faced cmu.

Section 3.02 TOLERANCES

A Dimensions and Locations of Elements:
   (i) For dimensions in cross section or elevation, do not vary by more than plus 1/2 inch (13 mm) or minus 1/4 inch (6.4 mm).
   (ii) For location of elements in plan, do not vary from that indicated by more than plus or minus 1/2 inch (13 mm).
   (iii) For location of elements in elevation, do not vary from that indicated by more than plus or minus 1/4 inch (6.4 mm) in a story height or 1/2 inch (13 mm) total.

B Lines and Levels:
   (i) For bed joints and top surfaces of bearing walls, do not vary from level by more than 1/4 inch in 10 ft. (6.4 mm in 3 m), or 1/2-inch (13-mm) maximum.
   (ii) For conspicuous horizontal lines, such as lintels, sills, parapets, and reveals, do not vary from level by more than 1/8 inch in 10 ft. (3.2 mm in 3 m), 1/4 inch in 20 ft. (6.4 mm in 6 m), or 1/2-inch (13-mm) maximum.
(iii) For vertical lines and surfaces, do not vary from plumb by more than 1/4 inch in 10 ft. (6.4 mm in 3 m), 3/8 inch in 20 ft. (10 mm in 6 m), or 1/2-inch (13-mm) maximum.

(iv) For conspicuous vertical lines, such as external corners, door jambs, reveals, and expansion and control joints, do not vary from plumb by more than 1/8 inch in 10 ft. (3.2 mm in 3 m), 1/4 inch in 20 ft. (6.4 mm in 6 m), or 1/2-inch (13-mm) maximum.

(v) For lines and surfaces, do not vary from straight by more than 1/4 inch in 10 ft. (6.4 mm in 3 m), 3/8 inch in 20 ft. (10 mm in 6 m), or 1/2-inch (13-mm) maximum.

(vi) For vertical alignment of exposed head joints, do not vary from plumb by more than 1/4 inch in 10 ft. (6.4 mm in 3 m), or 1/2-inch (13-mm) maximum.

C Joints:

(i) For bed joints, do not vary from thickness indicated by more than plus or minus 1/8 inch (3.2 mm), with a maximum thickness limited to 1/2 inch (13 mm).

(ii) For head and collar joints, do not vary from thickness indicated by more than plus 3/8 inch (10 mm) or minus 1/4 inch (6.4 mm).

(iii) For exposed head joints, do not vary from thickness indicated by more than plus or minus 1/8 inch (3.2 mm).

Section 3.03 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 or as bond pattern indicated on Drawings; do not use units with less-than-nominal 4-inch (102-mm) horizontal face dimensions at corners or jambs.

C Built-in Work: As construction progresses, build in items specified in this and other Sections. Fill in solidly with masonry around built-in items.

D Fill space between steel frames and masonry solidly with mortar unless otherwise indicated.

E Fill cores in hollow CMUs with grout 24 inches (610 mm) under bearing plates, beams, lintels, posts, and similar items unless otherwise indicated.

F Install Concrete in cores of CMU according to Structural General Notes.

G Install Masonry Core insulation in all open cells that are not required to be filled with concrete per structural notes.

Section 3.04 MORTAR BEDDING AND JOINTING

A Lay CMUs as follows:

(i) Bed face shells in mortar and make head joints of depth equal to bed joints.

(ii) Bed webs in mortar in all courses of piers, columns, and pilasters.

(iii) Bed webs in mortar in grouted masonry, including starting course on footings.

(iv) Fully bed entire units, including areas under cells, at starting course on footings where cells are not grouted.
(v) Fully bed units and fill cells with mortar at anchors and ties as needed to fully embed anchors and ties in mortar.

B Lay solid masonry units with completely filled bed and head joints; butter ends with sufficient mortar to fill head joints and shove into place. Do not deeply furrow bed joints or slush head joints.

C Rake out mortar joints at pre-faced CMUs to a uniform depth of 1/4 inch (6.4 mm).

D Tool exposed joints slightly concave when thumbprint hard, using a jointer larger than joint thickness unless otherwise indicated.

E Cut joints flush for masonry walls to receive plaster or other direct-applied finishes (other than paint) unless otherwise indicated.

Section 3.05 MASONRY-JOINT REINFORCEMENT

A General: Install entire length of longitudinal side rods in mortar with a minimum cover of 5/8 inch (16 mm) on exterior side of walls, 1/2 inch (13 mm) elsewhere. Lap reinforcement a minimum of 6 inches (152 mm).

(i) Space reinforcement not more than 16 inches (406 mm) o.c.

(ii) Space reinforcement not more than 8 inches (203 mm) o.c. in foundation walls and parapet walls.

(iii) Provide reinforcement not more than 8 inches (203 mm) above and below wall openings and extending 12 inches (305 mm) beyond openings.

B Interrupt joint reinforcement at control and expansion joints unless otherwise indicated.

C Provide continuity at wall intersections by using prefabricated T-shaped units.

D Provide continuity at corners by using prefabricated L-shaped units.

Section 3.06 ANCHORING MASONRY TO STRUCTURAL STEEL AND CONCRETE

A Anchor masonry to structural steel and concrete, where masonry abuts or faces structural steel or concrete, to comply with the following:

(i) Provide an open space not less than 1/2 inch (13 mm) wide between masonry and structural steel or concrete unless otherwise indicated. Keep open space free of mortar and other rigid materials.

(ii) Anchor masonry with anchors embedded in masonry joints and attached to structure.

(iii) Space anchors as indicated, but not more than 24 inches (610 mm) o.c. vertically and 36 inches (914 mm) o.c. horizontally.

Section 3.07 FLASHING, WEEP HOLES, AND CAVITY VENTS

A General: Install embedded flashing and weep holes in masonry at shelf angles, lintels, ledges, other obstructions to downward flow of water in wall, and where indicated. Install cavity vents at shelf angles, ledges, and other obstructions to upward flow of air in cavities, and where indicated.

B All flashing to be Black prefinished metal material unless otherwise indicated.

C Install flashing as follows unless otherwise indicated:

(ii) Prepare masonry surfaces so they are smooth and free from projections that could puncture flashing. Where flashing is within mortar joint, place through-wall flashing on sloping bed of mortar and cover with mortar. Before
covering with mortar, seal penetrations in flashing with adhesive, sealant, or tape as recommended by flashing manufacturer.

(ii) At multi-wythe masonry walls, including cavity walls, extend flashing through outer wythe, turned up a minimum of 4 inches (102 mm), and through inner wythe to within 1/2 inch (13 mm) of the interior face of wall in exposed masonry. Where interior face of wall is to receive furring or framing, carry flashing completely through inner wythe and turn flashing up approximately 2 inches (51 mm) on interior face.

(iii) At lintels and shelf angles, extend flashing 6 inches (152 mm) minimum at each end. At heads and sills, extend flashing 6 inches (152 mm) minimum and turn ends up not less than 2 inches (51 mm) to form end dams.

(iv) Install metal drip edges and sealant stops with sawtooth sheet metal flashing by interlocking hemmed edges to form hooked seam. Seal seam with elastomeric sealant complying with requirements in Section 079200 “Joint Sealants” for application indicated.

(v) Install metal drip edges beneath flexible flashing at exterior face of wall. Stop flexible flashing 1/2 inch (13 mm) back from outside face of wall and adhere flexible flashing to top of metal drip edge.

(vi) Install metal flashing termination beneath flexible flashing at exterior face of wall. Stop flexible flashing 1/2 inch (13 mm) back from outside face of wall and adhere flexible flashing to top of metal flashing termination.

D Install single-wythe CMU flashing system in bed joints of CMU walls where indicated to comply with manufacturer’s written instructions. Install CMU cell pans with upturned edges located below face shells and webs of CMUs above and with weep spouts aligned with face of wall. Install CMU web covers so that they cover upturned edges of CMU cell pans at CMU webs and extend from face shell to face shell.

E Install weep holes in exterior wythes and veneers in head joints of first course of masonry immediately above embedded flashing.

F Place cavity drainage material in cavities to comply with configuration requirements for cavity drainage material in "Accessories” Article.

Section 3.08 REINFORCED UNIT MASONRY

A Temporary Formwork and Shores: Construct formwork and shores as needed to support reinforced masonry elements during construction.

(i) Construct formwork to provide shape, line, and dimensions of completed masonry as indicated. Make forms sufficiently tight to prevent leakage of mortar and grout. Brace, tie, and support forms to maintain position and shape during construction and curing of reinforced masonry.

(ii) Do not remove forms and shores until reinforced masonry members have hardened sufficiently to carry their own weight and that of other loads that may be placed on them during construction.

B Placing Reinforcement: Comply with requirements in TMS 602.

C Grouting: Do not place grout until entire height of masonry to be grouted has attained enough strength to resist grout pressure.

(i) Comply with requirements in TMS 602 for cleanouts and for grout placement, including minimum grout space and maximum pour height.

(ii) Limit height of vertical grout pours to not more than 64 inches (1626 mm)

Section 3.09 FIELD QUALITY CONTROL
A Testing Agency: Owner will engage a qualified testing agency to perform tests and inspections. Allow inspectors access to scaffolding and work areas as needed to perform tests and inspections. Retesting of materials that fail to comply with specified requirements will be at Contractor's expense.

B Inspections: Special inspections in accordance with TMS 402.
   (i) Begin masonry construction only after inspectors have verified proportions of site-prepared mortar.
   (ii) Place grout only after inspectors have verified compliance of grout spaces and of grades, sizes, and locations of reinforcement.
   (iii) Place grout only after inspectors have verified proportions of site-prepared grout.

C Testing Prior to Construction: One set of tests.

D Testing Frequency: One set of tests for each 5000 sq. ft. (464 sq. m) of wall area or portion thereof.

E Clay Masonry Unit Test: For each type of unit provided, in accordance with ASTM C67/C67M for compressive strength.

F Concrete Masonry Unit Test: For each type of unit provided, in accordance with ASTM C140/C140M for compressive strength.

G Grout Test (Compressive Strength): For each mix provided, in accordance with ASTM C 476.

Section 3.10 CLEANING

A In-Progress Cleaning: Clean unit masonry as work progresses by dry brushing to remove mortar fins and smears before tooling joints.

B Final Cleaning: After mortar is thoroughly set and cured, clean exposed masonry as follows:
   (i) Remove large mortar particles by hand with wooden paddles and nonmetallic scrape hoes or chisels.
   (ii) Test cleaning methods on sample wall panel; leave one-half of panel uncleaned for comparison purposes. Obtain Architect's approval of sample cleaning before proceeding with cleaning of masonry.
   (iii) Protect adjacent stone and non-masonry surfaces from contact with cleaner by covering them with liquid strippable masking agent or polyethylene film and waterproof masking tape.
   (iv) Wet wall surfaces with water before applying cleaners; remove cleaners promptly by rinsing surfaces thoroughly with clear water.
   (vi) Clean concrete masonry by applicable cleaning methods indicated in NCMA TEK 8-4A.
   (vii) Clean masonry with a proprietary acidic masonry cleaner applied according to manufacturer's written instructions.

Section 3.11 Finish

A All masonry to be finished with a sealer, anti-graffiti coating, or paint. No unfinished masonry surfaces will be accepted.

B All painted Concrete Masonry Units to receive block filler to create smooth surface without defects or voids.
(i) Primer to be installed after block filler to increase adhesion of two coats of interior latex paint.

C All Exterior Exposed Split Faced Concrete Masonry Units to receive two coats of Anti-graffiti Coatings.

D All Concealed Masonry Surfaces to receive masonry sealer.

E Anti-graffiti coating to go from grade to top of parapets.

F Paint coatings to go from floor to one block above suspended acoustical ceiling or up to painted gypsum wallboard.

G Follow all manufacturer’s instructions and recommendations for installation of coatings and finishes. Meet manufacturer’s recommendations for moisture and temperature requirements.

H Test Moisture content of grout and CMU prior to installation of finishes. Verify tolerances have been met prior to finish installation.

Section 3.12 MASONRY WASTE DISPOSAL

A Waste Disposal as Fill Material: Dispose of clean masonry waste, including excess or soil-contaminated sand, waste mortar, and broken masonry units, by crushing and mixing with fill material as fill is placed.

(i) Do not dispose of masonry waste as fill within 18 inches (457 mm) of finished grade.

B Masonry Waste Recycling: Return broken CMUs not used as fill to manufacturer for recycling.

C Excess Masonry Waste: Remove excess clean masonry waste that cannot be used as fill, as described above or recycled, and other masonry waste, and legally dispose of off Owner’s property.

END OF SECTION 042200
SECTION 05 12 00
STRUCTURAL STEEL FRAMING

Part 1. GENERAL

Section 1.01 SUMMARY

A Section Includes:

(i) Structural steel.

(ii) Shear stud connectors, shop welded.

(iii) Shrinkage-resistant grout.

Section 1.02 DEFINITIONS

A Structural Steel: Elements of the structural frame indicated on Drawings and as described in ANSI/AISC 303.

Section 1.03 ACTION SUBMITTALS

A Refer to Structural General Notes for submittal requirements.

Section 1.04 QUALITY ASSURANCE

A Fabricator Qualifications: A qualified fabricator that participates in the AISC Quality Certification Program and is designated an AISC-Certified Plant, Category BU or is accredited by the IAS Fabricator Inspection Program for Structural Steel (Acceptance Criteria 172).

B Installer Qualifications: A qualified Installer who participates in the AISC Quality Certification Program and is designated an AISC-Certified Erector

C Welding Qualifications: Qualify procedures and personnel in accordance with AWS D1.1/D1.1M.

Part 2. PRODUCTS

Section 2.01 PERFORMANCE REQUIREMENTS

A Comply with applicable provisions of the following specifications and documents:

(i) ANSI/AISC 303.

(ii) ANSI/AISC 360.

(iii) RCSC's "Specification for Structural Joints Using High-Strength Bolts."

B Connection Design Information:

(i) Option 1: Connection designs have been completed and connections indicated on the Drawings.

Section 2.02 STRUCTURAL-STEEL MATERIALS

A W-Shapes: ASTM A992/A992M: Refer to Structural General Notes and Drawings.
B Channels, Angles: ASTM A36/A36M: Refer to Structural General Notes and Drawings.

C Plate and Bar: A572: Refer to Structural General Notes and Drawings.

D Cold-Formed Hollow Structural Sections: ASTM A500/A500M: structural tubing. Refer to Structural General Notes and Drawings.

E Steel Pipe: ASTM A53/A53M, Type E or Type S, Grade B. Refer to Structural General Notes and Drawings.

F Welding Electrodes: Comply with AWS requirements.

Section 2.03 BOLTS AND CONNECTORS

A High-Strength A325 Bolts, Nuts, and Washers: Refer to Structural General Notes and Drawings.

B Shear Stud Connectors: Refer to Structural General Notes and Drawings.

Section 2.04 RODS

A Anchor Rods: ASTM F1554, Grade 36 hex carbon steel: Refer to Structural General Notes.

(i) Configuration: Refer to Structural Drawings.

B Anchor Rods High Strength: ASTM F1554, Grade 55: Refer to Structural General Notes

(i) Configuration: Refer to Structural Drawings.

C Nuts: ASTM a 563. Grade and finish: Refer to Structural General Notes.

D Plate Washers: ASTM A36/A36M. Grade and finish: Refer to Structural General Notes.

E Washers: ASTM F 436. Grade and finish: Refer to Structural General Notes.

Section 2.05 PRIMER

A Steel Primer:

(i) Fabricator's standard lead- and chromate-free, nonasphaltic, rust-inhibiting primer complying with MPI 79 and compatible with topcoat.

Section 2.06 SHRINKAGE-RESISTANT GROUT

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

Section 2.07 FABRICATION

A Structural Steel: Fabricate and assemble in shop to greatest extent possible. Fabricate in accordance with ANSI/AISC 303 and to ANSI/AISC 360, Refer to Structural General Notes and Drawings.

B Shear Stud Connectors: Prepare steel surfaces as recommended by manufacturer of shear connectors. Weld using automatic end welding of headed-stud shear connectors in accordance with AWS D1.1/D1.1M and manufacturer's written instructions.
Section 2.08 SHOP CONNECTIONS

A  High-Strength Bolts: Shop install high-strength bolts in accordance with RCSC’s "Specification for Structural Joints Using High-Strength Bolts" for type of bolt and type of joint specified.

B  Weld Connections: Comply with AWS D1.1/D1.1M for tolerances, appearances, welding procedure specifications, weld quality, and methods used in correcting welding work.

Section 2.09 SHOP PRIMING

A  Shop prime steel surfaces, except the following:
   (i) Surfaces embedded in concrete or mortar.
   (ii) Surfaces to be field welded.
   (iii) Surfaces of high-strength bolted, slip-critical connections.
   (iv) Surfaces to receive sprayed fire-resistive materials (applied fireproofing).
   (v) Galvanized surfaces.
   (vi) Surfaces enclosed in interior construction.

B  Surface Preparation of Steel: Clean surfaces to be painted. Remove loose rust and mill scale and spatter, slag, or flux deposits.

C  Priming: Immediately after surface preparation, apply primer in accordance with manufacturer's written instructions and at rate recommended by SSPC to provide a minimum dry film thickness of 1.5 mils (0.038 mm). Use priming methods that result in full coverage of joints, corners, edges, and exposed surfaces.

Section 2.10 SOURCE QUALITY CONTROL

A  Testing Agency: Owner will engage a qualified testing agency to perform shop tests and inspections.
   (i) Allow testing agency access to places where structural-steel work is being fabricated or produced to perform tests and inspections.
   (ii) Bolted Connections: Inspect and test shop-bolted connections in accordance with RCSC's "Specification for Structural Joints Using High-Strength Bolts."
   (iii) Welded Connections: Visually inspect shop-welded connections in accordance with AWS D1.1/D1.1M and the following inspection procedures, at testing agency's option:
      a. Liquid Penetrant Inspection: ASTM E165/E165M.
      b. Magnetic Particle Inspection: ASTM E709; performed on root pass and on finished weld. Cracks or zones of incomplete fusion or penetration are not accepted.
      c. Ultrasonic Inspection: ASTM E164.
      d. Radiographic Inspection: ASTM E94/E94M.
   (iv) In addition to visual inspection, test and inspect shop-welded shear stud connectors in accordance with requirements in AWS D1.1/D1.1M.
(v) Prepare test and inspection reports.

Part 3. EXECUTION

Section 3.01 EXAMINATION

A Verify, with certified steel erector present, elevations of concrete- and masonry-bearing surfaces and locations of anchor rods, bearing plates, and other embedment's for compliance with requirements.

B Proceed with installation only after unsatisfactory conditions have been corrected.

Section 3.02 ERECTION

A Set structural steel accurately in locations and to elevations indicated and in accordance with ANSI/AISC 303 and ANSI/AISC 360.


(i) Set plates for structural members on wedges, shims, or setting nuts as required.

(ii) Weld plate washers to top of baseplate.

(iii) 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.

(iv) Promptly pack shrinkage-resistant grout solidly between bearing surfaces and plates, so no voids remain. Neatly finish exposed surfaces; protect grout and allow to cure. Comply with manufacturer's written installation instructions for grouting.

C Align and adjust various members forming part of complete frame or structure before permanently fastening. Before assembly, clean bearing surfaces and other surfaces that will be in permanent contact with members. Perform necessary adjustments to compensate for discrepancies in elevations and alignment.

D Do not use thermal cutting during erection unless approved by the Architect or Structural Engineer. Finish thermally cut sections within smoothness limits in AWS D1.1/D1.1M

E Maintain erection tolerances of structural steel within ANSI/AISC 303.

Section 3.03 FIELD CONNECTIONS

A High-Strength Bolts: Install high-strength bolts in accordance with RCSC's "Specification for Structural Joints Using High-Strength Bolts" for bolt and joint type specified.

(i) Joint Type: Snug tightened

B Weld Connections: Comply with AWS D1.1/D1.1M for tolerances, appearances, welding procedure specifications, weld quality, and methods used in correcting welding work.

(i) Comply with ANSI/AISC 303 and ANSI/AISC 360 for bearing, alignment, adequacy of temporary connections, and removal of paint on surfaces adjacent to field welds.

Section 3.04 FIELD MODIFICATIONS
A  The engineer of record needs to be notified and response back of acceptance of modification or alternate solution provide prior to any modification of structural steel that deviates from the structural steel shops.

Section 3.05 FIELD QUALITY CONTROL

A  Special Inspections: Owner will engage a special inspector to perform the following special inspections:

   (i)  Verify structural-steel materials and inspect steel frame joint details.

   (ii) Verify weld materials and inspect welds.

   (iii) Verify connection materials and inspect high-strength bolted connections.

B  Testing Agency: Owner will engage a qualified testing agency to perform tests and inspections.

   (i)  Bolted Connections: Inspect and test bolted connections in accordance with RCSC's "Specification for Structural Joints Using High-Strength Bolts."

   (II) Welded Connections: Visually inspect field welds in accordance with AWS D1.1/D1.1M.

END OF SECTION 051200
Part 1. GENERAL

Section 1.01 SUMMARY

A Section Includes:

(i) Miscellaneous steel framing and supports.

(ii) Prefabricated building columns.

(iii) Shelf angles.

(iv) Structural-steel door frames.

(v) Miscellaneous steel trim.

B Products furnished, but not installed, under this Section include the following:

(i) Loose steel lintels.

(ii) Anchor bolts, steel pipe sleeves, slotted-channel inserts, and wedge-type inserts indicated to be cast into concrete or built into unit masonry.

Section 1.02 ACTION SUBMITTALS

A Product Data: For the following:

(i) Nonslip aggregates and nonslip-aggregate surface finishes.

(ii) Fasteners.

(iii) Shop primers.

(iv) Shrinkage-resisting grout.

(v) Prefabricated building columns.

(vi) Slotted channel framing.

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.

C Delegated-Design Submittal: For ladders, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

Part 2. PRODUCTS

Section 2.01 PERFORMANCE REQUIREMENTS

A Delegated Design: Engage a qualified professional engineer, as defined in Section 014000 "Quality Requirements," to design ladders.
Section 2.02 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 A36/A36M.

C Stainless Steel Bars and Shapes: ASTM A276/A276M, Type 304.

D Rolled-Steel Floor Plate: ASTM A786/A786M, rolled from plate complying with ASTM A36/A36M or ASTM A283/A283M, Grade C or D.

E Rolled-Stainless Steel Floor Plate: ASTM A793.

F Steel Tubing: ASTM A500/A500M, cold-formed steel tubing.

G Steel Pipe: ASTM A53/A53M, Standard Weight (Schedule 40) unless otherwise indicated.

H Slotted Channel Framing: Cold-formed metal box channels (struts) complying with MFMA-3.

(i) Size of Channels: 1-5/8 by 1-5/8 inches (41 by 41 mm)

(ii) Material: Cold-rolled steel, ASTM A1008/A1008M, Grade 33 (Grade 230); 0.0677-inch (1.7-mm) minimum thickness.

I Cast Iron: Either gray iron, ASTM A48/A48M, or malleable iron, ASTM A47/A47M, unless otherwise indicated.


L Aluminum Castings: ASTM B26/B26M, Alloy 443.0-F.

Section 2.03 FASTENERS

A General: Unless otherwise indicated, provide stainless steel fasteners for exterior use and zinc-plated fasteners with coating complying with ASTM B633 or ASTM F1941/F1941M, Class Fe/Zn 5, at exterior walls. Select fasteners for type, grade, and class required.

B Cast-in-Place Anchors in Concrete: Either threaded or wedge type unless otherwise indicated; galvanized ferrous castings, either ASTM A47/A47M malleable iron or ASTM A27/A27M cast steel. Provide bolts, washers, and shims as needed, all hot-dip galvanized per ASTM F2329/F2329M.

C Post-Installed Anchors:

(i) Material for Interior Locations: Carbon-steel components zinc plated to comply with ASTM B633 or ASTM F1941/F1941M, Class Fe/Zn 5, unless otherwise indicated.

D Slotted-Channel Inserts: Cold-formed, hot-dip galvanized-steel box channels (struts) complying with MFMA-4, 1-5/8 by 7/8 inches (41 by 22 mm) by length indicated with anchor straps or studs not less than 3 inches (75 mm) long at not more than 8 inches (200 mm) o.c. Provide with temporary filler and tee-head bolts, complete with washers and nuts, all zinc-plated to comply with ASTM B633, Class Fe/Zn 5, as needed for fastening to inserts.

Section 2.04 MISCELLANEOUS MATERIALS
A Universal Shop Primer: Fast-curing, lead- and chromate-free, universal modified-alkyd primer complying with MPI#79 and compatible with topcoat.

(i) Use primer containing pigments that make it easily distinguishable from zinc-rich primer.

B Water-Based Primer: Emulsion type, anticorrosive primer for mildly corrosive environments that is resistant to flash rusting when applied to cleaned steel, complying with MPI#107 and compatible with topcoat.

C Epoxy Zinc-Rich Primer: Complying with MPI#20 and compatible with topcoat.

D Shop Primer for Galvanized Steel: Primer formulated for exterior use over zinc-coated metal and compatible with finish paint systems indicated.

E Galvanizing Repair Paint: High-zinc-dust-content paint complying with SSPC-Paint 20 and compatible with paints specified to be used over it.

F Bituminous Paint: Cold-applied asphalt emulsion complying with ASTM D1187/D1187M.

G Shrinkage-Resistant Grout: Factory-packaged, nonmetallic, non-staining, noncorrosive, nongaseous grout complying with ASTM C1107/C1107M. Provide grout specifically recommended by manufacturer for interior and exterior applications.

Section 2.05 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 (1 mm) 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:

(i) Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.

(ii) Obtain fusion without undercut or overlap.

(iii) Remove welding flux immediately.

(iv) At exposed connections, finish exposed welds and surfaces smooth and blended so no roughness shows after finishing.

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 Where units are indicated to be cast into concrete or built into masonry, equip with integrally welded steel strap anchors, not less than 8 inches (200 mm) from ends and corners of units and 24 inches (600 mm) o.c.
Section 2.06 MISCELLANEOUS FRAMING AND SUPPORTS

A 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.

B Fabricate steel pipe columns for supporting wood frame construction from steel pipe with steel baseplates and top plates as indicated. Drill or punch baseplates and top plates for anchor and connection bolts and weld to pipe with fillet welds all around. Make welds the same size as pipe wall thickness unless otherwise indicated.

C Furnish wedge-type concrete inserts, complete with fasteners, to attach shelf angles to cast-in-place concrete.

Section 2.07 STRUCTURAL-STEEL DOOR FRAMES

A Fabricate structural-steel door frames from steel shapes, plates, and bars of size and to dimensions indicated, fully welded together, with 5/8-by-1-1/2-inch (16-by-38-mm) steel channel stops, unless otherwise indicated. Plug-weld built-up members and continuously weld exposed joints. Reinforce frames and drill and tap as necessary to accept finish hardware.

(i) Provide with integrally welded steel strap anchors for securing door frames into adjoining concrete or masonry.

Section 2.08 MISCELLANEOUS STEEL TRIM

A Unless otherwise indicated, fabricate units from steel shapes, plates, and bars of profiles shown with continuously welded joints and smooth exposed edges. Miter corners and use concealed field splices where possible.

B Provide cutouts, fittings, and anchorages as needed to coordinate assembly and installation with other work.

(i) Provide with integrally welded steel strap anchors for embedding in concrete or masonry construction.

C Prime miscellaneous steel trim with primer specified in Section 099600 "High-Performance Coatings."

Section 2.09 PIPE GUARDS

A Fabricate pipe guards from 3/8-inch- (9.5-mm-) thick by 12-inch- (300-mm-) wide, steel plate, bent to fit flat against the wall or column at both ends and to fit around pipe with 2-inch (50-mm) clearance between pipe and pipe guard. Drill each end for two 3/4-inch (19-mm) anchor bolts.

Section 2.10 ABRASIVE METAL NOSINGS, TREADS, AND THRESHOLDS

A Extruded Units: Aluminum, with abrasive filler consisting of aluminum oxide, silicon carbide, or a combination of both, in an epoxy-resin binder. Fabricate units in lengths necessary to accurately fit openings or conditions.

B Provide ribbed units, with abrasive filler strips projecting 1/16 inch (1.5 mm) above aluminum extrusion.

C Provide anchors for embedding units in concrete, either integral or applied to units, as standard with manufacturer.

D Apply clear lacquer to concealed surfaces of extruded units.

Section 2.11 LOOSE BEARING AND LEVELING PLATES

A Provide loose bearing and leveling plates for steel items bearing on masonry or concrete construction. Drill plates to receive anchor bolts and for grouting.

B Galvanize bearing and leveling plates.
Section 2.12 LOOSE STEEL LINTELS

A Fabricate loose steel lintels from steel angles and shapes of size indicated for openings and recesses in masonry walls and partitions at locations indicated. Fabricate in single lengths for each opening unless otherwise indicated. Weld adjoining members together to form a single unit where indicated.

Section 2.13 STEEL WELD PLATES AND ANGLES

A Provide steel weld plates and angles not specified in other Sections, for items supported from concrete construction as needed to complete the Work. Provide each unit with no fewer than two integrally welded steel strap anchors for embedding in concrete.

Section 2.14 GENERAL FINISH REQUIREMENTS

A All exposed steel to be field painted per the painting schedule.

B All concealed steel can be left shop primed.

C No steel fabrications need to be galvanized unless indicated otherwise.

Section 2.15 STEEL AND IRON FINISHES

A Galvanizing: Hot-dip galvanize items as indicated to comply with ASTM A153/A153M for steel and iron hardware and with ASTM A123/A123M for other steel and iron products.

B Shop prime iron and steel items unless they are to be embedded in concrete, sprayed-on fireproofing, or masonry, or unless otherwise indicated.

C Preparation for Shop Priming: Prepare surfaces to comply with SSPC-SP 3, "Power Tool Cleaning."

(i) Other Steel 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.

Part 3. EXECUTION

Section 3.01 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:

(i) Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.

(ii) Obtain fusion without undercutting or overlapping.
(iii) Remove welding flux immediately.

(iv) 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.

Section 3.02 INSTALLATION OF MISCELLANEOUS FRAMING AND SUPPORTS

A Install framing and supports to comply with requirements of items being supported, including manufacturers’ written instructions and requirements indicated on Shop Drawings.

B Anchor supports for ceiling hung toilet partitions, operable partitions, overhead doors, and overhead grilles securely to, and rigidly brace from, building structure.

C Support steel girders on solid grouted masonry, concrete, or steel pipe columns. Secure girders with anchor bolts embedded in grouted masonry or concrete or with bolts through top plates of pipe columns.

Section 3.03 INSTALLATION OF PREFABRICATED BUILDING COLUMNS

A Install prefabricated building columns to comply with ANSI/AISC 360, "Specifications for Structural Steel Buildings," and with requirements applicable to listing and labeling for fire-resistance rating indicated.

Section 3.04 INSTALLATION OF BEARING AND LEVELING PLATES


B Set bearing and leveling plates on wedges, shims, or leveling nuts. After bearing members have been positioned and plumbed, tighten anchor bolts. Do not remove wedges or shims but, if protruding, cut off flush with edge of bearing plate before packing with shrinkage-resistant grout. Pack grout solidly between bearing surfaces and plates to ensure that no voids remain.

Section 3.05 REPAIRS

A Touchup Painting:

(i) Immediately after erection, clean field welds, bolted connections, and abraded areas. Paint uncoated and abraded areas with same material as used for shop painting to comply with SSPC-PA 1 for touching up shop-painted surfaces.

B Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas and repair galvanizing to comply with ASTM A780/A780M.

END OF SECTION 055000
SECTION 06 10 00
ROUGH CARPENTRY

Part 1. GENERAL

Section 1.01 SUMMARY

A Section Includes:

(i) Framing with dimension lumber.

(ii) Framing with engineered wood products.

(iii) Shear wall panels.

(iv) Rooftop equipment bases and support curbs.

(v) Wood blocking and nailers.

(vi) Wood furring and grounds.

(vii) Plywood backing panels.

Section 1.02 ACTION SUBMITTALS

A Product Data: None

Part 2. PRODUCTS

Section 2.01 WOOD PRODUCTS, GENERAL

A Lumber: Comply with DOC PS 20 and applicable rules of grading agencies indicated. If no grading agency is indicated, comply with the applicable rules of any rules-writing agency certified by the ALSC Board of Review. Grade lumber by an agency certified by the ALSC Board of Review to inspect and grade lumber under the rules indicated.

(i) Factory mark each piece of lumber with grade stamp of grading agency.

(ii) For exposed lumber indicated to receive a stained or natural finish, mark grade stamp on end or back of each piece.

(iii) Dress lumber, S4S, unless otherwise indicated.

B Maximum Moisture Content:

(i) Boards: As per Structural General Notes.

(ii) Dimension Lumber: As per Structural General Notes.

(iii) Timber. As per Structural General Notes.

C 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.
(i) Allowable design stresses, as published by manufacturer, shall 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.

Section 2.02 PRESERVATIVE TREATMENT

A Preservative Treatment by Pressure Process: AWPA U1; Use Category UC2 for interior construction not in contact with ground, Use Category UC3b for exterior construction not in contact with ground, and Use Category UC4a for items in contact with ground.

(i) Preservative Chemicals: Acceptable to authorities having jurisdiction and containing no arsenic or chromium.

B Kiln-dry lumber after treatment to a maximum moisture content as noted in Structural General Notes. 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 all rough carpentry unless otherwise indicated.

(i) Wood cants, nailers, curbs, equipment support bases, blocking, stripping, and similar members in connection with roofing, flashing, vapor barriers, and waterproofing.

(ii) Wood sills, sleepers, blocking, furring, and similar concealed members in contact with masonry or concrete.

(iii) Wood framing and furring attached directly to the interior of below-grade exterior masonry or concrete walls.

(iv) Wood framing members that are less than 18 inches (460 mm) above the ground in crawlspaces or unexcavated areas.

(v) Wood floor plates that are installed over concrete slabs-on-grade.

Section 2.03 DIMENSION LUMBER FRAMING

A Non-Load-Bearing Interior Partitions by Grade: As noted in Structural General Notes.

(i) Species:

   a. Western woods; WCLIB or WWPA or as noted in Structural General Notes.

B Framing Other Than Non-Load-Bearing Partitions by Grade: As noted in Structural General Notes.

(i) Application: Framing other than interior partitions not indicated as load bearing.

(ii) Species:

   b. Douglas fir-larch; WCLIB or WWPA, or as noted in Structural General Notes.

C Exposed Framing: Hand-select material for uniformity of appearance and freedom from characteristics, on exposed surfaces and edges, that would impair finish appearance, including decay, honeycomb, knot-holes, shake, splits, torn grain, and wane.

(i) Species and Grade: As indicated above for load-bearing construction of same type.

Section 2.04 ENGINEERED WOOD PRODUCTS
A Laminated-Veneer Lumber: Structural composite lumber made from wood veneers with grain primarily parallel to member lengths, evaluated and monitored according to ASTM D5456 and manufactured with an exterior-type adhesive complying with ASTM D2559.

(i) Extreme Fiber Stress in Bending, Edgewise: As indicated in Structural General Notes.

(ii) Modulus of Elasticity, Edgewise: As indicated in Structural General Notes.

B Wood I-Joists: Prefabricated units, I-shaped in cross section, made with solid or structural composite lumber flanges and wood-based structural panel webs, let into and bonded to flanges. Comply with material requirements of and with structural capacities established and monitored according to ASTM D5055.

(i) Structural Properties: Depths and design values not less than those indicated in Structural General Notes.

C Rim Boards: Product designed to be used as a load-bearing member and to brace wood I-joists at bearing ends, complying with research or evaluation report for I-joists.

Section 2.05 MISCELLANEOUS LUMBER

A Provide miscellaneous lumber indicated and lumber for support or attachment of other construction, including the following:

(i) Blocking.

(ii) Nailers.

(iii) Furring.

B Dimension Lumber Items: No. 2 grade lumber of any western species.

C Concealed Boards: 19 percent maximum moisture content and the following species and grades:

(i) Western woods; Construction or No. 2 Common grade; WCLIB or WWPA.

Section 2.06 PLYWOOD BACKING PANELS

A Equipment Backing Panels: Provide plywood backing panels on all walls of Electrical and IT rooms, in thickness indicated or, if not indicated, not less than 3/4-inch (19-mm) nominal thickness.

Section 2.07 FASTENERS

A General: Fasteners shall be of size and type indicated and shall comply with requirements specified in this article for material and manufacture. Provide nails or screws, in sufficient length, to penetrate not less than 1-1/2 inches (38 mm) into wood substrate.

(i) 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 A153/A153M.

B Power-Driven Fasteners: Fastener systems with an evaluation report acceptable to authorities having jurisdiction, based on ICC-ES AC70.

C Post-Installed Anchors: Fastener systems with an evaluation report acceptable to authorities having jurisdiction.

Section 2.08 MISCELLANEOUS MATERIALS

A Sill-Sealer Gaskets:
(i) Closed-cell neoprene foam, 1/4 inch (6.4 mm) thick, selected from manufacturer's standard widths to suit width of sill members indicated.

B Flexible Flashing: Composite, self-adhesive, flashing product consisting of a pliable, butyl rubber or rubberized-asphalt compound, bonded to a high-density polyethylene film, aluminum foil, or spunbonded polyolefin to produce an overall thickness of not less than 0.025 inch (0.6 mm).

C Adhesives for Gluing to Concrete or Masonry: Formulation complying with ASTM D3498 that is approved for use indicated by adhesive manufacturer.

Part 3. EXECUTION

Section 3.01 INSTALLATION

A Framing Standard: Comply with AF&PA's WCD 1, "Details for Conventional Wood Frame Construction," unless otherwise indicated.

B Framing with Engineered Wood Products: Install engineered wood products to comply with manufacturer's written instructions.

C Set work to required levels and lines, with members plumb, true to line, cut, and fitted. Fit rough carpentry accurately to other construction. Locate furring, nailers, blocking, grounds, and similar supports to comply with requirements for attaching other construction.

D Install shear wall panels to comply with Structural Engineers written and specific instructions.

E Do not splice structural members between supports unless otherwise indicated.

F Comply with AWPA M4 for applying field treatment to cut surfaces of preservative-treated lumber.

G Where wood-preservative-treated lumber is installed adjacent to metal decking, install continuous flexible flashing separator between wood and metal decking.

H Securely attach rough carpentry work to substrate by anchoring and fastening as indicated, complying with the following:

(i) Table 2304.9.1, "Fastening Schedule," in ICC's International Building Code (IBC) unless noted otherwise.

Section 3.02 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 wet enough 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 061000
SECTION 06 16 00
SHEATHING

Part 1. GENERAL

Section 1.01 SUMMARY

A Section Includes:

(i) Wall sheathing.

(ii) Sheathing joint and penetration treatment.

B ACTION SUBMITTALS

(i) Product Data: For each type of process and factory-fabricated product.

Part 2. PRODUCTS

Section 2.01 SHEATHING

A Plywood Sheathing:

(i) Refer to Wall, Roof, and Floor assemblies for thickness.

(ii) All sheathing to APA rated.

(iii) Select and install the appropriate exposure rated sheathing for the application of installation.

(iv) Select and install the appropriate APA span rating for the application of installation.

(v) Install ¾” fire treated plywood sheathing on walls of electrical and Information Technology rooms for proper installation of electrical panels, except walls with electrical switch gear and transformers. Plywood to be from +36” to +84”. This plywood is backer plywood for electrical equipment.

Section 2.02 FASTENERS

1) General: Provide fasteners of size, type, and spacing to comply with the international building code (IBC) and structural details and general notes. If a fastener size, type, spacing is not called out it is the responsibility of the contractor to contact the structural engineer for clarification and information.

Section 2.03 MISCELLANEOUS MATERIALS

A Adhesives for Field Gluing Panels to Wood Framing: Formulation complying with ASTM D3498 that is approved for use with type of construction panel indicated by manufacturers of both adhesives and panels.

Part 3. EXECUTION

Section 3.01 INSTALLATION, GENERAL

A Do not use materials with defects that impair quality of sheathing or pieces that are too small to use with minimum number of joints or optimum joint arrangement. 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 in Structural General Notes.

D Coordinate wall sheathing installation with all interior finishes and details.

E Do not bridge building expansion joints; cut and space edges of panels to match spacing of structural support elements.

F All sections of walls noted in the structural drawings to receive plywood for lateral resistance, shall have the plywood extend from inside corner of wall to inside corner, so there are no steps in the gypsum wall board. The full length of wall to be sheathed on one side.

   (i) Wall can be sheathed on either side to cover full length of shear wall called out by structural drawings and limit length of sheathing. Note: Contractor to notify the Architect which side of wall the contractor plans to install sheathing.

   (ii) Contractor to coordinate electrical and mechanical penetrations through shear wall with structural engineer and architect.

G All edges of sheathing to be blocked unless otherwise indicated.

END OF SECTION 061000
SECTION 06 17 53
SHOP FABRICATED WOOD TRUSSES

Part 1. GENERAL

Section 1.01 SUMMARY

A Section includes:

(i) Design, manufacture, and supply wood trusses as shown on the Construction Documents and as specified.

Section 1.02 DEFINITION

A BCSI: Guide to good practice for Handling, Installing, Restraining & Bracing of Metal Plate Connected Wood Trusses jointly produced by the Structural Building Components Association and the Truss Plate Institute.

B Standard: National Design Standard for Metal Plate Connected Wood Truss Construction (ANSI/TPI 1)

Section 1.03 DESIGN

A Trusses shall be designed in accordance with the Standard and where any applicable design feature is not specifically covered herein, design shall be in accordance with the applicable provisions of the latest edition of the American Forest & Paper Association’s (AF&PA’s) National Design Specification (NDS) for Wood Construction and applicable legal requirements.

B Truss Manufacturer shall furnish Truss Design Drawings prepared and stamped by a Structural Engineer licensed in the State of Idaho.

C The Truss Manufacturer shall be responsible for contacting the local and state jurisdiction for applicable codes, loads, and design requirements for the trusses. If conflict between this information and the documented information in the Construction Documents exists, the manufacturer is to contact the project structural engineer for clarification.

Section 1.04 ACTION SUBMITTALS

A Shop Drawings: The drawing shall be stamped by a Licensed State of Idaho Structural Engineer and include the following:

(i) Building Code used for Design.

(ii) Slope or depth, span and spacing.

(iii) Location of all joints and support locations.

(iv) The number of plies if greater than one.

(v) Required bearing widths.

(vi) Design loads as applicable, including:

a. Top Chord Live load (for roof trusses, this shall be controlling case of live load, or snow load including snow drifting).

b. Top Chord Dead Load.
c. Bottom Chord Live Load.

d. Bottom Chord Dead Load.

e. Additional loads and locations.

f. Environmental Load Design Criteria (Wind speed, snow, seismic, and all applicable factors as required to calculate the Truss loads); and

g. Other lateral loads, including drag strut loads.

(vii) Adjustments to Wood Member and Metal Connector Plate design values for conditions of use.

(viii) Maximum reaction force and direction, including maximum uplift reaction forces where applicable.

(ix) Size, species, and grade of each Wood Member.

(x) Truss to Truss connection and Truss field assembly requirements.

(xi) Calculated span to deflection ratio and/or maximum vertical and horizontal deflection for live and total load and $K_c$ (creep factor) as applicable.

(xii) Maximum axial tension and compression forces in the Truss members.

(xiii) Fabrication tolerance per Standard.

(xiv) Required Permanent Individual Truss Member Restraint location and the method of Restraint/Bracing to be used per the Standard.

(xv) Methods for Temporary Construction Bracing.

a. It is the responsibility of the truss erector to temporarily brace all truss installations for the duration of the truss installation until the completion of the roof design.

Section 1.05 CLOSEOUT SUBMITTALS

A Operation and maintenance data.

Part 2. PRODUCTS

Section 2.01 MATERIALS

A Lumber used shall be identified by grade mark of a lumber inspection bureau or agency approved by the American Lumber Standards Committee, and shall be the size, species, and grade as shown on the Truss Design Drawings, or equivalent as approved by the Truss Design Engineer.

B Fire retardant treated lumber shall be used where applicable and shall meet the specifications of the fire retardant chemical manufacturer.

C All materials shall meet the specifications and notes stated in the Project Structural Engineer's notes.

D Metal connector plates shall be manufactured by a Truss Plate Institute (TPI) member plate manufacturer and shall not be less than 0.036 in. thick (20 gauge) and shall meet or exceed ASTM A653/A653M grade 33, and galvanized coating shall meet or exceed ASTM A924/924M, coating designation G60. Working stresses in steel are to be applied to effectiveness ratios for plates as determined by test and in accordance with the Standard.
Section 2.02 MANUFACTURING

A  Trusses shall be manufactured to meet the quality requirements of the Standard and in accordance with information provided in the final approved Truss Design Drawings.

Part 3.  EXECUTION

Section 3.01 INSTALLATION

A  Handling, Installing, Restraining and Bracing

(i)  Trusses shall be handled during manufacturing, delivery and by the Contractor at the job site so as not to be subjected to excessive bending.

(ii)  Trusses shall be unloaded in a manner so as to minimize lateral strain. Trusses shall be protected from damage that might result from on-site activities and environmental conditions. Trusses shall be handled in such a way so as to prevent toppling when banding is removed.

(iii)  Contractor shall be responsible for the handling, installation, and temporary restraint/bracing of the trusses in a good workmanlike manner and in accordance with the recommendations set forth in the latest edition of BCSI.

(iv)  Trusses are to be stored in flat, level, and dry location. Trusses are to be held off the ground a minimum of 4” and supported evenly.

(v)  All Trusses are to be inspected and examined prior to installation.

a.  All cracks, deformations, separation of joints, bent plates, discoloration, checks, splits, degradation, and all other damage are to be documented on the shop drawings and the truss manufacturer is to be notified.

b.  Prior to installation approval from the truss engineer of all noted items is required before installation.

(vi)  Apparent damage to Trusses, if any, shall be reported to Truss Manufacturer and engineer prior to erection.

(vii)  Trusses shall be set and secured level and plumb, and in correct location. Each truss shall be held in correct alignment until specified permanent restraint and bracing is installed.

(viii)  Cutting and altering trusses is not permitted. If alteration is required, approval from the truss manufacturer and engineer is required prior to modification. If any Truss should become broken, damaged, or altered, written concurrence and approval by the Truss Engineer is required.

(ix)  Concentrated loads shall not be placed on top of trusses until all specified restraint and bracing has been installed and decking is permanently nailed in plate. Specifically avoid stacking full bundles of plywood or other concentrated loads on top of trusses.

(x)  Do not place any loads greater than the design values of the trusses on the roof/trusses.

(xi)  It is the responsibility of the Truss Manufacturer to make sure there is several copies of the Truss Shop drawings and installation instructions on site and the erectors have a copy.

a.  If the manufacturer hasn’t supplied the truss shop drawings and installation instructions it is the responsibility of the truss installer to obtain copies of both documents.

(xii)  It is the responsibility of the truss installer and manufacturer to review all structural and architect’s drawings/details prior to manufacturing along with installation.
a. Deviations from the construction documents or shop drawings is not acceptable unless prior written approval has been received from the Architect and Structural Engineer.

(xiii) Trusses shall be permanently restrained and braced in a manner consistent with good building practices as outlined in BCSI and in accordance with the requirements of the Construction Documents. Trusses shall furthermore be anchored or restrained to prevent out-of-plane movement so as to keep all truss members from simultaneously buckling together in the same direction. Such permanent lateral restraint shall be accomplished by: (a) anchorage to solid end walls; (b) permanent diagonal bracing in the plane of the web members; or (c) other suitable means.

(xiv) Materials used in temporary and permanent restrain and bracing shall be furnished by Contractor.

END OF SECTION 06 17 53
SECTION 06 18 00
GLUED LAMINATED CONSTRUCTION

Part 1. GENERAL

Section 1.01 SUMMARY

A Section Includes:

(i) Structural glued-laminated timber.

(ii) Timber connectors.

(iii) Factory finishing.

Section 1.02 ACTION SUBMITTALS

A None

Section 1.03 DELIVERY, STORAGE, AND HANDLING

A General: Comply with provisions in AITC 111.

B Individually wrap members using plastic-coated paper covering them with water-resistant seams.

Part 2. PRODUCTS

Section 2.01 STRUCTURAL GLUED-LAMINATED TIMBER

A General: Provide structural glued-laminated timber that complies with ANSI A190.1 and ANSI 117 or research/evaluation reports acceptable to authorities having jurisdiction.

(i) Factory mark each piece of structural glued-laminated timber with AITC Quality Mark or APA-EWS trademark. Place mark on surfaces that are not exposed in the completed Work.

(ii) Provide structural glued-laminated timber made with wet-use adhesive complying with ANSI A190.1.

B Species and Grades for Structural Glued-Laminated Timber: Douglas fir-larch that complies with structural properties indicated.

C Species and Grades for Beams:

(i) Species and Beam Stress Classification: As noted in Structural General Notes.

(ii) Lay-up: As noted in Structural General Notes.

D Appearance Grade: Rough Sawn, complying with AITC 110.

Section 2.02 TIMBER CONNECTORS

A Materials: As indicated, in Structural General Notes and Drawings:

B Finish steel assemblies and fasteners with rust-inhibitive primer, 2-mil (0.05-mm) dry film thickness.
C Provide hot-dip galvanized steel assemblies and fasteners that are in contact with concrete.

Section 2.03 MISCELLANEOUS MATERIALS

A End Sealer: Manufacturer's standard, transparent, colorless wood sealer that is effective in retarding the transmission of moisture at cross-grain cuts and is compatible with indicated finish.

B Penetrating Sealer: Manufacturer's standard, transparent, penetrating wood sealer that is compatible with indicated finish.

C Provide pre-finished metal cap with drip edges over butyl sealant on top of all glulam beams on all exterior exposed glulam's.

D Provide pre-finished metal caps on all ends of exterior glulam ends. Provide butyl adhesive between cap and glulam.

E Secure cap from side with colored wood screws matching the cap color.

F Provide bird spikes on top of all beams where birds can roost. Secure with adhesive.

Section 2.04 FABRICATION

A Shop fabricate for connections to the greatest extent possible, including cutting to length and drilling bolt holes.

B Camber: Fabricate horizontal and inclined members of less than 1:1 slope with either circular or parabolic camber equal to 1/500 of span.

C End-Cut Sealing: Immediately after end cutting each member to final length, apply a saturation coat of end sealer to ends and other cross-cut surfaces, keeping surfaces flood coated for not less than 10 minutes.

D Seal Coat: After fabricating, sanding, and end-coat sealing, apply a heavy saturation coat of penetrating sealer on surfaces of each unit.

E Finishing:

(i) All Exposed glulam beams receive solid body stain.

(ii) All interior glulam beams can be left untreated with the factory finish.

(iii) All interior glulam beams are to be left exposed and not wrapped with drywall, unless otherwise noted.

F Install Metal caps on the top of all portions of glulam beams that extend past the building envelopes.

G Install Metal caps covering all glulam beams ends that are exposed to the exterior elements.

Part 3. EXECUTION

Section 3.01 INSTALLATION

A General: Erect structural glued-laminated timber true and plumb and with uniform, close-fitting joints. Provide temporary bracing to maintain lines and levels until permanent supporting members are in place.

(i) Handle and temporarily support glued-laminated timber to prevent surface damage, compression, and other effects that might interfere with the indicated finish.
B Cutting: Avoid extra cutting after fabrication. Where field fitting is unavoidable, comply with requirements for shop fabrication.

C Fit structural glued-laminated timber by cutting and restoring exposed surfaces to match specified surfacing.

(i) Predrill for fasteners using timber connectors as templates.

(ii) Finish exposed surfaces to remove plane or surfacing marks.

(iii) Coat crosscuts with end sealer.

Section 3.02 ADJUSTING

A Repair damaged surfaces after completing erection. Replace damaged structural glued-laminated timber if repairs are not approved by Architect.

Section 3.03 PROTECTION

A Do not remove wrappings on individually wrapped members until they no longer serve a useful purpose, including protection from weather, sunlight, soiling, and damage from work of other trades.

(i) Slit underside of wrapping to prevent accumulation of moisture inside the wrapping.

END OF SECTION 061800
SECTION 06 40 23
INTERIOR ARCHITECTURAL WOODWORK

Part 1. GENERAL

Section 1.01 SUMMARY
A Section Includes:
   (i) Interior standing and running trim.
   (ii) Wood furring, blocking, shims, and hanging strips for installing interior architectural woodwork items that are not concealed within other construction.
   (iii) Shop finishing of interior architectural woodwork.

Section 1.02 ACTION SUBMITTALS
A Samples: For each exposed product and for each shop-applied color and finish specified.

Part 2. PRODUCTS

Section 2.01 ARCHITECTURAL WOODWORK, GENERAL
A Quality Standard: Unless otherwise indicated, comply with the Architectural Woodwork Standards for grades of interior architectural woodwork indicated for construction, finishes, installation, and other requirements.

Section 2.02 INTERIOR STANDING AND RUNNING TRIM FOR TRANSPARENT FINISH
A Wood Trim Picture Rail
   (i) Species and Grade: Birch, Grade A
   (ii) Stain: Semi Transparent
   (iii) Finish: Clear
   (iv) Maximum Moisture Content: 9 percent.
   (v) Finger Jointing: Not allowed.
   (vi) Dimension: 5/8" x 2"
   (vii) Outside Edges: Eased
   (viii) Face Surface: Surfaced (smooth)
   (ix) Matching: Selected for compatible grain and color.
B Backsplash Trim
   (i) Species and Grade: Birch, Grade A
   (ii) Stain: Semi Transparent
(iii) Finish: Clear
(iv) Maximum Moisture Content: 9 percent.
(v) Finger Jointing: Not allowed.
(vi) Dimension: 5/8” x 3 1/2”
(vii) Outside Edges: Eased
(viii) Face Surface: Surfaced (smooth)
(ix) Matching: Selected for compatible grain and color.

C Ceiling Trim at CMU Walls
(i) Species and Grade: MDF (Paint Grade Trim)
(ii) Finish: Painted to match wall color
(iii) Maximum Moisture Content: 9 percent.
(iv) Finger Jointing: allowed
(v) Dimension: 5/8” x 2 1/2”
(vi) Outside Edges: Eased
(vii) Face Surface: Surfaced (smooth)

Section 2.03 MISCELLANEOUS MATERIALS

A Furring, Blocking, Shims, and Nailers: Softwood lumber, kiln-dried to less than 15 percent moisture content.

B Kiln-dry lumber after treatment to a maximum moisture content of 19 percent, unless specified otherwise.

Section 2.04 FABRICATION

A Fabricate interior architectural woodwork to dimensions, profiles, and details indicated.

(i) Ease edges to radius indicated for the following:

(ii) Edges of Solid-Wood (Lumber) Members: 1/16 inch (1.5 mm) unless otherwise indicated.

(iii) Edges of Rails and Similar Members More Than 3/4 Inch (19 mm) Thick: 1/8 inch (3 mm).

B Complete fabrication, including assembly, to maximum extent possible before shipment to Project site.

(i) Disassemble components only as necessary for shipment and installation.

(ii) Where necessary for fitting at site, provide allowance for scribing, trimming, and fitting.

(iii) Trial fit assemblies at fabrication shop that cannot be shipped completely assembled.

(iv) Install dowels, screws, bolted connectors, and other fastening devices that can be removed after trial fitting.
(v) Verify that parts fit as intended, and check measurements of assemblies against field measurements indicated on approved Shop Drawings before disassembling for shipment.

Section 2.05 SHOP FINISHING

A Finish interior architectural woodwork with semitransparent finish at fabrication shop, except paint grade trim. Defer only final touchup, cleaning, and polishing until after installation.

B Preparation for Finishing: Comply with Architectural Woodwork Standards, Section 5 for sanding, filling countersunk fasteners, sealing concealed surfaces, and similar preparations for finishing interior architectural woodwork, as applicable to each unit of work.

(i) Back priming or back sealing: Apply one coat of sealer or primer or sealer, compatible with finish coats, to concealed surfaces of interior architectural woodwork. Apply two coats to end-grain surfaces.

Section 2.06 FIELD PAINTING

A Paint all paint grade ceiling to wall trim to match wall color. Caulk all nail holes prior to painting.

Part 3. EXECUTION

Section 3.01 PREPARATION

A Before installation, condition interior architectural woodwork to humidity conditions in installation areas for not less than 72 hours prior to beginning of installation.

B Before installing interior architectural woodwork, examine shop-fabricated work for completion and complete work as required, including removal of packing and back priming or back sealing of concealed surfaces.

Section 3.02 INSTALLATION

A Grade: Install interior architectural woodwork to comply with same grade as item to be installed.

B Assemble interior architectural woodwork and complete fabrication at Project site to the extent that it was not completed during shop fabrication.

C Install interior architectural woodwork level, plumb, true in line, and without distortion.

(i) Shim as required with concealed shims.

(ii) Install level and plumb to a tolerance of 1/8 inch in 96 inches (3 mm in 2400 mm).

D Scribe and cut interior architectural woodwork to fit adjoining work, refinish cut surfaces, and repair damaged finish at cuts.

E Preservative-Treated Wood: Where cut or drilled in field, treat cut ends and drilled holes in accordance with AWPA M4.

1) Anchor interior architectural woodwork to anchors or blocking built in or directly attached to substrates.

(ii) Secure with countersunk, concealed fasteners and blind nailing.

(iii) For shop-finished items, use filler matching finish of items being installed.

F Standing and Running Trim:
(i) Install with minimum number of joints possible, using full-length pieces (from maximum length of lumber available) to greatest extent possible.

(ii) Do not use pieces less than 60 inches (1500 mm) long, except where shorter single-length pieces are necessary.

(iii) Scarf running joints and stagger in adjacent and related members.

(iv) Fill gaps, if any, between top of base and wall with plastic wood filler; sand smooth; and finish same as wood base if finished.

(v) Install standing and running trim with no more variation from a straight line than 1/8 inch in 96 inches (3 mm in 2400 mm).

END OF SECTION 064023
SECTION 06 41 16
PLASTIC LAMINATE CLAD ARCHITECTURAL CABINETS

Part 1. GENERAL

Section 1.01 SUMMARY

A Section Includes:
   (i) Plastic-laminate-clad architectural cabinets.
   (ii) Plastic-laminate-clad countertops
   (iii) Cabinet hardware and accessories.
   (iv) Wood furring, blocking, shims, and hanging strips for installing plastic-laminate-clad architectural cabinets that are not concealed within other construction.

Section 1.02 ACTION SUBMITTALS

A Product Data: For each type of product.
B Shop Drawings:
   (i) Include plans, elevations, sections, and attachment details.
C Samples: For each exposed product and for each color and texture specified.

Section 1.03 QUALITY ASSURANCE

A Manufacturer's Qualifications: Employs skilled workers who custom fabricate products similar to those required for this Project and whose products have a record of successful in-service performance.

Section 1.04 FIELD CONDITIONS

A Environmental Limitations without Humidity Control: Do not deliver or install cabinets until building is enclosed, wet-work is complete, and HVAC system is operating and maintaining temperature and relative humidity at levels planned for building occupants during the remainder of the construction period.
B Environmental Limitations with Humidity Control: Do not deliver or install cabinets until building is enclosed, wet-work is complete, and HVAC system is operating and maintaining temperature between 60 and 90 deg F (16 and 32 deg C) and relative humidity between 25 and 55 percent during the remainder of the construction period.

Part 2. PRODUCTS

Section 2.01 MANUFACTURES

A Formica
B Nevamer
C Wilsonart

Section 2.02 PLASTIC-LAMINATE-CLAD ARCHITECTURAL CABINETS

A Quality Standard: Unless otherwise indicated, comply with the Architectural Woodwork Premium Standards for grades of cabinets indicated for construction, finishes, installation, and other requirements.
B Architectural Woodwork Standards Grade: Premium.

C Type of Construction: Frameless.

D Door and Drawer-Front Style: Full overlay.

E High-Pressure Decorative Laminate: NEMA LD 3, grades as indicated or if not indicated, as required by quality standard.

F Laminate Cladding for Exposed Surfaces:
   (i) Horizontal Surfaces: Grade HGS.
   (ii) Postformed Surfaces: Grade HGP.
   (iii) Vertical Surfaces: Grade VGS.
   (iv) Cabinet and Drawer Edges: PVC edge banding, 3.0 mm thick, matching laminate in color, pattern, and finish.
   (v) Pattern Direction: Vertically for drawer fronts, doors, and fixed panels.
   (vi) Cabinet Boxes and Concealed Surfaces: Colored melamine, Architect to determine color from manufacture’s full range.

G Concealed Backs of Panels with Exposed Plastic-Laminate Surfaces: High-pressure decorative laminate, NEMA LD 3, Grade BKL.

H Drawer Construction: Fabricate with exposed fronts fastened to sub front with mounting screws from interior of body.
   (i) Join sub fronts, backs, and sides with glued rabbeted joints supplemented by mechanical fasteners.

I Colors, Patterns, and Finishes:
   1. Basis for Bid: Wilsonart, Landmark Wood, 7981K-12, or equal.

Section 2.03 PLASTIC LAMINATE COUNTERTOPS

A Quality Standard: Unless otherwise indicated, comply with Architectural Woodwork Premium Standards for grades of cabinets indicated for construction, finishes, installation, and other requirements.

B Architectural Woodwork Standards Grade: Premium

C High-Pressure Decorative Laminate: NEMA LD 3.

D Colors, Patterns, and Finishes:
   (i) Basis for Bid: Wilsonart, Salentina Nero, 1864K-55, or equal

E Edge Treatment: Wood Trim – Stained to Match Laminate. Eased Edge on Top ¼” Radius.

F Core Material: Particleboard.

G Counter Thickness including laminate and Particleboard: 1 ½”.

Section 2.04 WOOD MATERIALS

A Wood Products: Provide materials that comply with requirements of referenced quality standard for each type of architectural cabinet and quality grade specified unless otherwise indicated.

   (i) Wood Moisture Content: 4 to 9 percent.
B Composite Wood Products: Provide materials that comply with requirements of referenced quality standard for each type of architectural cabinet and quality grade specified unless otherwise indicated.

(i) Medium-Density Fiberboard (MDF): ANSI A208.2, Grade 130.

(ii) Particleboard (Medium Density): ANSI A208.1, Grade M-2.

Section 2.05 CABINET HARDWARE AND ACCESSORIES

A General: Provide cabinet hardware and accessory materials associated with architectural cabinets.

B Frameless Concealed Hinges (European Type): ANSI/BHMA A156.9, B01602, 135 degrees of opening, self-closing.

C Wire Pulls: Back mounted, solid metal 4 inches (100 mm) long, 5/16 inch (8 mm) in diameter.

D Adjustable Shelf Standards and Supports: ANSI/BHMA A156.9, B04071; with shelf rests, B04081.

E Drawer Slides: ANSI/BHMA A156.9.

(i) Heavy-Duty (Grade 1HD-100 and Grade 1HD-200): Side mount.

a. Type: Full extension.

b. Material: Galvanized steel ball bearing slides.

c. Motion Feature: Soft close dampener.

F Door Locks: ANSI/BHMA A156.11, E07121.

G Drawer Locks: ANSI/BHMA A156.11, E07041.

H Door and Drawer Silencers: ANSI/BHMA A156.16, L03011.

I Grommets for Cable Passage: 2-1/2-inch OD, molded-plastic grommets and matching plastic caps with slot for wire passage.

(i) Color: Black.

(ii) Qty: 5

J Exposed Hardware Finishes: For exposed hardware, provide finish that complies with ANSI/BHMA A156.18 for ANSI/BHMA finish number indicated.

(i) Satin Chromium Plated: ANSI/BHMA 626 for brass or bronze base; ANSI/BHMA 652 for steel base.

K For concealed hardware, provide manufacturer's standard finish that complies with product class requirements in ANSI/BHMA A156.9.

Section 2.06 MISCELLANEOUS MATERIALS

A Furring, Blocking, Shims, and Hanging Strips: Softwood or hardwood lumber, kiln-dried to less than 15 percent moisture content.
B Anchors: Select material, type, size, and finish required for each substrate for secure anchorage. Provide metal expansion sleeves or expansion bolts for post-installed anchors. Use nonferrous-metal or hot-dip galvanized anchors and inserts at inside face of exterior walls and at floors.

Section 2.07 FABRICATION

A 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.

B 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.

C Countertop Fabrication:

(i) Fabricate Countertops to dimensions, profiles, and details indicated. Provide front and end overhang of 1 inch over base cabinets.

(ii) Complete fabrication, including assembly, 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.

a. Notify construction manager seven days in advance of the date and times woodwork fabrication will be complete.

b. 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.

(iii) Shop cut openings to maximum extent possible to receive appliances, plumbing fixtures, electrical work, and similar items. Locate openings accurately and use templates or rough-in diagrams to produce accurately sized and shaped openings. Sand edges of cutouts to remove splinters and burrs.

a. Seal edges of openings in countertops with a coat of varnish.

Part 3. EXECUTION

Section 3.01 INSTALLATION

A Before installation, condition cabinets to humidity conditions in installation areas for not less than 72 hours.

B Architectural Woodwork Standards Grade: Install cabinets to comply with quality standard grade of item to be installed.

C Anchor cabinets to anchors or blocking built in or directly attached to substrates. Secure with wafer-head cabinet installation screws.

D Install cabinets level, plumb, and true in line to a tolerance of 1/8 inch in 96 inches (3 mm in 2400 mm) using concealed shims.

(i) Scribe and cut cabinets to fit adjoining work, refinish cut surfaces, and repair damaged finish at cuts.

(ii) Install cabinets without distortion so doors and drawers fit openings 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.

(iii) Fasten wall cabinets through back, near top and bottom, and at ends not more than 16 inches (400 mm) o.c. with No. 10 wafer-head sheet metal screws through metal backing or metal framing behind wall finish.
Section 3.02 COUNTERTOP INSTALLATION

A PREPARATION

(i) Before installation, condition countertops to average prevailing humidity conditions in installation areas.

(ii) Before installing countertops, examine shop-fabricated work for completion and complete work as required, including removal of packing and back priming/sealing.

B INSTALLATION

(i) Grade: Install countertops to comply with same grade as item to be installed.

(ii) Assemble countertops and complete fabrication at Project site to the extent that it was not completed in the shop.

   a. Seal edges of cutouts by saturating with varnish.

(iii) Field Jointing: Where possible, make in the same manner as shop jointing, using dowels, splines, adhesives, and fasteners recommended by manufacturer. Prepare edges to be joined in shops so Project-site processing of top and edge surfaces is not required. Locate field joints where shown on Shop Drawings.

   a. Secure field joints in plastic laminate countertops with concealed clamping devices located within 6 inches (150 mm) of front and back edges and at intervals not exceeding 24 inches (600 mm). Tighten according to manufacturer’s written instructions to exert a constant, heavy-clamping pressure at joints.

(iv) Install countertops level, plumb, true, and straight. Shim as required with concealed shims. Install level and plumb, true, and straight. Shim as required with concealed shims. Install level and plumb to a tolerance of 1/8 inch in 96 inches.

(v) Scribe and cut countertops to fit adjoining work, refinish cut surfaces, and repair damaged finish at cuts.

(vi) Countertops: Anchor securely by screwing through corner blocks of base cabinets or other supports into underside of countertop.

   a. Install countertops with no more than 1/8 inch in 96 inch sag, bow, or other variation from a straight line.

   b. Secure backsplashes to walls with adhesive.

   c. Seal junctures of tops, splash, and walls with mildew-resistant silicone sealant.

C ADJUSTING AND CLEANING

(i) Repair damaged and defective countertops, where possible, to eliminate functional and visual defects; where not possible to repair, replace woodwork. Adjust joinery for uniform appearance.

(ii) Clean countertops on exposed and semi exposed surfaces. Touch up shop-applied finishes to restore damaged or soiled areas.

END OF SECTION 064116
SECTION 06 61 16
SOLID SURFACE FABRICATIONS

Part 1. GENERAL

Section 1.01 SUMMARY
A Section Includes: Provide solid surfacing fabrications including but not limited to the following:
   (i) Window sills and apron
   (ii) Countertops

Section 1.02 DEFINITIONS
A Solid Surface: Non-porous, homogeneous material in the same composition throughout.

Section 1.03 SUBMITTALS
A Product Data: For each type of process and factory-fabricated product.
B Samples: Submit samples that are 4” x 4” in size, cut sample and seam together for representation of inconspicuous seam.

Section 1.04 CLOSEOUT SUBMITTALS
A Submit manufacturer's care and maintenance data, including repair and cleaning instructions.

Section 1.05 QUALITY ASSURANCE
A Installers: Provide work in this Section by installers with experience in the application of this product, systems, and assemblies.

Section 1.06 DELIVERY, STORAGE, AND HANDLING
A Delivery and Acceptance Requirements: Deliver no components to Project site until areas are ready for installation.
B Storage and Handling Requirements:
   (i) Store components indoors prior to installation.
   (ii) Handle materials to prevent damage to finished surfaces.

Section 1.07 WARRANTY
A Manufacturer Warranty: Provide manufacturer’s standard warranty for material against defects and/or deficiencies in accordance with General Conditions of the Contract. Promptly correct any defects or deficiencies which become apparent within warranty period, to satisfaction of Architect and at no expense to Owner.

Part 2. PRODUCTS

Section 2.01 MANUFACTURERS
A Approved Manufacturer's: Corian, LG HI-MACS, Avonite Surfaces, Wilsonart, Samsung, Formica, Living Stone, or approved equal.

Section 2.02 MATERIALS

A Solid Surface Material.

(i) Non-porous, homogeneous material maintaining the same composition throughout the part with a composition of acrylic polymer, aluminum trihydrate filler and pigment; not coated, laminated or of composite construction.

B Adhesive.

(i) Adhesive for Bonding to Other Products: One component silicone to ASTM C920.

C Colors:

(i) Window Sill and Countertops: Corian, Earth, or Equal

Section 2.03 COMPONENTS

A Window Sills and Aprons: 1/2" thick solid surfacing material, adhesively joined with inconspicuous seams, edge details as indicated on Drawings. Color as noted above.

B Countertops: 1 ½" Finished Edge Thickness, Built-up edge Solid Surface, adhesively joined with inconspicuous seams as indicated on drawings. Color as noted above.

(i) Countertop installed over particleboard or MDF substrate.

Section 2.04 FABRICATION

A Fabricate components in shop to greatest extent practical to sizes and shapes indicated, in accordance with approved Shop Drawings and solid polymer manufacturer requirements. Form joints between components using manufacturer’s standard joint adhesive without conspicuous joints. Provide factory cutouts for plumbing fittings and bath accessories as indicated on Drawings.

B Where indicated, thermoform corners and edges or other objects to shapes and sizes indicated on Drawings, prior to seaming and joining. Cut components larger than finished dimensions and sand edges to remove nicks and scratches. Heat entire component uniformly prior to forming.

C Ensure no blistering, whitening and cracking of components during forming.

D Fabricate joints between components using manufacturer's standard joint adhesive. Ensure joints are inconspicuous in appearance and without voids. Attach 50 mm (2") wide reinforcing strip of solid polymer material under each joint. Reinforcing strip of solid polymer material is not required when using DuPont™ Joint Adhesive 2.0.

E Rout and finish component edges to a smooth, uniform finish. Rout cutouts, then sand edges smooth. Repair or reject defective or inaccurate work.

F Finish: Ensure surfaces have uniform finish.

Part 3. EXECUTION

Section 3.01 EXAMINATION
A Examine substrates and conditions, with fabricator present for compliance with requirements for installation tolerances and other conditions affecting performance of work. Proceed with installation only after unsatisfactory conditions have been corrected.

B Verify actual site dimensions and location of adjacent materials prior to commencing work.

C Notify Architect in writing of any conditions which would be detrimental to installation.

Section 3.02 INSTALLATION

A Install components plumb, level, rigid, scribed to adjacent finishes in accordance with reviewed Shop Drawings and Product installation details.

B Fabricate field joints using manufacturer's recommended adhesive, with joints being inconspicuous in finished work. Exposed joints/seams are not permitted. Keep components and hands clean when making field joints as specified herein. Cut and finish component edges with clean, sharp returns.

C Rout radii and contours to template. Anchor securely to base component or other supports. Align adjacent components and form seams to comply with manufacturer's written recommendations using adhesive in color to match work. Carefully dress joints smooth, remove surface scratches and clean entire surface.

D Seal between wall and components with joint sealant as per manufacture's recommendation.

E Keep components and hands clean during installation. Remove adhesives, sealants and other stains. Ensure components are clean on date of Substantial Completion of the Work.

Section 3.03 REPAIR

A Repair minor imperfections and cracked seams and replace areas of severely damaged surfaces in accordance with manufacturer's “Technical Bulletins”.

Section 3.04 CLEANING

A Remove excess adhesive and sealant from visible surfaces.

B Clean surfaces in accordance with manufacturer’s “Care and Maintenance Instructions”.

Section 3.05 PROTECTION

A Provide protective coverings to prevent physical damage or staining following installation for duration of Project.

B Protect surfaces from damage until date of Substantial Completion of the Work.

END OF SECTION 066116
SECTION 06 64 00
PLASTIC PANELING

Part 1. GENERAL

Section 1.01 SUMMARY
A Section includes plastic sheet paneling.

Section 1.02 ACTION SUBMITTALS
A Product Data: For each type of product.
B Samples: For plastic paneling and trim accessories.

Part 2. PRODUCTS

Section 2.01 PLASTIC SHEET PANELING
   (i) Surface-Burning Characteristics: As follows when tested by a qualified testing agency according to ASTM E84. Identify products with appropriate markings from an applicable testing agency.
   a. Flame-Spread Index: 25 or less.
   b. Smoke-Developed Index: 450 or less.
   c. Nominal Thickness: Not less than 0.09 inch (2.3 mm).
   d. Surface Finish: Pebbled.
   e. Color: Gray

Section 2.02 ACCESSORIES
A Trim Accessories: Manufacturer's standard one-piece vinyl extrusions designed to retain and cover edges of panels. Provide division bars, inside corners, outside corners, and caps as needed to conceal edges.
   (i) Color: Match panels.
B Sealant: Latex sealant recommended by plastic paneling manufacturer.

Part 3. EXECUTION

Section 3.01 PREPARATION
A Clean substrates of substances that could impair adhesive bond, including oil, grease, dirt, and dust.
B Condition panels by unpacking and placing in installation space before installation according to manufacturer's written recommendations.
C Lay out paneling before installing. Locate panel joints to provide equal panels at ends of walls not less than half the width of full panels.

Section 3.02 INSTALLATION
A Install plastic paneling according to manufacturer's written instructions.
B Install panels in a full spread of adhesive.
C Install trim accessories with adhesive.
D Fill grooves in trim accessories with sealant before installing panels, and bed inside corner trim in a bead of sealant.
E Maintain uniform space between panels and wall fixtures. Fill the space with sealant.
F Remove excess sealant and smears as paneling is installed. Clean with solvent recommended by sealant manufacturer and then wipe with clean dry cloths until no residue remains.

END OF SECTION 066400
SECTION 07 11 13
BITUMINOUS DAMPROOFING

Part 1. GENERAL

Section 1.01 SUMMARY

A Section includes:

(i) Cold-applied, emulsified-asphalt damp proofing.

Section 1.02 ACTION SUBMITTALS

A Product Data: For each type of product.

Part 2. PRODUCTS

Section 2.01 PERFORMANCE REQUIREMENTS

A VOC Content: Products shall comply with VOC content limits of authorities having jurisdiction unless otherwise indicated.

Section 2.02 COLD-APPLIED, EMULSIFIED-ASPHALT DAMPROOFING

A Trowel Coats: ASTM D1227, Type II, Class 1.

B Fibered Brush and Spray Coats: ASTM D1227, Type II, Class 1.

C Brush and Spray Coats: ASTM D1227, Type III, Class 1.

Section 2.03 AUXILIARY MATERIALS

A Furnish auxiliary materials recommended in writing by damproofing manufacturer for intended use and compatible with bituminous damproofing.

B Emulsified-Asphalt Primer: ASTM D1227, Type III, Class 1, except diluted with water as recommended in writing by manufacturer.

C Asphalt-Coated Glass Fabric: ASTM D1668/D1668M, Type I.

Part 3. EXECUTION

Section 3.01 APPLICATION, GENERAL

A Comply with manufacturer's written instructions for damproofing application, cure time between coats, and drying time before backfilling unless otherwise indicated.

(i) Apply damproofing to provide continuous plane of protection.

(ii) Apply additional coats if recommended in writing by manufacturer or to achieve a smooth surface and uninterrupted coverage.

B Where damproofing 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 (150 mm) over outside face of footing.
(i) Extend damproofing 12 inches (300 mm) onto intersecting walls and footings, but do not extend onto surfaces exposed to view when Project is completed.

(ii) Install flashings and corner protection stripping at internal and external corners, changes in plane, construction joints, cracks, and where indicated as "reinforced," by embedding an 8-inch- (200-mm-) wide strip of asphalt-coated glass fabric in a heavy coat of damproofing. Damproofing coat for embedding fabric is in addition to other coats required.

Section 3.02 COLD-APPLIED, EMULSIFIED-ASPHALT DAMPROOFING

A Concrete Foundations: Apply two brush or spray coats at not less than 1.5 gal./100 sq. ft. (0.6 L/sq. m) for the first coat and 1 gal./100 sq. ft. (0.4 L/sq. m) for the second coat.

END OF SECTION 071113
SECTION 07 21 00
THERMAL INSULATION

Part 1. GENERAL

Section 1.01 SUMMARY

A Section Includes:

(i) Extruded-Polystyrene Board Insulation.

(ii) Mineral-Fiber Blanket Insulation.

(iii) Polyisocyanurate Rigid Insulation.

Section 1.02 ACTION SUBMITTALS

A Product Data: For the following:

(i) Extruded-Polystyrene Board Insulation.

(ii) Polyisocyanurate (ISO or polyiso) insulation (high Density)

(iii) Mineral-Fiber Blanket Insulation.

Section 1.03 INFORMATIONAL SUBMITTALS

A Installer's Certification: Listing type, manufacturer, and R-value of insulation installed in each element of the building thermal envelope.

(i) Sign, date, and post the certification in a conspicuous location on Project site.

B Product test reports.

C Research reports.

Part 2. PRODUCTS

Section 2.01 EXTRUDED POLYSTYRENE BOARD INSULATION (Below Grade)

A Extruded Polystyrene Board Insulation, Type IV, ASTM C578, Type IV, 25-psi (173-kPa) minimum compressive strength; unfaced.

(i) Flame-Spread Index: Not more than 25 when tested in accordance with ASTM E84.

(ii) Smoke-Developed Index: Not more than 450 when tested in accordance with ASTM E84.

(iii) Fire Propagation Characteristics: Passes NFPA 285 testing as part of an approved assembly.

(iv) Labeling: Provide identification of mark indicating R-value of each piece of insulation 12 inches (305 mm) and wider in width.

Section 2.02 MINERAL-FIBER BLANKET INSULATION (Wall Cavities)
A Mineral-Fiber Blanket Insulation, Unfaced: ASTM C665, Type I (blankets without membrane facing); consisting of fibers; passing ASTM E136 for combustion characteristics.

(i) Flame-Spread Index: Not more than 25 when tested in accordance with ASTM E84.

(ii) Smoke-Developed Index: Not more than 50 when tested in accordance with ASTM E84.

(iii) Labeling: Provide identification of mark indicating R-value of each piece of insulation 12 inches (305 mm) and wider in width.

Section 2.03 POLYISOCYANURATE RIGID INSULATION (Above Sheathing Insulation)

A Compressive Strength: Grade 2 110 psi (min)
B Flexural Strength: 400 psi
C Break Load: 20 lbf
D Tensile Strength: 2000 psf
E Water Absorption: 4.0% vol. Max.
F Water Vapor Transmission: 1.5 perm, max.
G Minimal Thermal Resistance @ 75 +/- 2 Deg. F: (¼” – 1) or (½” -2)

H Labeling: Provide identification mark indicating R-value of each piece of insulation 12 inches and wider in width.

Section 2.04 ACCESSORIES

A Insulation Anchors, Spindles, and Standoffs: As recommended by manufacturer.
B Adhesive for Bonding Insulation: Product compatible with insulation and air and water barrier materials, and with demonstrated capability to bond insulation securely to substrates without damaging insulation and substrates.
C Eave Ventilation Troughs: Preformed, rigid fiberboard or plastic sheets designed and sized to fit between roof framing members and to provide ventilation between insulated attic spaces and vented eaves.

Part 3. EXECUTION

Section 3.01 INSTALLATION, GENERAL

A Comply with insulation manufacturer's written instructions applicable to products and applications.
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 Install insulation with manufacturer's R-value label exposed after insulation is installed.
D Extend insulation to envelop entire area to be insulated. Fit tightly around obstructions and fill voids with insulation. Remove projections that interfere with placement.
E Provide sizes to fit applications and selected from manufacturer's standard thicknesses, widths, and lengths. Apply single layer of insulation units unless multiple layers are otherwise shown or required to make up total thickness or to achieve R-value.
F Maintain minimum 2” ventilation space at eaves for ventilation if applicable.

**Section 3.02 INSTALLATION OF SLAB INSULATION**

A On vertical slab edge and foundation surfaces, set insulation units using manufacturer's recommended adhesive according to manufacturer's written instructions.

(i) If not otherwise indicated, extend insulation a minimum of 24 inches (610 mm) below exterior grade line.

B On horizontal surfaces, loosely lay insulation units according to manufacturer's written instructions. Stagger end joints and tightly abut insulation units.

(i) If not otherwise indicated, extend insulation a minimum of 24 inches (610 mm) in from exterior walls of office spaces.

**Section 3.03 INSTALLATION OF FOUNDATION WALL INSULATION**

A Butt panels together for tight fit.

B Anchor Installation: Install board insulation on concrete substrates by adhesively attached, spindle-type insulation anchors.

C Adhesive Installation: Install with adhesive or press into tacky waterproofing or damp proofing according to manufacturer's written instructions.

**Section 3.04 INSTALLATION OF CAVITY-WALL INSULATION**

A Foam-Plastic Board Insulation: Install pads of adhesive spaced approximately 24 inches (610 mm) o.c. both ways on inside face and as recommended by manufacturer.

(i) Fit courses of insulation between wall ties and other obstructions, with edges butted tightly in both directions, and with faces flush.

(ii) Press units firmly against inside substrates.

B Mineral-Wool Board Insulation: Install insulation fasteners 4 inches (100 mm) from each corner of board insulation, at center of board, and as recommended by manufacturer.

(i) Fit courses of insulation between masonry wall ties and other obstructions, with edges butted tightly in both directions, and with faces flush.

(ii) Press units firmly against inside substrates.

**Section 3.05 INSTALLATION OF INSULATION IN FRAMED CONSTRUCTION**

A Blanket Insulation: Install in cavities formed by framing members according to the following requirements:

(i) 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.

(ii) Place insulation in cavities formed by framing members to produce a friction fit between edges of insulation and adjoining framing members.

(iii) Maintain 3-inch (76-mm) clearance of insulation around recessed lighting fixtures not rated for or protected from contact with insulation.
(iv) For wall cavities where cavity heights exceed 96 inches (2438 mm), support unfaced blankets mechanically and support faced blankets by taping flanges of insulation to flanges of metal studs.

(v) Vapor-Retarder-Faced Blankets: Tape joints and ruptures in vapor-retarder facings and seal each continuous area of insulation to ensure airtight installation.

a. Exterior Walls: Set units with facing placed toward as indicated on Architectural Drawings.

b. Interior Walls: Set units with facing placed as indicated on Architectural Drawings.

B Miscellaneous Voids: Install insulation in miscellaneous voids and cavity spaces where required to prevent gaps in insulation using the following materials:

(i) Glass-Fiber Insulation: Compact to approximately 40 percent of normal maximum volume equaling a density of approximately 2.5 lb/cu. ft. (40 kg/cu. m).

Section 3.06 INSTALLATION OF RIGID ROOF INSTALLATION (Polyiso at Metal Roofing)

A Install Full Ice & Water Shield

B Install Z-Purlins (Furring) directly to roof sheathing, spacing to @ 16" o.c.

C Cut rigid polyiso to fit snug between Z-Girts. All voids to be filled with a compatible low expansion insulation foam filling the void.

(i) Secure foam to rigid insulation with mechanical fasteners. Make sure fasteners don’t impede the installation of the metal roofing.

D Secure concealed fastener metal roof to Z-Girts.

E For installation of polyiso insulation at single ply roofing refer to appropriate single ply roofing specification section.

END OF SECTION 072100
SECTION 07 25 00
WEATHER BARRIERS

Part 1. GENERAL

Section 1.01 SUMMARY

A Section Includes:

(i) Commercial weather barrier assemblies
(ii) Flexible flashing
(iii) Fluid applied flashing
(iv) Weather barrier accessories
(v) Drainage material

Section 1.02 Definitions

A Weather Barrier: A combination of materials and accessories that do the following:

(i) Prevent the accumulation of water as a water-resistive barrier.
(ii) Minimize the air leakage into or out of the building envelope as a continuous air barrier.
(iii) Provide sufficient water vapor transmission to enable drying as a vapor-permeable membrane.

B Water-Resistive Barrier: A combination of materials and accessories that prevent the accumulation of water within the wall assembly per International Building Code Section 1403.2.

C Continuous Air Barrier: The combination of interconnected materials, assemblies, and sealed joints and components of the building envelope that minimize air leakage into or out of the building envelope per ASHRAE 90.1 section 5.4.3.1.

D Vapor Diffusion: A slow movement of individual water vapor molecules from regions of higher to lower water vapor concentration (higher to lower vapor pressure).

E Vapor Permeable Membrane: The property of having a water-vapor permeance rating of 10 perms (575 ng/Pa x s x sq. m) or greater, when tested in accordance with the desiccant method using Procedure A of ASTM E96 per definition in International Building Code. Vapor permeable material permits the passage of moisture vapor through vapor diffusion.

Section 1.03 ACTION SUBMITTALS

A Product Data: For each type of product.

Section 1.04 INFORMATIONAL SUBMITTALS

A Evaluation Reports: For water-resistive barrier and flexible flashing, from ICC-ES.

B Manufacturer’s Instructions: For installation of each product specified.

C Sample Warranty: For manufacturer's warranty.
D Reports: Field Observation and photographs of installation.

Section 1.05 QUALITY ASSURANCE

A Installer Qualifications: A qualified firm that is certified to install the manufacturer’s product.

B Contractor to document the project before and after installation for records of installation of product. Documentation to photographs of all wall surfaces standing 10 to 15 feet from surface.

Section 1.06 DELIVERY, STORAGE, AND HANDLING

A Do not store near heat source or open flame.

B Store product in an enclosed space away from moisture or under tarp set on a pallet.

Section 1.07 WARRANTY

A Manufacturer’s Product and Labor Warranty: Manufacturer agrees to repair and replace weather barrier that fails in materials withing specified period, including removal and replacement of affected construction up to manufacturer’s limits.

(i) Warranty Period: 10 years from date of purchase.

Part 2. PRODUCTS

Section 2.01 MANUFACTURERS

(i) Source limitations: Obtain weather barrier assembly components, including weather barrier flashing from same manufacturer as weather barrier.

Section 2.02 PERFORMANCE REQUIREMENTS

A General Performance: Install weather barrier and accessories shall withstand specified, wind pressures, liquid water penetration, and water vapor pressures without failure due to defective manufacture of products.

Section 2.03 WEATHER BARRIER

A Commercial Building Wrap: ASTM E2357 passed, ABAA (Air Barrier Association of America) evaluated air barrier assembly, and assembly water resistance per ASTM E331; with flame-spread and smoke-developed indexes of less than 25 and 450, respectively, when tested in accordance with ASTM E84; UV stabilized for nine-month exposure; and acceptable to authorities having jurisdiction.

(i) Basis-of-Design Product: Subject to compliance with requirements, provide DuPont de Nemours, Inc.; Tyvek CommercialWrap D or approved equal.

(ii) System Description, Single-Layer Drainable: Single-layer weather barrier with integral drainage, including flashing and sealing of penetrations and seams.

B Drainability:

(i) Air Permeance, Assembly: Not more than 0.04 cfm/sq. ft. at 1.57 lbf/sq. ft. (0.2 L/s x sq. m at 75 PA) when tested in accordance with ASTM E 2357 and evaluated by ABAA.

   a. Water Penetration Resistance, Product: Hydrostatic head resistance greater than 22 inches (55 cm) in accordance with AATCC 127.
(ii) Water Penetration Resistance, Assembly: Assembly wall specimen described in ASTM E2357 to water resistance in accordance with ASTM E331 to 15 lbf/sq. ft. (718 Pa).

a. Water-Vapor Permeance: Not less than 30 perms (1700 ng/Pa x s x sq. m) per ASTM E96/E96M, Water Method (Procedure B).

b.

c. Allowable UV Exposure Time: Not less than 9 months (270 days) when tested in accordance with ASTM G155 (Accelerated Weathering).

d. Flame Propagation Test: Materials and construction shall be as tested in accordance with NFPA 285.


g. Total Heat Release: 1762 Btu/sq. ft. (20 MJ/sq. m)

h. Effective Heat of Combustion: 7744 Btu/lb (18 MJ/kg)

Section 2.04 WEATHER BARRIER FLASHING

A Conformable Weather Barrier Flashing: Composite flashing material composed of micro-creped, polyethylene laminate with a 100 percent butyl-based adhesive layer; AAMA 711 Class A (no primer), Level 3 Thermal exposure, 176 deg F (80 deg C) for seven days.

(i) Basis of Design Product: Subject to compliance with requirements provide DuPont Flex Wrap or approved equal.

a. Conformability: Able to create a seamless sill pan extending up the jambs without cuts, patches, or fasteners.

b. Water Penetration: No leakage at 15 psf per ASTM E331.

c. Low Temperature adhesion: Exceeds minimum value of 1.5 lb/in at 25 degrees F as Class A (without primer use).

d. Adhesion after Water Immersion: Exceeds minimum value of 1.5 lb/in after AAMA 800, Sections 2.4.1.3.1/2.4.1.4.3, Test B.

B Conformable Weather Barrier Flashing for Sealing Penetrations: Composite flashing material composed of micro-creped, polyethylene laminate with a 100 percent butyl-based adhesive layer; AAMA 711 Class A (no primer), Level 3 Thermal exposure, 176 deg F (80 deg C) for seven days.

(i) Basis of Design Product: Subject to compliance with requirements provide DuPont Flex Wrap or approved equal.

a. Conformability: Able to create a seamless sill pan extending up the jambs without cuts, patches, or fasteners.

b. Water Penetration: No leakage at 15 psf per ASTM E331.

c. Low Temperature adhesion: Exceeds minimum value of 1.5 lb/in at 25 degrees F as Class A (without primer use).

d. Adhesion after Water Immersion: Exceeds minimum value of 1.5 lb/in after AAMA 800, Sections 2.4.1.3.1/2.4.1.4.3, Test B.
C Strip Flashing: Composite flashing material composed of spunbonded polyethylene laminate with a 100 percent butyl-based adhesive layer; dual-sided, adhesive layer, AAMA 711 Class A (no primer), Level 3 Thermal exposure, 176 deg F (80 deg C) for seven days.

(i) Basis of Design Product: Subject to compliance with requirements provide DuPont Straight Flash, VersaFlange or approved equal.
   a. Water Penetration: No leakage at 15 psf per ASTM E331.
   b. Low Temperature adhesion: Exceeds minimum value of 1.5 lb/in at 25 degrees F as Class A (without primer use).
   c. Adhesion after Water Immersion: Exceeds minimum value of 1.5 lb/in after AAMA 800, Sections 2.4.1.3.1/2.4.1.4.3, Test B.

Section 2.05 WEATHER BARRIER ACCESSORIES

A Building Wrap Tape: Pressure-sensitive plastic tape recommended by weather barrier manufacturer for sealing joints and penetrations in commercial building wrap.

(i) Basis-of-Design Product: Subject to compliance with requirements, provide DuPont de Nemours, Inc.; Tyvek® Tape or approved equal.

B Fasteners with Self-Gasketing Washers: Commercial building wrap manufacturer’s recommended pneumatically or hand-applied fasteners with 2-inch- (50-mm-) diameter, high-density polyethylene cap washers with UV inhibitors.

(i) Basis-of-Design Product: Subject to compliance with requirements, provide DuPont de Nemours, Inc.; Tyvek® Wrap Caps or comparable product.

C Primer for Flashings: Synthetic rubber-based product; spray applied. Strengthen adhesive bond at low temperature applications between weather products such as self-adhered flashing products, commercial building wraps, and common building sheathing materials.

(i) Peel Adhesion Test: Passes in accordance with ASTM D3330, Test Method F, for the following.
   a. Peel Angles: 0, 25, 72, and 180 degrees.

(ii) Substrates: Concrete masonry units (CMUs), exterior gypsum sheathing, oriented strand board (OSB), aluminum, and vinyl.
   a. Chemical Compatibility: Pass; AAMA 713.
   b. Flame Spread Index: 5; ASTM E84.
   c. Smoke Development Index: 0; ASTM E84.

Part 3. EXECUTION

Section 3.01 EXAMINATION

A Examine substrates, with Installer present, for compliance with requirements.
B Verify that substrate and surface conditions are in accordance with commercial weather barrier manufacturer recommendations prior to installation.

(i) Verify that rough sill framing for doors and windows is sloped downwards towards the exterior and is level across width of the opening.

C Verify that surfaces to receive weather barrier flashing are clean, dry, and free of frost.

D Proceed with installation only after unsatisfactory conditions have been corrected.

Section 3.02 PREPARATION

A Direct water onto an acceptable weather barrier drainage plane with an unobstructed path to exterior of wall.

(i) Provide a drainage path for water intrusion through window and door attachment system that collects at window and door sills and directs water to the exterior or weather barrier.

Section 3.03 COMMERCIAL BUILDING WRAP INSTALLATION

A General: Comply with weather barrier manufacturer's written installation guidelines and warranty requirements.

B Cover exposed exterior surface of sheathing with weather barrier securely fastened to framing immediately after sheathing is installed.

(i) Maintain continuity of air and water barrier assemblies.

(ii) Start weather barrier installation at a building corner, leaving 12 inches (300 mm) of weather barrier extended beyond corner to overlap.

(iii) Install weather barrier horizontally starting at lower portion of wall surface.

(iv) Provide minimum 6 inches (150 mm) overlap at horizontal- and vertical-wrap seams in a shingle manner to maintain continuous downward drainage plane and air and water barrier.

C Seams: Seal seams with building wrap tape per manufacturer's recommended installation instructions.

(i) Shiplap horizontal seams in weather barrier to facilitate proper drainage.

D Fasteners: Use weather barrier manufacturer's recommended fasteners to secure weather barrier and install fasteners according to weather barrier manufacturer's installation guidelines.

(i) Do not use temporary fasteners to permanently attach weather barrier.

(ii) Do not place fasteners with gasketing washers where weather barrier flashing will be installed.

(iii) Install fasteners with gasketing washers through flashing where recommended by manufacturer.

E Openings: Completely cover openings with weather barrier, then cut weather barrier membrane to openings in accordance with weather barrier manufacturer's installation guidelines.

(i) Provide head and jamb flaps and seam overlaps to maintain continuous drainage.

(ii) Repair damage to weather barrier using method recommended by weather barrier manufacturer.

(iii) Install flashing in accordance with weather barrier manufacturer's installation guidelines.
Section 3.04 WEATHER BARRIER FLASHING INSTALLATION

A Installation: Remove wrinkles and bubbles, reposition weather barrier as necessary to produce a uniform, smooth surface.

(i) Ensure that ambient and substrate surface temperatures are acceptable in accordance with manufacturer instructions and recommendations.

(ii) Wipe surfaces to remove moisture, dirt, grease and other debris that could interfere with adhesion.

(iii) Apply weather barrier manufacturer's recommended primer over concrete, masonry, and glass-mat gypsum wall sheathing substrates to receive weather barrier flashing.

(iv) Lap weather barrier flashing a minimum of 2 inches (50 mm) onto weather barrier.

(v) Apply pressure over entire surface using roller or firm hand pressure

B Rough Openings: Shiplap flashing with weather barrier in a shingle manner to maintain a continuous downward drainage plane and air and water barrier in accordance with manufacturer's written instructions.

(i) Apply 9-inch- (230-mm-) wide conformable weather barrier flashing at door and window sills.

(ii) Ensure that sill flashing does not slope to the interior.

(iii) Install backer rod in joint between frame of opening product and flashed rough opening on the interior.

(iv) Apply sealant or closed-cell polyurethane foam insulation around entire opening/fenestration product to create air seal around interior perimeter of window openings in accordance with weather barrier manufacturer's instructions.

(v) Weather barrier flashing selection and application methods are specific to type of opening product and rough opening configuration. When building envelope design requirements exceed ASTM E1677, 65 mph equivalent structural load, and 50 mph/6.24 psf equivalent wind-driven rainwater infiltration resistance, use DuPont's butyl-based "StraightFlash" and wrap cap screws in subparagraphs below.

(vi) Around door and window openings, apply butyl-based flashing to flaps of weather barrier.

(vii) Use strip flashing with wrap cap screws to secure head flap of the windows.

C Penetrations: Apply weather barrier manufacturer's recommended weather barrier flashing patches behind fastening plates, such as brick-tie base plates, metal-flashing clips, and metal channels.

(i) Seal weather barrier around each penetration with weather barrier manufacturer's recommended self-adhered flashing product or sealant. Integrate products with flanges into the weather barrier.

D Terminations: Provide minimum 2 inches (50 mm) overlap using strip flashing on adjoining roof and base of wall systems to maintain continuous downward drainage plane.

(i) Secure weather barrier with fasteners and weather barrier flashing.

Section 3.05 DRAINAGE MATERIAL INSTALLATION

A Install drainage material with grooves or channels running vertically in compliance with manufacturer’s written instructions.

Section 3.06 CLEANING
A Immediately remove release paper and scrap from work area and dispose of material in accordance with requirements of per the local jurisdiction.

Section 3.07 PROTECTION

A Protect installed weather barrier from the following:

(i) Damage from cladding, structure, or a component of the structure (for example, window, door, or wall system).

(ii) Contamination from building site chemicals, premature deterioration of building materials, or nonstandard use or application of products.

(iii) Foreign objects or agents, including the use of materials incompatible with weather barrier products.

(iv) UV exposure in excess of products' stated limits.

END OF SECTION 072500
SECTION 07 41 13.19
CONCEALED FASTENER METAL ROOFING

Part 1. GENERAL

Section 1.01 SUMMARY

A Section Includes:

(i) Batten-seam metal roof panels.

Section 1.02 ACTION SUBMITTALS

A Product Data: For each type of product.

(i) Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for each type of panel and accessory.

B Samples: For each type of metal panel colors as indicated.

Section 1.03 CLOSEOUT SUBMITTALS

A Maintenance data.

B Manufacturer’s standard warranty data.

Part 2. PRODUCTS

Section 2.01 CONCEALED FASTENER METAL ROOF PANELS

A Provide factory-formed metal roof panel assembly designed to be installed by covering vertical side edges of adjacent panels with battens and mechanically attaching panels to supports using concealed clips. Include battens and accessories required for weathertight installation.

B Manufacturer: Miramac Metals, Inc. or approved equal.

C Model: Concealed Fastener Metal Roofing – GR80 Snap Lock

D Color: Copper Penny (14)

E Description: 16” Wide Panel Coverage with snap lock.

Section 2.02 UNDERLAYMENT MATERIALS

A Self-Adhering, High-Temperature Underlayment: Provide self-adhering, cold-applied, sheet underlayment, a minimum of 30 mils (0.76 mm) thick, specifically designed to withstand high metal temperatures beneath metal roofing. Provide primer when recommended by underlayment manufacturer.

(i) Thermal Stability: Stable after testing at 240 deg F (116 deg C); ASTM D1970.

(ii) Low-Temperature Flexibility: Passes after testing at minus 20 deg F (29 deg C); ASTM D1970.

B Synthetic Roofing Underlayment:
Section 2.03 MISCELLANEOUS MATERIALS

A Miscellaneous Metal Sub framing and Furring: ASTM C645; cold-formed, metallic-coated steel sheet, ASTM A653/A653M, G90 (Z275 hot-dip galvanized) coating designation or ASTM A792/A792M, Class AZ50 (Class AZM150) aluminum-zinc-alloy coating designation unless otherwise indicated. Provide manufacturer's standard sections as required for support and alignment of metal panel system to offset the thickness of the polyiso roof insulation.

B Panel Accessories: Provide components required for a complete, weathertight panel system including trim, copings, fascia, Mullions, sills, corner units, clips, flashings, sealants, gaskets, fillers, closure strips, and similar items. Match material and finish of metal panels unless otherwise indicated.

(i) Closures: Provide closures at eaves and ridges, fabricated of same metal as metal panels.

(ii) Backing Plates: Provide metal backing plates at panel end splices, fabricated from material recommended by manufacturer.

(iii) Closure Strips: Closed-cell, expanded, cellular, rubber or crosslinked, polyolefin-foam or closed-cell laminated polyethylene; minimum 1-inch- (25-mm-) thick, flexible closure strips; cut or pre-molded to match metal panel profile. Provide closure strips where indicated or necessary to ensure weathertight construction.

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. 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.

D Panel Sealants: Provide sealant type recommended by manufacturer that are compatible with panel materials, are nonstaining, and do not damage panel finish.

(i) Sealant Tape: Pressure-sensitive, 100 percent solids, gray polyisobutylene compound sealant tape with release-paper backing; 1/2 inch (13 mm) wide and 1/8 inch (3 mm) thick.

(ii) Joint Sealant: ASTM C920; as recommended in writing by metal panel manufacturer.

(iii) Butyl-Rubber-Based, Solvent-Release Sealant: ASTM C1311.

Section 2.04 FABRICATION

1) 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.

Part 3. EXECUTION

Section 3.01 PREPARATION

A Inspect roof sheathing and remove or replace any displacement greater than 1/8". Verify all roof sheathing fasteners are secure and not protruding.

B Sweep all saw dust and debris off the roof plane.

Section 3.02 INSTALLATION OF UNDERLAYMENT
A Self-Adhering Sheet Underlayment: Apply primer if required by manufacturer. Comply with temperature restrictions of underlayment manufacturer for installation.

(i) Apply over the entire roof surface.

B Slip Sheet: Apply slip sheet over underlayment before installing Z-Purlins.

C Flashings: Install flashings to cover underlayment to comply with requirements specified in Section 076200 "Sheet Metal Flashing and Trim."

Section 3.03 INSTALLATION OF METAL Z-PURLIN (FURRING)

A Install Galvanized Z-purlins at 16” O.C. over self-healing adhesive roofing underlayment.

B Adjust spacing of Z-purlins to make efficient use of insulation and properly secure roof metal panels to Z-purlins.

C Make depth of Z-Purlins match depth of specified polyiso roofing insulation +/- 1/16 inch.

D Install 2x Nailers at all perimeter edges. Match depth of rigid insulation.

Section 3.04 INSTALLATION OF POLYISO RIGID INSULATION

A Install polyiso rigid insulation between Z-Purlins. Cut Rigid insulation to create a tight fit between purlins with a tight gap.

B Spray foam with low-expansion foam all voids and gaps to create a continuous section of insulation between Z-purlins.

Section 3.05 INSTALLATION OF SYNTHETIC ROOFING UNDERLAYMENT

A Install synthetic roofing underlayment on top of Z-purlins prior to installation roof panels.

B Lap roofing underlayment minimum of 6 inches. Tape all seams.

C Coordinate all flashing and drip edge installation with roofing underlayment.

D Take care not to puncture the roofing underlayment.

E Install all drip edges and lap roofing underlay over drip edges.

F Install self-adhering flashing tape over all fasteners.

Section 3.06 INSTALLATION OF CONCEALED METAL ROOF PANELS

A Concealed Metal Roof Panel Installation: Install as per manufacturer’s instructions.

B Accessory Installation: Install accessories with positive anchorage to building and weathertight mounting and provide for thermal expansion. Coordinate installation with flashings and other components.

C 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. Install work with laps, joints, and seams that are permanently watertight and weather resistant.

D Any damaged panels to be replaced. Minor scrapes to be coated with finish touch-up. Panels with Major scrapes or defects to be replaced and will not be accepted.
Section 3.07 CLEANING

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 a clean condition during construction.

END OF SECTION 074113.19
SECTION 07 46 19
STEEL SIDING

Part 1. GENERAL

Section 1.01 SUMMARY
A Section includes steel siding and soffit

Section 1.02 ACTION SUBMITTALS
A Product Data: For each type of product.
B Samples: For steel siding including related accessories.

Section 1.03 CLOSEOUT SUBMITTALS
A Maintenance data.
B Manufacture’s standard warranty data.

Part 2. PRODUCTS

Section 2.01 APPROVED MANUFACTURES
A Miramac Metals, Inc, PAC-Clad Peterson, Metal Sales, Taylor Metal Products, or approved equal.

Section 2.02 STEEL SIDING
A SIDING #1
(i) Manufacturer: Miramac or approved equal.
(ii) Model: 10” Legacy Board & Batt’n Panel
(iii) Description: Board & Batten Look siding w/ Concealed Fasteners
(iv) Color: Standard: Light Gray (07)
(v) Installation: Vertical
(vi) Outside Corners: 4” Corner Trim
(vii) Inside Corners: J-Channel
(viii) Door & Window Trim: J-Channel

B SIDING #2
(i) Manufacturer: Miramac or approved equal
(ii) Model: Designer Panel
(iii) Description: ¾” Corrugated Panel
(iv) Color: Standard: Dark Blue (11)
(v) Installation: Horizontal
(vi) Inside Corner: J-Channel
(vii) Door & Window Trim J-Channel

C NON-VENTED SOFFIT
(i) Manufacturer: Miramac
(ii) Model: 12" V-Groove Metal Soffit
(iii) Description: Linear V-Groove Soffit Panel
(iv) Color: Standard: Light Gray (07)
(v) Trim: J-Channel

D ACCESSORIES
(i) Colors of Trim: Match Adjacent Materials
(ii) Provide 6” x 6” Flat Square w/ J-Channel around all outlets, Lights, & hose bibs: Match Siding Color
(iii) Flashing: Provide necessary flashing around, doors, windows, material transitions, and penetrations per industry standard to provide a watertight envelope. Coordinate installation with weather resistant barrier.

E FASTENERS
(i) For fastening to metal, use ribbed bugle-head screws of sufficient length to penetrate a minimum of 1/4 inch (6 mm), or three screw-threads, into substrate.
(ii) For fastening galvanized steel, use hot-dip galvanized-steel fasteners. Where fasteners are exposed to view, use prefinished galvanized-steel fasteners in color to match the item being fastened.

Part 3. EXECUTION

Section 3.01 INSTALLATION

A General: Comply with manufacturer's written installation instructions applicable to products and applications indicated unless more stringent requirements apply.

B Installation of Metal Siding to not take place until weather resistive barrier has been installed per manufacturer instructions.

C Document the weather barrier with photographs prior to installation of metal siding.

D Install roofing & soffit prior to installation of metal roofing.

E Install all Roof to Wall Roofing installation prior to wall panel installation.

F Install all J-molding prior to installation of siding.

G Install Metal siding per manufacturer's instructions.
H  Conceal fasteners where possible. Use color match pop rivets connecting trim pieces.

I  Install joint sealants as recommended by manufacturer’s instructions.

J  Where steel siding contacts dissimilar metals, protect against galvanic action by painting contact surfaces with primer or by applying sealant or tape or installing nonconductive spacers as recommended by manufacturer for this purpose.

Section 3.02 ADJUSTING AND CLEANING

A  Remove damaged, improperly installed, or otherwise defective materials and replace them with new materials complying with specified requirements.

B  Remove protective coatings.

C  Clean finished surfaces according to manufacturer’s written instructions and maintain in a clean condition during construction.

D  Coordinate Metal Siding Cleaning with Conceal Fastener Metal Siding installation. Cleaning of metal siding to not take place until roofing has been cleaned.

E  Cleaning to not take place until the end of the project and all soil has been stabilized and the dust is limited.

F  Roof gutters must be in place.

END OF SECTION 074619
SECTION 07 54 23
THERMOPLASTIC-POLYOLEFIN MEMBRANE ROOFING

Part 1. GENERAL

Section 1.01 SUMMARY

A Section includes:

(i) Thermoplastic Polyolefin (TPO) sheet roofing mechanically fastened to roof deck.

Section 1.02 ACTION SUBMITTALS

A Product Data: For each type of product.

Section 1.03 PRE-INSTALLATION MEETING

A Conduct pre-installation meeting at the project site minimum 30 days before beginning Work of this section.

(i) Required Participants:

a. Owner Representative
b. Architect or Representative
c. Construction Manager as Advisor
d. Roofing Contractor and other installers responsible for adjacent or intersecting work, flashing, copings, utility penetrations, rooftop curbs and equipment.

(ii) Meeting Agenda

a. Installation schedule
b. Installation sequence
c. Preparatory work
d. Protection before, during, and after installation.
e. Installation
f. Terminations
g. Transitions and connections to other work.
h. Transitions and connections to other work.
i. Inspection and testing.
j. Material storage, including roof deck load limitations.

(iii) Document and distribute meeting minutes to participants to record decision affecting installation.

Section 1.04 QUALITY ASSURANCE
A Installer Qualifications:
   (i) Approved by roofing system manufacturer as installer for roofing system with specified warranty.
   (ii) Regularly installs specified products.
   (iii) Installed specified products with satisfactory service on five similar installations for minimum five years.
   (iv) Must employ full-time supervisors experienced installing specified system and able to communicate with installers and construction manager representatives.

Section 1.05 DELIVERY, STORAGE, AND HANDLING

A Deliver products in manufacturer’s original sealed packaging.
B Mark packaging, legibly. Indicate manufacturer’s name or brand, type, and manufacture date.
C Before installation, return or dispose of products within distorted, damaged, or opened packaging.
D Comply with NRCA Manual storage and handing requirements.
E Store products indoors in dry, weathertight facility.
F Store adhesives according to manufacturer’s instructions.
G Protect products from damage during handling and construction operations.
H Products stored on the roof deck must not cause permanent deck deflection.

Section 1.06 FIELD CONDITIONS

A Environment:
   (i) Product Temperature: Minimum 4 degrees C (40 degrees F) for minimum 48 hours before installation.
   (ii) Weather Limitations: Install roofing only during dry current and forecasted weather conditions.

Section 1.07 WARRANTY

A Manufacturer’s Warranty: Warrant roofing system against material and manufacturing defects and agree to repair any leak caused by a defect in the roofing system materials or workmanship of the installer.
   (i) Warranty Period: 10 years.

Section 1.08 CLOSEOUT SUBMITTALS

A Maintenance data.

Part 2. PRODUCTS

Section 2.01 SYSTEM DESCRIPTION

A Roofing System: Thermoplastic Polyolefin (TPO) sheet roofing mechanically fastened to roof deck.

Section 2.02 SYSTEM PERFORMANCE
A Design roofing system complying with specified performance:

(i) Load Resistance: ASCE/SE 7; Design Criteria: as indicated on drawings and structural general notes.

(ii) Adhere to all requirements stated in the International Building Code for performance.

B Energy Performance:

(i) ASTM E1980; Minimum 78 solar reflectance index (SRI).

Section 2.03 GENERAL

A Provide roof system components from one manufacturer.

Section 2.04 ROOFING MEMBRANE

A TPO sheet: ASTM D6878/D6878, internally fabric or scrim reinforced, 1.5 mm (60 mils) thick with fabric backing.

Section 2.05 MEMBRANE ACCESSORY MATERIALS

A Sheet Flashing: Manufacturer’s standard sheet flashing of same material, type, reinforcement, thickness, and color as TPO sheet membrane.

B Factory formed flashings: Inside and outside corners, pipe boots, and other special flashing shapes to minimize field fabrication.

C Bonding Adhesive: Manufacturer’s standard, water based.

D Metal Termination Bars: Manufacturer’s standard, stainless-steel or aluminum, 25 mm by 3mm thick factory drilled for fasteners.

E Battens: Manufacturer’s standard, galvannealed or galvanized steel sheet, 25 mm wide by 1.3 mm thick (1-inch wide by 0.05 inch thick), factory punched for fasteners.

F Fasteners: Manufacturer’s standard coated steel with metal or plastic plates, to suit application.

G Primers, Sealers, T-Joint Covers, Lap Sealants, and Termination Reglets: As specified by roof membrane manufacturer.

H Adhesive and sealant materials recommended by roofing system manufacturer for intended use, identical to materials utilized in approved listed roofing system, and compatible with roofing membrane. 2.6

Section 2.06 WALKWAY PADS

A Manufacturer's standard, slip-resistant rolls, minimum 900 mm (3 feet) wide by 5 mm (3/16 inch) thick.

B Provide 48” around all equipment.

C Provide 36” from all access ladders to equipment.

Section 2.07 PROTECTION ACCESSORIES

A Provide protection in the form of expanded polystyrene (EPS) insulation to protect the roofing during equipment installation.
Section 2.08 INSULATION

A Polyisocyanurate insulation, tapered as required to provide min ¼" per foot roof slope and crickets to roof drains.

Section 2.09 ROOF DRAINS

A Double Drain system as shown on architectural & mechanical plans.

B Piped as shown on plans.

C Provide cows tongue trim at all through wall penetrations.

Part 3. EXECUTION

Section 3.01 EXAMINE

A Examine and verify substrate suitability with roofing Installer and construction manager.

   (i) Verify roof penetrations are complete and secured against movement.

   (ii) Verify roof deck is adequately secured to resist wind uplift.

   (iii) Verify roof deck is clean, dry, and in plane ready to receive roofing system.

B Correct unsatisfactory conditions before beginning roofing work.

Section 3.02 INSTALLATION - GENERAL

A Install products according to manufacturer’s instructions and approved submittal information.

B Comply with NRCA Manual installation requirements.

C Comply with UL 580 and UL 1897 for uplift resistance.

D Do not allow membrane and flashing to contact surfaces contaminated with asphalt, coal tar, oil grease, or other substances incompatible with TPO.

Section 3.03 ROOFING INSTALLATION

A Install the membrane so the sheets run perpendicular to the long dimension of the insulation boards.

B Begin installation at the low point of the roof and work towards the high point. Lap membrane shingled in water flow direction.

C Position the membrane free of buckles and wrinkles.

D Roll membrane out; inspect for defects as membrane is unrolled. Remove defective areas:

   (i) Lap edges and ends of sheets 50 mm (2 inches) or more as recommended by the manufacturer.

   (ii) Heat weld laps. Apply pressure as required. Seam strength of laps as required by ASTM D4434/D4434M.

   (iii) Check seams to ensure continuous adhesion and correct defects.

   (iv) Finish seam edges with beveled bead of lap sealant.
(v) Finish seams same day as membrane is installed.

(vi) Anchor membrane perimeter to roof deck or parapet wall as indicated on drawings.

(vii) Repair areas of welded seams where samples have been taken or marginal welds, bond voids, or skips occurs.

   Repair fish mouths and wrinkles by cutting to lay flat and installing patch over cut area extending 100 mm (4 inches) beyond cut.

E Membrane Perimeter Anchorage:

   (i) 1. Install batten at perimeter of each roof area, curb flashing, expansion joints and similar penetrations on top of roof membrane as indicated on drawings.

   (ii) 2. Mechanically Fastening:

      a. Space fasteners maximum 300 mm (12 inches) on center, starting 25 mm (1 inch) from ends.

      b. When battens are cut, round edges and corners before installing.

      c. After mechanically fastening strip cover and seal strip with a 150 mm (6 inch) wide roof membrane strip; heat weld to roof membrane and seal edges.

      d. At fascia-cants turn roofing membrane down over front edge of the blocking, cant, or nailer. Secure roofing membrane to vertical portion of nailer; or, if required by the membrane manufacturer, with fasteners spaced maximum 150 mm (6 inches) on centers.

      e. At parapet walls intersecting building walls and curbs, secure roofing membrane to structural deck with fasteners 150 mm (6 inches) on centers or as shown in NRCA manual.

F Adhered System:

   (i) Apply bonding adhesive in quantities required by roof membrane manufacturer.

   (ii) Fold sheet back on itself, clean and coat the bottom side of the membrane and the top of substrate with adhesive. Do not coat the lap joint area.

   (iii) After adhesive has set according to adhesive manufacturer's instruction, roll roofing membrane into adhesive minimizing voids and wrinkles.

   (iv) Repeat for other half of sheet.

G Mechanically Fastened System Installation:

   (i) Secure roofing membrane to structural deck with fasteners through battens to achieve specified wind uplift performance. a. Drill pilot holes for fasteners installed into cast-in-place concrete. Drill hole minimum 10 mm (3/8 inch) deeper than fastener penetration.

   (ii) When fasteners are installed within membrane laps, locate battens minimum 13 mm (1/2 inch) from the edge of sheets.

   (iii) Apply lap sealant under battens and anchor to deck while lap sealant is still fluid. Cover fastener head with fastener sealer.

   (iv) Where fasteners are installed over roofing membrane after seams are welded, cover fasteners with minimum 200 mm (8 inch) diameter TPO membrane cap centered over fasteners. Where battens are used cover battens
with minimum 200 mm (8 inch) wide TPO strip cap centered over batten. Splice caps to roofing membrane and finish edges with lap sealant.

**Section 3.04 FLASHING INSTALLATION**

A Install flashings same day as roofing membrane is installed. When flashing cannot be completely installed in one day, complete installation until flashing is water tight and provide temporary covers or seals.

B Flashing Roof Drains

(i) 1. Install roof drain flashing as recommended by roofing membrane manufacturer.
   a. Coordinate to set the metal drain flashing in asphalt roof cement, holding cement back from the edge of the metal flange.
   b. Do not allow the roof cement to come in contact with TPO roofing membrane.
   c. Adhere roofing membrane to metal flashing with bonding adhesive.

(ii) 2. Turn down the metal drain flashing and roofing membrane into drain body. Install clamping ring and strainer.

C Installing Base Flashing and Pipe Flashing

(i) Install flashing sheet to pipes, wall or curbs to minimum 200 mm (8 inches) above roof surfaces and extending roofing manufacturer's standard lap dimension onto roofing membranes.
   a. Adhere flashing with bonding adhesive.
   b. Form inside and outside corners of flashing sheet according to NRCA manual. Form pipe flashing according to NRCA manual.
   c. Lap ends roofing manufacturer's standard dimension.
   d. Heat weld flashing membranes together and flashing membranes to roofing membranes. Finish exposed edges with lap sealant.
   e. Install flashing membranes according to NRCA manual.

(ii) Anchor top of flashing to walls and curbs with fasteners spaced maximum 150 mm (6 inches) on center. Use surface mounted fastening strip with sealant on ducts. Use pipe clamps on pipes or other round penetrations.

(iii) Apply sealant to top edge of flashing.

D Repairs to Membrane and Flashings

(i) Remove sections of roofing membrane or flashing that are creased, wrinkled, or fish mouthed.

(ii) Cover removed areas, cuts and damaged areas with a patch extending 100 mm (4 inches) beyond damaged, cut, or removed area. Heat weld to roofing membrane or flashing sheet. Finish edge of lap with lap sealant.

**Section 3.05 WALKWAY PAD INSTALLATION**

A Heat weld walkway sheet to roofing membrane at edges. Weld area 50 mm (2 inches) wide by the entire length of the walkway sheet.

B Finish edges of laps with lap sealant.
Section 3.06 FIELD QUALITY CONTROL

A Examine and probe roofing membrane and flashing seams in presence of Construction Manager.

(i) Probe seams to detect marginal bonds, voids, skips, and fish mouths.

(ii) Repair fish mouths and wrinkles by cutting to lay flat. Install patch over cut area extending 100 mm (4 inches) beyond cut.

Section 3.07 PROTECTION AND CLEANING

A Remove excessive adhesives before adhesive sets.

B Clean exposed roofing surfaces. Remove contaminates and stains.

C Protect roofing system from traffic and construction operations.

(i) Protect roofing system when used for subsequent work platform, materials storage, or staging.

(ii) Distribute scaffolding loads to exert maximum 50 percent roofing system materials compressive strength.

D B. Loose lay temporary insulation board overlaid with plywood or OSB.

(i) Weight boards to secure against wind uplift.

E C. Remove protective materials immediately before acceptance.

F D. Repair damage.

END OF SECTION 07 54 23
SECTION 07 62 00
SHEET METAL FLASHING AND TRIM

Part 1. GENERAL

Section 1.01 SUMMARY

A Section Includes:
   (i) Formed wall sheet metal fabrications.

Section 1.02 ACTION SUBMITTALS

A Product Data

Section 1.03 CLOSEOUT SUBMITTALS

A Maintenance data.

Section 1.04 QUALITY ASSURANCE

A Fabricator Qualifications: Employs skilled workers who custom fabricate sheet metal flashing and trim similar to that required for this Project and whose products have a record of successful in-service performance.
   (i) For copings and roof edge flashings that are ANSI/SPRI/FM 4435/ES-1 tested shop shall be listed as able to fabricate required details as tested and approved.

Section 1.05 WARRANTY

A Special Warranty on Finishes: Manufacturer agrees to repair finish or replace sheet metal flashing and trim that shows evidence of deterioration of factory-applied finishes within 5 years from substantial completion.

B Exposed Panel Finish: Deterioration includes, but is not limited to, the following:
   (i) Color fading more than 5 Delta E units when tested in accordance with ASTM D2244.
   (ii) Chalking in excess of a No. 8 rating when tested in accordance with ASTM D4214.
   (iii) Cracking, checking, peeling, or failure of paint to adhere to bare metal.

C Finish Warranty Period: 5 years from date of Substantial Completion.

Part 2. PRODUCTS

Section 2.01 PERFORMANCE REQUIREMENTS

A Sheet metal flashing and trim assemblies, including cleats, anchors, and fasteners, 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: Architectural Metal Flashing, Condensation and Air Leakage Control, and Reroofing" 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.

Section 2.02 SHEET METALS

A Protect mechanical and other finishes on exposed surfaces from damage by applying strippable, temporary protective film before shipping.

B Metallic-Coated Steel Sheet: Provide zinc-coated (galvanized) steel sheet in accordance with ASTM A653/A653M, G90 (Z275) coating designation or aluminum-zinc alloy-coated steel sheet in accordance with ASTM A792/A792M, Class AZ50 (Class AZM150) coating designation, Grade 40 (Grade 275); prepainted by coil-coating process to comply with ASTM A755/A755M.

(i) Surface: Smooth and flat.

(ii) Exposed Coil-Coated Finish:

a. Two-Coat Fluoropolymer: AAMA 621. Fluoropolymer finish containing not less than 70 percent polyvinylidene fluoride (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.

C Color:

(i) Roof Parapet Coping / Cap: Black

(ii) Siding Flashing: Match Adjacent Metal Siding

(iii) Flashing: Roof to Membrane Transitions / Flashing: Light Gray

(iv) Metal Roofing to CMU Flashing: Match Roofing Color

(v) Outside Corner Trim: Match Adjacent Siding Color

(vi) Inside Corner Trim: Match Adjacent Siding Color

Section 2.03 UNDERLAYMENT MATERIALS

A Felt: ASTM D226/D226M, Type II (No. 30), asphalt-saturated organic felt; nonperforated.

B Slip Sheet: Rosin-sized building paper, 3 lb/100 sq. ft. (0.16 kg/sq. m) minimum.

C Use underlayment materials where required to provide a weathertight envelop or separated dissimilar metals.

Section 2.04 MISCELLANEOUS MATERIALS

A 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.

(i) General: Blind fasteners or self-drilling screws, gasketed, with hex-washer head.
a. Exposed Fasteners: Heads matching color of sheet metal using plastic caps or factory-applied coating. Provide metal-backed EPDM or PVC sealing washers under heads of exposed fasteners bearing on weather side of metal.

b. Blind Fasteners: High-strength aluminum or stainless steel rivets suitable for metal being fastened.

c. Spikes and Ferrules: Same material as gutter; with spike with ferrule matching internal gutter width.

C Sealant Tape: Pressure-sensitive, 100 percent solids, polyisobutylene compound sealant tape with release-paper backing. Provide permanently elastic, nonsag, nontoxic, nonstaining tape 1/2 inch (13 mm) wide and 1/8 inch (3 mm) thick.

D Elastomeric Sealant: ASTM C920, elastomeric polyurethane 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 C1311, 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 in accordance with ASTM D1187/D1187M.


Section 2.05 FABRICATION, GENERAL

A Custom fabricate sheet metal flashing and trim to comply with details indicated and recommendations in cited sheet metal standard that apply to design, dimensions, geometry, metal thickness, and other characteristics of item required.

(i) Fabricate sheet metal flashing and trim in shop to greatest extent possible.

(ii) 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.

(iii) Verify shapes and dimensions of surfaces to be covered and obtain field measurements for accurate fit before shop fabrication.

(iv) 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.

(v) Conceal fasteners and expansion provisions where possible. Do not use exposed fasteners on faces exposed to view.

B Fabrication Tolerances:

(i) Fabricate sheet metal flashing and trim that is capable of installation to tolerances specified.

C Expansion Provisions: Form metal for thermal expansion of exposed flashing and trim.

(i) Form expansion joints of intermeshing hooked flanges, not less than 1 inch (25 mm) deep, filled with butyl sealant concealed within joints.

D Sealant Joints: Where movable, nonexpansion-type joints are required, form metal in accordance with cited sheet metal standard to provide for proper installation of elastomeric sealant.

E Fabricate cleats and attachment devices from same material as accessory being anchored or from compatible, noncorrosive metal.
Section 2.06 Seams:

A 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.

Section 2.07 LOW-SLOPE ROOF SHEET METAL FABRICATIONS

A Roof Edge Flashing and Fascia Cap: Fabricate in minimum 96-inch- (2400-mm-) long, but not exceeding 12-foot- (3.6-m-) long sections. Furnish with 6-inch- (150-mm-) wide, joint cover plates. Shop fabricate interior and exterior corners.

(i) Fabricate from the following materials:
   d. Aluminum-Zinc Alloy-Coated Steel: 0.028 inch (0.71 mm) thick.

B Base Flashing: Shop fabricate interior and exterior corners. Fabricate from the following materials:

   (i) Aluminum-Zinc Alloy-Coated Steel: 0.028 inch (0.71 mm) thick.

C Counterflashing: Shop fabricate interior and exterior corners. Fabricate from the following materials:

   (i) Aluminum-Zinc Alloy-Coated Steel: 0.022 inch (0.56 mm) thick.

D Roof-Penetration Flashing: Fabricate from the following materials:

   (i) Aluminum-Zinc Alloy-Coated Steel: 0.028 inch (0.71 mm) thick.

Part 3. EXECUTION

Section 3.01 INSTALLATION OF UNDERLAYMENT

A Synthetic Underlayment: Install synthetic underlayment, wrinkle free, in accordance with manufacturers' written instructions, and using adhesive where possible to minimize use of mechanical fasteners under sheet metal.

   (i) Lap horizontal joints not less than 4 inches (100 mm).

   (ii) Lap end joints not less than 12 inches (300 mm).

Section 3.02 INSTALLATION, GENERAL

A Install sheet metal flashing and trim to comply with details indicated and recommendations of cited sheet metal standard that apply to installation characteristics required unless otherwise indicated on Drawings.

   (i) Install fasteners, solder, protective coatings, separators, sealants, and other miscellaneous items as required to complete sheet metal flashing and trim system.

   (ii) Install sheet metal flashing and trim true to line, levels, and slopes. Provide uniform, neat seams with minimum exposure of solder.

   (iii) Anchor sheet metal flashing and trim and other components of the Work securely in place, with provisions for thermal and structural movement.

   (iv) Install sheet metal flashing and trim to fit substrates and to result in watertight performance.
(v) Install continuous cleats with fasteners spaced not more than 12 inches (300 mm) o.c.

(vi) Install exposed sheet metal flashing and trim with limited oil-canning, and free of buckling and tool marks.

(vii) Do not field cut sheet metal flashing and trim by torch.

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.

(i) Coat concealed side of sheet metal flashing and trim with bituminous coating where flashing and trim contact wood, ferrous metal, or cementitious construction.

(ii) Underlayment: Where installing sheet metal flashing and trim directly on cementitious or wood substrates, install underlayment and cover with slip sheet.

C Expansion Provisions: Provide for thermal expansion of exposed flashing and trim.

(i) Space movement joints at maximum of 10 feet (3 m) with no joints within 24 inches (600 mm) of corner or intersection.

(ii) Form expansion joints of intermeshing hooked flanges, not less than 1 inch (25 mm) deep, filled with sealant concealed within joints.

(iii) Use lapped expansion joints only where indicated on Drawings.

D Fasteners: Use fastener sizes that penetrate 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.

   a) Use sealant-filled joints unless otherwise indicated.

   (ii) Form joints to completely conceal sealant.

   (iii) When ambient temperature at time of installation is between 40 and 70 deg F (4 and 21 deg C), set joint members for 50 percent movement each way.

   (iv) Adjust setting proportionately for installation at higher ambient temperatures.

   e. Do not install sealant-type joints at temperatures below 40 deg F (4 deg C).

   f. Prepare joints and apply sealants to comply with requirements in Section 079200 "Joint Sealants."

G Rivets: Rivet joints in uncoated aluminum where necessary for strength.

Section 3.03 INSTALLATION OF WALL FLASHINGS

A Install sheet metal wall flashing to intercept and exclude penetrating moisture in accordance with cited sheet metal standard unless otherwise indicated. Coordinate installation of wall flashing with installation of wall-opening components such as windows, doors, and louvers.
B Opening Flashings in Frame Construction: Install continuous head, sill, jamb, and similar flashings to extend 4 inches (100 mm) beyond wall openings.

C Reglet: Install reglets per Industry Standard for each substrate.

Section 3.04 INSTALLATION TOLERANCES

A Installation Tolerances: Shim and align sheet metal flashing and trim within installed tolerance of 1/4 inch in 20 feet (6 mm in 6 m) on slope and location lines indicated on Drawings and within 1/8-inch (3-mm) offset of adjoining faces and of alignment of matching profiles.

Section 3.05 CLEANING

A Clean exposed metal surfaces of substances that interfere with uniform oxidation and weathering.

B Clean and neutralize flux materials. Clean off excess solder.

C Clean off excess sealants.

Section 3.06 PROTECTION

A Remove temporary protective coverings and strippable films as sheet metal flashing and trim are installed unless otherwise indicated in manufacturer's written installation instructions.

B 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, as determined by Architect.
SECTION 07 92 00
JOINT SEALANTS

Part 1. GENERAL

Section 1.01 SUMMARY

A Section Includes:

(i) Silicone joint sealants.
(ii) Nonstaining silicone joint sealants.
(iii) Urethane joint sealants.
(iv) Immersible joint sealants.
(v) Mildew-resistant joint sealants.
(vi) Latex joint sealants.

Section 1.02 ACTION SUBMITTALS

A Product data.
B Samples: Manufacturer's standard color charts consisting of strips of cured sealants showing the full range of colors available for each product exposed to view.
C Joint-sealant schedule.

Section 1.03 INFORMATIONAL SUBMITTALS

A Sample warranties.

Section 1.04 CLOSEOUT SUBMITTALS

A Warranty Documentation:

(i) Manufacturers' special warranties.
(ii) Installer's special warranties.

Part 2. PRODUCTS

Section 2.01 JOINT SEALANTS, 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 Colors of Exposed Joint Sealants: As selected by Architect from manufacturer's full range.

(i) Match Colors to adjacent materials. If two colors are present on each side of joint, contact architect for color selection.
**Section 2.02 SILICONE JOINT SEALANTS**

A Silicone, S, NS, 100/50, NT: Single-component, nonsag, plus 100 percent and minus 50 percent movement capability, nontraffic-use, neutral-curing silicone joint sealant; ASTM C920, Type S, Grade NS, Class 100/50, Use T, M, and O.

B Silicone, S, NS, 25, NT: Single-component, nonsag, plus 25 percent and minus 25 percent movement capability, nontraffic-use, neutral-curing silicone joint sealant; ASTM C920, Type S, Grade NS, Class 25, Use T, NT, M, G, A, and O.

**Section 2.03 URETHANE JOINT SEALANTS**

A Urethane, S, NS, 25, T, NT: Single-component, nonsag, plus 25 percent and minus 25 percent movement capability, traffic- and nontraffic-use, urethane joint sealant; ASTM C920, Type S, Grade NS, Class 25, Use T, NT, M, G, A, and O.


**Section 2.04 MILDEW-RESISTANT JOINT SEALANTS**

A Mildew-Resistant Joint Sealants: Formulated for prolonged exposure to humidity with fungicide to prevent mold and mildew growth.

B Silicone, Mildew Resistant, Acid Curing, S, NS, 25, NT: Mildew-resistant, single-component, nonsag, plus 25 percent and minus 25 percent movement capability, nontraffic-use, acid-curing silicone joint sealant; ASTM C920, Type S, Grade NS, Class 25, Use NT.

**Section 2.05 LATEX JOINT SEALANTS**

A Acrylic Latex: Acrylic latex or siliconized acrylic latex, ASTM C834, Type OP, Grade NF.

**Section 2.06 JOINT-SEALANT BACKING**

A Sealant Backing Material, General: Nonstaining; compatible with joint substrates, sealants, primers, and other joint fillers; and approved for applications indicated by sealant manufacturer based on field experience and laboratory testing.

B Cylindrical Sealant Backings: ASTM C1330, Type C (closed-cell material with a surface skin), Type O (open-cell material), Type B (bicellular material with a surface skin), or any of the preceding types, as approved in writing by joint-sealant manufacturer for joint application indicated, 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.

**Section 2.07 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

Section 3.01 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:

(i) 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.

(ii) 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. Exterior insulation and finish systems.

(iii) Remove laitance and form-release agents from concrete.

(iv) Clean nonporous joint substrate surfaces with chemical cleaners or other means that do not stain, harm substrates, or leave residues capable of interfering with adhesion of joint sealants. Nonporous joint substrates include the following:
   a. Metal.
   b. Glass.

B Joint Priming: Prime joint substrates where recommended by joint-sealant manufacturer or as indicated by preconstruction joint-sealant-substrate tests or prior experience. Apply primer to comply with joint-sealant manufacturer's written instructions. Confine primers to areas of joint-sealant bond; do not allow spillage or migration onto adjoining surfaces.

C Masking Tape: Use masking tape where required to prevent contact of sealant or primer with adjoining surfaces that otherwise would be permanently stained or damaged by such contact or by cleaning methods required to remove sealant smears. Remove tape immediately after tooling without disturbing joint seal.

Section 3.02 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 C1193 for use of joint sealants as applicable to materials, applications, and conditions indicated.
C Install sealant backings of type 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.

(i) Do not leave gaps between ends of sealant backings.

(ii) Do not stretch, twist, puncture, or tear sealant backings.

(iii) 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:

(i) Place sealants so they directly contact and fully wet joint substrates.

(ii) Completely fill recesses in each joint configuration.

(iii) 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.

(i) Remove excess sealant from surfaces adjacent to joints.

(ii) Use tooling agents that are approved in writing by sealant manufacturer and that do not discolor sealants or adjacent surfaces.

(iii) Provide concave joint profile in accordance with ASTM C1193 unless otherwise indicated.

G 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.

H 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, remove, and repair damaged or deteriorated joint sealants immediately so installations with repaired areas are indistinguishable from original work.

END OF SECTION 079200
SECTION 08 11 13
HOLLOW METAL DOORS AND FRAMES

Part 1. GENERAL

Section 1.01 SUMMARY

A Section includes:

(i) Interior standard steel doors and frames.

(ii) Exterior standard steel doors and frames.

Section 1.02 ACTION SUBMITTALS

A Product Data: For each type of product.

B Shop Drawings: Include the following:

(i) Elevations of each door type.

(ii) Details of doors, including vertical and horizontal-edge details and metal thicknesses.

(iii) Frame details for each frame type, including dimensioned profiles and metal thicknesses.

C Product Schedule: For hollow-metal doors and frames, 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.

Part 2. PRODUCTS

Section 2.01 PERFORMANCE REQUIREMENTS

A Fire-Rated Door Assemblies: Assemblies complying with NFPA 80 that are listed and labeled by a qualified testing agency acceptable to authorities having jurisdiction for fire-protection ratings indicated on Drawings, based on testing at positive pressure in accordance with NFPA 252 or UL 10C.

(i) Smoke- and Draft-Control Door Assemblies: Listed and labeled for smoke and draft control by a qualified testing agency acceptable to authorities having jurisdiction, based on testing in accordance with UL 1784 and installed in compliance with NFPA 105.

(ii) Temperature-Rise Limit: At vertical exit enclosures and exit passageways, provide doors that have a maximum transmitted temperature end point of not more than 450 deg F (250 deg C) above ambient after 30 minutes of standard fire-test exposure.

B Fire-Rated, Borrowed-Lite Assemblies: Assemblies complying with NFPA 80 and listed and labeled by a qualified testing agency acceptable to authorities having jurisdiction, for fire-protection ratings indicated, based on testing in accordance with NFPA 257 or UL 9.

C Thermally Rated Door Assemblies: Provide door assemblies with U-factor of not less than R-8 when tested in accordance with ASTM C518.

Section 2.02 INTERIOR STANDARD STEEL DOORS AND FRAMES
A Construct hollow-metal doors and frames to comply with standards indicated for materials, fabrication, hardware locations, hardware reinforcement, tolerances, and clearances, and as specified.

(i) Manufactures:

B Standard-Duty Doors and Frames: ANSI/SDI A250.8, Level 1; ANSI/SDI A250.4, Level C. At locations indicated in the Door and Frame Schedule.

(i) Doors:
   a. Type: As indicated in the Door and Frame Schedule.
   b. Thickness: 1-3/4 inches (44.5 mm).
   c. Face: Metallic-coated steel sheet, minimum thickness of 0.032 inch (0.8 mm).
   d. Edge Construction: Model 2, Seamless.
   e. Core: Manufacturer’s standard.

(ii) Frames:
   a. Materials: Metallic-coated steel sheet, minimum thickness of 0.042 inch (1.0 mm).
   b. Construction: Full profile welded.

Section 2.03 EXTERIOR STANDARD STEEL DOORS AND FRAMES

A Construct hollow-metal doors and frames to comply with standards indicated for materials, fabrication, hardware locations, hardware reinforcement, tolerances, and clearances, and as specified.

B Extra Heavy-Duty Doors and Frames: ANSI/SDI A250.8, Level 2; ANSI/SDI A250.4, Level A. At locations indicated in the Door and Frame Schedule.

(i) Doors:
   a. Type: As indicated in the Door and Frame Schedule.
   b. Thickness: 1-3/4 inches (44.5 mm).
   c. Face: Metallic-coated steel sheet, minimum thickness of 0.042-inch (1.0 mm), with minimum A40 (ZF120) coating.
   d. Edge Construction: Model 2, Seamless.
   e. Edge Bevel: Provide manufacturer's standard beveled or square edges.
   f. Top Edge Closures: Close the top edges of doors with flush closures of same material as face sheets. Seal joints against water penetration.
   g. Bottom Edges: Close bottom edges of doors where required for attachment of weather stripping with end closures or channels of same material as face sheets. Provide weep-hole openings in bottoms of exterior doors to permit moisture to escape.
h. Core: Polyurethane.

(ii) Frames:

i. Materials: Metallic-coated steel sheet, minimum thickness of 0.053-inch (1.3 mm), with minimum A40 (ZF120) coating.

j. Construction: Full profile welded.

Section 2.04 FRAME ANCHORS

A Jamb Anchors:

(i) Type: Anchors of minimum size and type required by applicable door and frame standard, and suitable for performance level indicated.

(ii) Quantity: Minimum of three anchors per jamb, with one additional anchor for frames with no floor anchor. Provide one additional anchor for each 24 inches (610 mm) of frame height above 7 feet (2.1 m).

(iii) Post installed Expansion Anchor: Minimum 3/8-inch- (9.5-mm-) diameter bolts with expansion shields or inserts, with manufacturer's standard pipe spacer.

B Floor Anchors: Provide floor anchors for each jamb and mullion that extends to the floor.

C Floor Anchors for Concrete Slabs with Underlayment: Adjustable-type anchors with extension clips, allowing not less than 2-inch (51-mm) height adjustment. Terminate bottom of frames at top of underlayment.

D Material: ASTM A879/A879M, Commercial Steel (CS), 04Z (12G) coating designation; mill phosphatized.

(i) For anchors built into exterior walls, steel sheet complying with ASTM A1008/A1008M or ASTM A1011/A1011M; hot-dip galvanized in accordance with ASTM A153/A153M, Class B.

Section 2.05 MATERIALS

A Cold-Rolled Steel Sheet: ASTM A1008/A1008M, Commercial Steel (CS), Type B; suitable for exposed applications.

B Hot-Rolled Steel Sheet: ASTM A1011/A1011M, Commercial Steel (CS), Type B; free of scale, pitting, or surface defects; pickled and oiled.

C Metallic-Coated Steel Sheet: ASTM A653/A653M, Commercial Steel (CS), Type B.

D Inserts, Bolts, and Fasteners: Hot-dip galvanized in accordance with ASTM A153/A153M.

E 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.

F Mineral-Fiber Insulation: ASTM C665, 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 E136 for combustion characteristics.

G Glazing: Comply with requirements in Section 088000 "Glazing."

Section 2.06 FABRICATION
A Door Astragals: Provide overlapping astragal on one leaf of pairs of doors where required by NFPA 80 for fire-performance rating or where indicated. Extend minimum 3/4 inch (19 mm) beyond edge of door on which astragal is mounted or as required to comply with published listing of qualified testing agency.

B Hollow-Metal Frames: Fabricate in one piece except where handling and shipping limitations require multiple sections. Where frames are fabricated in sections, provide alignment plates or angles at each joint, fabricated of metal of same or greater thickness as frames.

(i) Provide countersunk, flat- or oval-head exposed screws and bolts for exposed fasteners unless otherwise indicated.

(ii) Door Silencers: Except on weather-stripped frames, drill stops to receive door silencers as follows. Keep holes clear during construction.
   a. Single-Door Frames: Drill stop in strike jamb to receive three door silencers.
   b. Double-Door Frames: Drill stop in head jamb to receive two door silencers.

C Hardware Preparation: Factory prepared hollow-metal doors and frames to receive templated mortised hardware, and electrical wiring; include cutouts, reinforcement, mortising, drilling, and tapping in accordance with ANSI/SDI A250.6, the Door Hardware Schedule, and templates.

(i) Reinforce doors and frames to receive nontemplated, mortised, and surface-mounted door hardware.

(ii) Comply with BHMA A156.115 for preparing hollow-metal doors and frames for hardware.

D Glazed Lites: Provide stops and moldings around glazed lites where indicated. Form corners of stops and moldings with mitered hairline joints.

(i) Provide stops and moldings flush with face of door, and with beveled stops unless otherwise indicated.

(ii) Multiple Glazed Lites: Provide fixed and removable stops and moldings so that each glazed lite is capable of being removed independently.

(iii) Provide fixed frame moldings on the outside of exterior and on secure side of interior doors and frames. Provide loose stops and moldings on the inside of hollow-metal doors and frames.

(iv) Coordinate rabbet width between fixed and removable stops with glazing and installation types indicated.

(v) Provide stops for installation with countersunk flat- or oval-head machine screws spaced uniformly not more than 9 inches (230 mm) o.c. and not more than 2 inches (51 mm) o.c. from each corner.

Section 2.07 STEEL FINISHES

A Prime Finish: Clean, pretreat, and apply manufacturer's standard primer.

(i) Shop Primer: Manufacturer's standard, fast-curing, lead- and chromate-free primer complying with ANSI/SDI A250.10; recommended by primer manufacturer for substrate; compatible with substrate and field-applied coatings despite prolonged exposure.

Part 3. EXECUTION

Section 3.01 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. Touch up factory-applied finishes where spreaders are removed.

B Drill and tap doors and frames to receive nontemplated, mortised, and surface-mounted door hardware.

Section 3.02 INSTALLATION

A Hollow-Metal Frames: Comply with ANSI/SDI A250.11.

(i) Set frames accurately in position; plumbed, aligned, and braced securely until permanent anchors are set. After wall construction is complete, remove temporary braces without damage to completed Work.
   a. Where frames are fabricated in sections, field splice at approved locations by welding face joint continuously; grind, fill, dress, and make splice smooth, flush, and invisible on exposed faces. Touch-up finishes.
   b. Install frames with removable stops located on secure side of opening.

(ii) Fire-Rated Openings: Install frames in accordance with NFPA 80.

(iii) Floor Anchors: Secure with post installed expansion anchors.
   1) Floor anchors may be set with power-actuated fasteners instead of post installed expansion anchors if so indicated and approved on Shop Drawings.

(iv) Solidly pack mineral-fiber insulation inside frames.

(v) Masonry Walls: Coordinate installation of frames to allow for solidly filling space between frames and masonry with grout or mortar.

(vi) In-Place Concrete or Masonry Construction: Secure frames in place with post installed expansion anchors. Countersink anchors, and fill and make smooth, flush, and invisible on exposed faces.

(vii) Installation Tolerances: Adjust hollow-metal frames to the following tolerances:
   a. Squareness: Plus or minus 1/16 inch (1.6 mm), measured at door rabbet on a line 90 degrees from jamb perpendicular to frame head.
   b. Alignment: Plus or minus 1/16 inch (1.6 mm), measured at jambs on a horizontal line parallel to plane of wall.
   c. Twist: Plus or minus 1/16 inch (1.6 mm), measured at opposite face corners of jambs on parallel lines, and perpendicular to plane of wall.
   d. Plumbness: Plus or minus 1/16 inch (1.6 mm), measured at jambs at floor.

(viii) Hollow-Metal Doors: Fit and adjust hollow-metal doors accurately in frames, within clearances specified below.
   a. Non-Fire-Rated Steel Doors: Comply with ANSI/SDI A250.8 NAAMM-HMMA 841 and NAAMM-HMMA guide specification indicated.
   b. Fire-Rated Doors: Install doors with clearances in accordance with NFPA 80.
   c. Smoke-Control Doors: Install doors in accordance with NFPA 105.

(ix) Glazing: Comply with installation requirements in Section 088000 "Glazing" and with hollow-metal manufacturer's written instructions.
Section 3.03 REPAIR

A  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.

B  Metallic-Coated Surface Touchup: Clean abraded areas and repair with galvanizing repair paint according to manufacturer's written instructions.

C  Touchup Painting: Cleaning and touchup painting of abraded areas of paint are specified in painting Sections.

END OF SECTION 081113
SECTION 08 14 16
FLUSH WOOD DOORS

Part 1. GENERAL

Section 1.01 SUMMARY

A Section Includes:

(i) Five-ply flush, natural birch veneer-faced doors with clear natural finish.

Section 1.02 ACTION SUBMITTALS

A Product Data: For each type of product, including the following:

(i) Door core materials and construction.

(ii) Door edge construction

(iii) Door face type and characteristics.

(iv) Door trim for openings.

(v) Door frame construction.

B Shop Drawings: Indicate location, size, and hand of each door; elevation of each type of door; construction details not covered in Product Data; and the following:

(i) Door schedule indicating door, frame, location, type, size, fire protection rating, and swing.

(ii) Door elevations, dimension and locations of hardware, lite and louver cutouts, and glazing thicknesses.

(iii) Details of frame for each frame type, including dimensions and profile.

(iv) Details of electrical raceway and preparation for electrified hardware, access control systems, and security systems.

(v) Dimensions and locations of blocking for hardware attachment.

(vi) Clearances and undercuts.

(vii) Requirements for veneer matching.

C Samples: Provide samples of door species and finish.

Part 2. PRODUCTS

Section 2.01 PERFORMANCE REQUIREMENTS

A Fire-Rated Wood Door Assemblies: Assemblies complying with NFPA 80 that are listed and labeled by a qualified testing agency acceptable to authorities having jurisdiction, for fire-protection ratings indicated on Drawings, based on testing at positive pressure in accordance.

Section 2.02 FABRICATION
A Factory fit doors to suit frame-opening sizes indicated.
   (i) Comply with clearance requirements of referenced quality standard for fitting unless otherwise indicated.
   (ii) Comply with NFPA 80 requirements for fire-rated doors.

B Factory machine doors for hardware that is not surface applied.
   (i) Locate hardware to comply with DHI-WDHS-3.
   (ii) Comply with final hardware schedules, door frame Shop Drawings, ANSI/BHMA-156.115-W, and hardware templates.
   (iii) Coordinate with hardware mortises in metal frames, to verify dimensions and alignment before factory machining.
   (iv) For doors scheduled to receive electrified locksets, provide factory-installed raceway and wiring to accommodate specified hardware.

C Openings: Factory cut and trim openings through doors.
   (i) Light Openings: Trim openings with moldings of material and profile indicated.
   (ii) Glazing: Factory install glazing in doors indicated to be factory finished. Comply with applicable requirements in Section 088000 “Glazing.”
   (iii) Louvers: Factory install louvers in prepared openings.

Part 3. EXECUTION

Section 3.01 INSTALLATION

A Hardware: For installation, see Architectural Drawings.

B Install doors to comply with manufacturer’s written instructions and referenced quality standard, and as indicated.

C Install frames level, plumb, true, and straight.
   (i) Shim as required with concealed shims. Install level and plumb to a tolerance of 1/8 inch in 96 inches (3.2 mm in 2400 mm).
   (ii) Anchor frames to anchors or blocking built in or directly attached to substrates.
      a. Secure with countersunk, concealed fasteners and blind nailing.
      b. Use fine finishing nails for exposed fastening, countersunk and filled flush with woodwork.
         a) For factory-finished items, use filler matching finish of items being installed.
      c. Install fire-rated doors and frames in accordance with NFPA 80.

D Job-Fitted Doors:
   (i) Align and fit doors in frames with uniform clearances and bevels as indicated below.
      a. Do not trim stiles and rails in excess of limits set by manufacturer or permitted for fire-rated doors.
(ii) Machine doors for hardware.

(iii) Seal edges of doors, edges of cutouts, and mortises after fitting and machining.

(iv) Clearances:
   a. Provide 1/8 inch (3.2 mm) at heads, jambs, and between pairs of doors.
   b. Provide 1/8 inch (3.2 mm) from bottom of door to top of decorative floor finish or covering unless otherwise indicated on Drawings.
   c. Where threshold is shown or scheduled, provide 1/4 inch (6.4 mm) from bottom of door to top of threshold unless otherwise indicated.

(v) Bevel non-fire-rated doors 1/8 inch in 2 inches (3-1/2 degrees) at lock and hinge edges.

(vi) Bevel fire-rated doors 1/8 inch in 2 inches (3-1/2 degrees) at lock edge; trim stiles and rails only to extent permitted by labeling agency.

E Factory-Fitted Doors: Align in frames for uniform clearance at each edge.

F Factory-Finished Doors: Restore finish before installation if fitting or machining is required at Project site.

Section 3.02 ADJUSTING

A Operation: Rehang or replace doors that do not swing or operate freely.

B Finished Doors: Replace doors that are damaged or 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 081416
Part 1. GENERAL

Section 1.01 SUMMARY

A Section includes:

(i) Access panels and frames for walls and ceilings.

(ii) Accessories

Section 1.02 ACTION SUBMITTALS

A Product Data: For each type of product.

B Shop Drawings:

(i) Include details of each frame type, elevation of panel, anchorage and accessory items.

(ii) Schedule showing each type of access panel and frame, locations, sizes, latching or locking provisions, and other data pertinent to installation.

(iii) Indicated installation procedures and accessories required for a complete installation.

Section 1.03 QUALITY ASSURANCE

A Provide access panels and frames produced by a single manufacturer.

B Whenever a fire resistance classification is indicated or needed to provide a ceiling or wall assembly that is fire rated. Provide an access assembly with panel, frame, hinge, and latch with a UL Label on each fire-rated access panel.

(i) It is the responsibility of the contractor if an access panel is needed in a fire rated assembly to coordinate and provide a fire rated access panel in the assembly. Fire rated walls and ceilings are shown in the general information code plans.

Section 1.04 DELIVERY, STORAGE, AND HANDLING

A Deliver products in manufacturer's original sealed packaging.

B Deliver, store, and handle access panels and frames using means and methods that will prevent damage.

Section 1.05 CLOSEOUT SUBMITTALS

A Product Data & Shop Drawings showing locations of access panels.

Part 2. PRODUCTS

Section 2.01 INTERIOR FIRE RATED ACCESS PANELS AND FRAMES

A Style: Fire Rated and insulated flush access panel in masonry.
(i) Frame and Trim: 16 gauge steel with 1 inch flange, and welded-on masonry anchor.

(ii) Panel: Insulated 20 gauge steel with continuous hinge; 2 inch thickness.

(iii) Finish: Painted to match adjacent material.

(iv) Standard Latch / Lock: Universal turn ring and key lock “U”.

(v) General Use: Walls

(vi) Fire Rating: Refer to Code plans.

(vii) Size: Size access panel to provide necessary clearance needed for access.

B Style: Fire Rated and insulated flush access panel in drywall.

(i) Frame and Trim: 16 gauge steel with 1 inch drywall bead which can be taped and mudded for a smooth appearance.

(ii) Panel: Insulated 20 gauge steel with continuous hinge; 2 inch thickness.

(iii) Finish: Painted to match adjacent material.

(iv) Standard Latch / Lock: Universal turn ring and key lock “U”.

(v) General Use: Walls and Ceilings.

(vi) Size: Size access panel to provide necessary clearance needed for access.

(vii) Fire Rating: Refer to Code plans.

C Style: Non-Fire Rated and flush access panel in masonry.

(i) Frame and Trim: 16 gauge steel with 1 inch flange, and welded-on masonry anchor.

(ii) Panel: 20 gauge steel with continuous hinge; 2 inch thickness.

(iii) Finish: Painted to match adjacent material.

(iv) Standard Latch / Lock: Universal turn ring and key lock “U”.

(v) General Use: Walls

(vi) Size: Size access panel to provide necessary clearance needed for access.

D Style: Fire Rated and flush access panel in drywall.

(i) Frame and Trim: 16 gauge steel with 1 inch drywall bead which can be taped and mudded for a smooth appearance.

(ii) Panel: 20 gauge steel with continuous hinge; 2 inch thickness.

(iii) Finish: Painted to match adjacent material.

(iv) Standard Latch / Lock: Universal turn ring and key lock “U”.
(v) General Use: Walls and Ceilings
(vi) Size: Size access panel to provide necessary clearance needed for access.

Section 2.02 FABRICATION
A General: Furnish each access panel assembly manufactured as an integral unit, complete and 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, roller trade names or roughness.
C Panels and Frames: Grind exposed welds smooth and flush with adjacent surfaces. Furnish attachment devices and fasteners of type required to secure access panel and frames to types of supports indicated.
   (i) For concealed flanges with drywall bead, provide edge trim for gypsum board securely attached to perimeter of frames.
   (ii) For concealed flanges with plaster bead for full-bed plaster applications, provide zinc coated expanded metal lath and exposed casing bead welded to perimeter of frames.
   (iii) Provide mounting holes in frames for attachment of units to metal or wood framing.
   (iv) Provide mounting holes in frame for attachment of masonry anchors.
D Latching Mechanisms: Furnish number required to hold panels in flush, smooth plane when closed.
   (i) Provide all necessary tools and keys to open access panels. Two per access panel.

Part 3. EXECUTION
Section 3.01 EXAMINE
A Examine substrates for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
   (i) Notify the Contractor in writing of conditions detrimental to proper and timely completion of the installation.
   (ii) Proceed with installation only after unsatisfactory conditions have been corrected.

Section 3.02 INSTALLATION
A Comply with manufacturer's written instructions for installing access panels and frames.
B Install panels flush with adjacent finish surfaces or recessed to receive finish material.

Section 3.03 PROTECTION AND CLEANING
A Adjust access panels to operate easily without binding. Verify that integral locking/latching devices operate properly.
B Remove panels and frames that are warped, bowed, or otherwise damaged, and replace them with new components.
C On completion of access panel installation, clean interior and exterior surfaces as recommended by manufacturer.

END OF SECTION 08 31 16
SECTION 08 33 00
INSULATED ROLLING SERVICE DOOR

Part 1. GENERAL

Section 1.01 SUMMARY

A Section Includes:

(i) Electric Operated overhead insulated rolling doors (Service Doors)

Section 1.02 SUBMITTALS

A Product Data

B Shop Drawings

(i) Provide shop drawings showing dimensions and installation requirements. Show special condition details and interface with adjacent work.

C Quality Assurance

(i) Provide manufacturer and installer qualifications.

(ii) Provide manufacturer installation instructions.

D Closeout Submittals

(i) Product Data & Shop Drawings

(ii) Operation and Maintenance Manual

Section 1.03 DELIVERY STORAGE AND HANDLING

A Deliver, Store, and install per manufacturers instructions.

Section 1.04 WARRANTY

A Warranty: Two years from date of installation against defects in material and workmanship.

B Maintenance: Supply for owner’s consideration and acceptance of a maintenance service agreement for installed products.

Part 2. PRODUCTS

Section 2.01 MANUFACTURE

A Cornell, Cookson, Cloplay Building Products, or approved equal.

Section 2.02 PRODUCT INFORMATION

A Basis of Design: Cornell Model ESD 20

B Materials:
(i) Curtain:
   a. Slat Material: No. 6F, (Listed Exterior / Interior)
      a) Galvanized Steel: Manufacture recommended gauge based on performance requirements. Minimum 24/24 Gauge, grade 40, ASTM A 653 galvanized steel zinc coating.
   b. Exterior Slat Finish
      b) ASTM A 653 galvanized base coating treated with dual process rinsing agents in preparation for chemical bonding baked-on base coat and gray baked-on polyester enamel finish coat. 2.5-3.5 mil cured film thickness. 2H or better pencil hardness.
   c. Interior Slat Finish
      c) ASTM A 653 galvanized base coating treated with dual process rinsing agents in preparation for chemical bonding baked-on base coat and gray baked-on polyester enamel finish coat. 2.5-3.5 mil cured film thickness 2h or better pencil hardness.

(ii) Endlocks: Fabricate interlocking sections with high strength nylon endlocks on alternate slats each secured with two ¼ inch rivets. Provide windlocks as required to meet specified wind load.
   a. Nylon: Required up to 21 feet width.

(iii) Bottom Bar:
   a. Configuration: Heavy Duty Bottom Bar: 6” x 2” x 3/8” aluminum tubular extrusion configured to withstand 350% more impact than standard bottom bar.
   b. Finish: Exterior & Interior Match Slats

(iv) Guides:
   a. Fabrication: Minimum 3/16 inch structural steel angles. Provide windlock bars of same material when windlocks are required to meet specified wind load. Top of inner and outer guide angles to be flared outwards to form bellmouth for smooth entry of curtain into guides. Provide removable guide stoppers to prevent over travel of curtain and bottom bar.
   b. Top 16 1/2 inch of coil guide angles to be removable for ease of curtain installation and as needed for future service.
   c. Finish: Powder Coated (Stock Color): Zinconium treatment followed by a gray back-on polyester powder coat, minimum 2.5 mils cured film thickness.

(v) Counterbalance Shaft Assembly:
   a. Barrel: Steel pipe capable of supporting curtain load with maximum deflection of 0.03 inches per foot of width.
   b. Spring Balance: Oil-tempered, heat treated steel helical torsion spring assembly designed for proper balance of door to ensure that maximum effort to operate will not exceed 25lbs. Provide wheel for applying and adjusting spring torque.

(vi) Brackets:
   a. Fabricate from minimum 3/16-inch steel plate with permanent lubricated ball or roller bearings at rotating support points to support counterbalance shaft assembly and form end closures.
(vii) Hood:

a. Minimum 24 gauge galvanized steel with reinforced top and bottom edges. Provide minimum ¼ inch steel intermediate support brackets as required to prevent excessive sag.

   a) Finish: Gray baked-on polyester enamel finish coat over galvanized coating.

(viii) Weatherstripping:

a. Bottom Bar:

   a) Bottom Bar, Motor Operated Doors: Sensing/weather edge with neoprene astragal extending full width of door bottom bar.

   b) Guides: Replaceable vinyl strip on guides seal against both side of curtain.

   c) Hood: Neoprene/rayon baffle to impede air flow above coil.

   d) Lintel Seal: Nylon brush seal fitted at door header to impede air flow.

Section 2.03 OPERATION

A Motor:

(i) Standard Use Model SG (Super Duty Gear Head) Operator: The operator must not extend above or below the door coil when mounted front-of coil. UL Listed. Total enclosed fan cooled gear head operator HP rated as recommended by manufacture. Provide complete with electric motor and factory pre-wired motor control terminal, maintenance free solenoid actuated brake, emergency manual chain hoist and control station. Motor shall be high starting torque, industrial type, with overload protection. Primary speed reduction shall be heavy-duty gears running in grease or oil bath with mechanical braking to hold the door in any position. The emergency manual chain hoist assembly is automatically disengaged when motor is energized. A disconnect chain shall not be required to engage or release the manual chain hoist. Operator drive and door driven sprockets shall be provided with minimum #50 roller chain. Operator shall be capable of driving the door at a speed of up to 9” per second or as recommended for door size. Fully adjustable, driven linear screw type cam limit switch mechanism shall synchronize the operator with the door. The motor shall be removable without affecting the limit switch settings. The electrical contractor shall mount the control station(s) and supply the appropriate disconnect switch, all conduit and wiring per the overhead door wiring instructions.

B Control Station:

(i) Surface Mounted Open/Close/Stop push buttons; NEMA 1

C Control Operation:

(i) 1. Momentary Contact to Close:


   b. SafetyGard UL325 Light Curtain with Dynamic Sequential Blanking: Provide monitored, non-contact light curtain consisting of a transmitter and a receiver to be mounted to the guide assembly of the door in the provided mounting channel, projecting a thru beam across the width of the door for the height of the light curtain (3ft or 6ft depending on opening size of the door). Interruption of beam before door fully closes shall cause door to immediately stop downward travel and reverse direction to the fully opened position.
Section 2.04 ACCESSORIES
   A  None

Part 3.  EXECUTION

Section 3.01 EXAMINATION
   A  Examine substrates upon which work will be installed and verify conditions are in accordance with approved shop drawings.
   B  Coordinate with responsible entity to perform corrective work on unsatisfactory substrates.
   C  Commencement of work by installer is acceptance of substrate.

Section 3.02 INSTALLATION
   A  General: Install door and operating equipment with necessary hardware, anchors, inserts, hangers and supports
   B  Follow manufacturer's installation instructions.

Section 3.03 ADJUSTING
   A  Following completion of installation, including related work by others, lubricate, test, and adjust doors for ease of operation, free from warp, twist, or distortion.

Section 3.04 CLEANING
   A  Clean surfaces soiled by work as recommended by manufacturer.
   B  Remove surplus materials and debris from the site.

Section 3.05 3.5 DEMONSTRATION
   A  Demonstrate proper operation to Owner's Representative.
   B  Instruct Owner's Representative in maintenance procedures.

END OF SECTION 08 33 00
SECTION 08 41 13
ALUMINUM-FRAMED ENTRANCES AND STOREFRONTS

Part 1. GENERAL

A SUMMARY

(i) Section Includes:

a. Aluminum-framed storefront systems.

b. Aluminum-framed entrance door systems.

Section 1.02 ACTION SUBMITTALS

A Product Data: For each type of product.

B Shop Drawings: For aluminum-framed entrances and storefronts. Include plans, elevations, sections, full-size details, and attachments to other work.

(i) Show connection to and continuity with adjacent thermal, weather, air, and vapor barriers.

(ii) Include point-to-point wiring diagrams.

C Entrance Door Hardware Schedule: Prepared by or under supervision of supplier, detailing fabrication and assembly of entrance door hardware, as well as procedures and diagrams.

Section 1.03 CLOSEOUT SUBMITTALS

A Operation and maintenance data.

Section 1.04 QUALITY ASSURANCE

A Qualifications:

(i) Installers: An entity that employs installers and supervisors who are trained and approved by manufacturer and that employs a qualified glazing contractor for this Project who is certified under the North American Contractor Certification Program (NACC) for Architectural Glass & Metal (AG&M) contractors and that employs glazing technicians certified under the Architectural Glass and Metal Technician (AGMT) certification program.

B Product Options: Information on Drawings and in Specifications establishes requirements for aesthetic effects and performance characteristics of assemblies. Aesthetic effects are indicated by dimensions, arrangements, alignment, and profiles of components and assemblies as they relate to sightlines, to one another, and to adjoining construction.

(i) 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.

Section 1.05 WARRANTY

A Special Warranty: Installer 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.

(i) Warranty Period: 1 year from date of Substantial Completion.
Part 2. PRODUCTS

Section 2.01 PERFORMANCE REQUIREMENTS

A Delegated Design: Engage a qualified professional engineer, as defined in Section 014000 “Quality Requirements,” to design aluminum-framed entrances and storefronts.

B 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.

(i) Aluminum-framed entrances and storefronts shall withstand movements of supporting structure, including, but not limited to, twist, column shortening, long-term creep, and deflection from uniformly distributed and concentrated live loads.

(ii) 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.

C Deflection of Framing Members Supporting Glass: At design wind load, as follows:

   a. Deflection Normal to Wall Plane: Limited to 1/175 of clear span for spans of up to 13 feet 6 inches (4.1 m) and to 1/240 of clear span plus 1/4 inch (6.35 mm) for spans greater than 13 feet 6 inches (4.1 m).

   b. Deflection Parallel to Glazing Plane: Limited to amount not exceeding that which reduces glazing bite to less than 75 percent of design dimension and that which reduces edge clearance between framing members and glazing or other fixed components to less than 1/8 inch (3.2 mm)

      a) Operable Units: Provide a minimum 1/16-inch (1.6-mm) clearance between framing members and operable units.

D Structural: Test in accordance with ASTM E330/E330M as follows:

   (i) When tested at positive and negative wind-load design pressures, storefront assemblies, including entrance doors, do not evidence deflection exceeding specified limits.

   (ii) When tested at 150 percent of positive and negative wind-load design pressures, storefront assemblies, including entrance doors and anchorage, do not evidence material failures, structural distress, or permanent deformation of main framing members exceeding 0.2 percent of span.

   (iii) Test Durations: As required by design wind velocity, but not less than [10] <Insert number> seconds.

E Water Penetration under Static Pressure: Test in accordance with ASTM E331 as follows:

   (i) No evidence of water penetration through fixed glazing and framing areas, including entrance doors, when tested in accordance with a minimum static-air-pressure differential of 20 percent of positive wind-load design pressure, but not less than 6.24 lbf/sq. ft. (300 Pa).
F Energy Performance: Certified and labeled by manufacturer for energy performance as follows:

(i) Thermal Transmittance (U-factor):

a. Fixed Glazing and Framing Areas: U-factor for the system of not more than 0.45 Btu/sq. ft. x h x deg F (2.55 W/sq. m x K) as determined in accordance with NFRC 100.

b. Entrance Doors: U-factor of not more than 0.77 Btu/sq. ft. x h x deg F (4.37 W/sq. m x K) as determined in accordance with NFRC 100.

(ii) Solar Heat-Gain Coefficient (SHGC):

a. Fixed Glazing and Framing Areas: SHGC for the system of not more than 0.26 as determined in accordance with NFRC 200.

b. Entrance Doors: SHGC of not more than 0.35 as determined in accordance with NFRC 200.

(iii) Air Leakage:

a. Fixed Glazing and Framing Areas: Air leakage for the system of not more than 0.06 cfm/sq. ft. (0.30 L/s per sq. m) at a static-air-pressure differential of 1.57 lbf/sq. ft. (75 Pa) when tested in accordance with ASTM E283.

b. Entrance Doors: Air leakage of not more than 1.0 cfm/sq. ft. (5.08 L/s per sq. m) at a static-air-pressure differential of 1.57 lbf/sq. ft. (75 Pa).

G Thermal Movements: Allow for thermal movements resulting from ambient and surface temperature changes.

(i) Temperature Change: 120 deg F (67 deg C), ambient; 180 deg F (100 deg C), material surfaces.

Section 2.02 STOREFRONT SYSTEMS

A Exterior Frames: Kawneer 451-T or Approved Equal

B Interior Frames: Kawneer 451 or Approved Equal

C Framing Members: Manufacturer's extruded- or formed-aluminum framing members of thickness required and reinforced as required to support imposed loads.

(i) Exterior Framing Construction: Thermally broken.

a. 2” x 4 ½”

(ii) Interior Vestibule Framing Construction: Nonthermal.

a. 2” x 4 ½”

(iii) Glazing System: Retained mechanically with gaskets on four sides.

(iv) Finish: Anodized

(v) Fabrication Method: Field-fabricated stick system.

(vi) Aluminum: Alloy and temper recommended by manufacturer for type of use and finish indicated.

(vii) Steel Reinforcement: As required by manufacturer.
D Backer Plates: Manufacturer's standard, continuous backer plates for framing members, if not integral, where framing abuts adjacent construction.

E Brackets and Reinforcements: Manufacturer's standard high-strength aluminum with nonstaining, nonferrous shims for aligning system components.

Section 2.03 ENTRANCE DOOR SYSTEMS

A Storefront Door: Kawneer 350 (Medium Stile)
   (i) 3 ½" Vertical, 6 ½" Bottom, 3 ½" Top Rail

B Entrance Doors: Manufacturer's standard glazed entrance doors for manual-swing or automatic operation.
   (i) Door Construction: 1-3/4-inch (44.5-mm) overall thickness, with minimum 0.125-inch- (3.2-mm-) thick, extruded-aluminum tubular rail and stile members. Mechanically fasten corners with reinforcing brackets that are deeply penetrated and fillet welded or that incorporate concealed tie rods.
      a. Thermal Construction: High-performance plastic connectors separate aluminum members exposed to the exterior from members exposed to the interior.
   (ii) Glazing Stops and Gaskets: Square, snap-on, extruded-aluminum stops and preformed gaskets.
      a. Provide nonremovable glazing stops on outside of door.

Section 2.04 ENTRANCE DOOR HARDWARE

A Entrance Door Hardware: Hardware not specified in this Section is specified in Section 087100 "Door Hardware."

B General: Provide entrance door hardware and entrance door hardware sets indicated in door and frame schedule for each entrance door, to comply with requirements in this Section.
   (i) Egress Doors: Not more than 15 lbf (67 N) to release the latch and not more than 30 lbf (133 N) to set the door in motion and not more than 15 lbf (67 N) to open
   (ii) Accessible Interior Doors: Not more than 5 lbf (22.2 N) to fully open door.

C Designations: Requirements for design, grade, function, finish, quantity, size, and other distinctive qualities of each type of entrance door hardware are indicated in Architectural Drawings, Door Schedule. Products are identified by using entrance door hardware designations as follows:

D Pivot Hinges: BHMA A156.4, Grade 1.

E Offset-Pivot Hinges: Provide top, bottom, and intermediate offset pivots at each door leaf.

F Butt Hinges: BHMA A156.1, Grade 1, radius corner.
   (i) Nonremovable Pins: Provide setscrew in hinge barrel that, when tightened into a groove in hinge pin, prevents removal of pin while entrance door is closed.
   (ii) Exterior Hinges: Stainless steel, with stainless steel pin.
   (iii) Quantities:
      a. For doors up to 87 inches (2210 mm) high, provide three hinges per leaf.
H  Mortise Auxiliary Locks: BHMA A156.5, Grade 1.
I  Manual Flush Bolts: BHMA A156.16, Grade 1.
K  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 in accordance with UL 305.

L  Cylinders:
   (i) As specified in Section 087100 “Door Hardware.”
   (ii) BHMA A156.5, Grade 1.
      a. Keying: Master key system. Permanently inscribe each key with a visual key control number and include notation ”DO NOT DUPLICATE”.

M  Strikes: Provide strike with black-plastic dust box for each latch or lock bolt; fabricated for aluminum framing.
N  Operating Trim: BHMA A156.6.
O  Removable Mullions: BHMA A156.3 extruded aluminum.
   (i) When used with panic exit devices, provide keyed removable mullions listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for panic protection, based on testing in accordance with UL 305. Use only mullions that have been tested with exit devices to be used.

P  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.

Q  Concealed Overhead Holders and Stops: BHMA A156.8, Grade 1.
R  Door Stops: BHMA A156.16, Grade 1, floor or wall mounted, as appropriate for door location indicated, with integral rubber bumper.

S  Weather Stripping: Manufacturer's standard replaceable components.
   (i) Compression Type: Made of ASTM D2000 molded neoprene or ASTM D2287 molded PVC.
   (ii) Sliding Type: AAMA 701/702, made of wool, polypropylene, or nylon woven pile with nylon-fabric or aluminum-strip backing.

T  Weather Sweeps: Manufacturer's standard exterior-door bottom sweep with concealed fasteners on mounting strip.

U  Thresholds: BHMA A156.21 raised thresholds beveled with a slope of not more than 1:2, with maximum height of 1/2 inch (12.7 mm).

V  Finger Guards: Manufacturer's standard collapsible neoprene or PVC gasket anchored to frame hinge-jamb at center-pivoted doors.

Section 2.05 GLAZING
A Glazing: Comply with Section 088000 "Glazing."

B Glazing Gaskets: Manufacturer's standard sealed-corner pressure-glazing system of black, resilient elastomeric glazing gaskets, setting blocks, and shims or spacers.

C Glazing Sealants: As recommended by manufacturer.

Section 2.06 MATERIALS

A Sheet and Plate: ASTM B209 (ASTM B209M).

B Extruded Bars, Rods, Profiles, and Tubes: ASTM B221 (ASTM B221M).

C Structural Profiles: ASTM B308/B308M.

D Steel Reinforcement:
   (i) Structural Shapes, Plates, and Bars: ASTM A36/A36M.
   (ii) Cold-Rolled Sheet and Strip: ASTM A1008/A1008M.
   (iii) Hot-Rolled Sheet and Strip: ASTM A1011/A1011M.

E Steel Reinforcement Primer: Manufacturer's standard zinc-rich, corrosion-resistant primer complying with SSPC-PS Guide No. 12.00; applied immediately after surface preparation and pretreatment. Select surface preparation methods in accordance with recommendations in SSPC-SP COM, and prepare surfaces in accordance with applicable SSPC standard.

Section 2.07 FABRICATION

A Form or extrude aluminum shapes before finishing.

B Weld in concealed locations to the 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:
   (i) Profiles that are sharp, straight, and free of defects or deformations.
   (ii) Accurately fitted joints with ends coped or mitered.
   (iii) Physical and thermal isolation of glazing from framing members.
   (iv) Accommodations for thermal and mechanical movements of glazing and framing to maintain required glazing edge clearances.
   (v) Provisions for field replacement of glazing.
   (vi) 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 Entrance Door Frames: Reinforce as required to support loads imposed by door operation and for installing entrance door hardware.

F Entrance Doors: Reinforce doors as required for installing entrance door hardware.
**G** 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.

**H** After fabrication, clearly mark components to identify their locations in Project in accordance with Shop Drawings.

**Section 2.08 ALUMINUM FINISHES**

**A** Clear Anodic Finish: AAMA 611, AA-M12C22A41, Class I, 0.018 mm or thicker.

**Part 3. EXECUTION**

**Section 3.01 INSTALLATION, GENERAL**

**A** Comply with manufacturer's written instructions.

**B** Do not install damaged components.

**C** Fit joints to produce hairline joints free of burrs and distortion.

**D** Rigidly secure nonmovement joints.

**E** Install anchors with separators and isolators to prevent metal corrosion and electrolytic deterioration and to prevent impeding movement of moving joints.

**F** Seal perimeter and other joints watertight unless otherwise indicated.

**G** Metal Protection:

(i) 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.

(ii) Where aluminum is in contact with concrete or masonry, protect against corrosion by painting contact surfaces with bituminous paint.

**H** Set continuous sill members and flashing in full sealant bed, as specified in Section 079200 "Joint Sealants," to produce weathertight installation.

**I** Install joint filler behind sealant as recommended by sealant manufacturer.

**J** Install components plumb and true in alignment with established lines and grades.

**Section 3.02 INSTALLATION OF GLAZING**

**A** Install glazing as specified in Section 088000 "Glazing."

**Section 3.03 INSTALLATION OF ALUMINUM-FRAMED ENTRANCE DOORS**

**A** Install entrance doors to produce smooth operation and tight fit at contact points.

(i) Exterior Doors: Install to produce weathertight enclosure and tight fit at weather stripping.
(ii) Field-Installed Entrance Door Hardware: Install surface-mounted entrance door hardware in accordance with entrance door hardware manufacturers' written instructions using concealed fasteners to the greatest extent possible.

END OF SECTION 084113
SECTION 08 71 00
ALUMINUM-FRAMED ENTRANCES AND STOREFRONTS

Part 1. GENERAL

Section 1.01 SUMMARY
A Section Includes:

(i) Mechanical door hardware for the following:
   a. Swinging doors.

(ii) Cylinders for door hardware specified in other Sections.

Section 1.02 ACTION SUBMITTALS
A Product Data: For each type of product.
B Door hardware schedule.
C Keying schedule.

Section 1.03 CLOSEOUT SUBMITTALS
A Maintenance data.

Section 1.04 QUALITY ASSURANCE
A Installer Qualifications: Supplier of products and an employer of workers trained and approved by product manufacturers and of an Architectural Hardware Consultant who is available during the course of the Work to consult Contractor, Architect, and Owner about door hardware and keying.

Part 2. PRODUCTS

Section 2.01 PERFORMANCE REQUIREMENTS
A Fire-Rated Door Assemblies: Where fire-rated doors are indicated, provide door hardware complying with NFPA 80 that is listed and labeled by a qualified testing agency, for fire-protection ratings indicated, based on testing at positive pressure in accordance with NFPA 252 or UL 10C.

(i) Air Leakage Rate: Maximum air leakage of 0.3 cfm/sq. ft. (3 cu. m per minute/sq. m) < at the tested pressure differential of 0.3-inch wg (75 Pa) of water.

B Means of Egress Doors: Latches do not require more than 15 lbf (67 N) to release the latch. Locks do not require use of a key, tool, or special knowledge for operation.

Section 2.02 HINGES
A Hinges: BHMA A156.1., Stainless Steel,

(i) Stanley, Hager, McKinney

(ii) Non removeable hinge pins for exterior and public interior exposure
(iii) All hinges to be Ball-bearing.

Section 2.03 SELF-CLOSING HINGES AND PIVOTS

A Self-Closing Hinges and Pivots: BHMA A156.17.

Section 2.04 MECHANICAL LOCKS AND LATCHES

A Lock Functions: As indicated in the door hardware schedule.

B Lock Throw: Comply with testing requirements for length of bolts required for labeled fire doors, and as follows:
   (i) Bored Locks: Minimum 1/2-inch (13-mm) latchbolt throw.
   (ii) Mortise Locks: Minimum 3/4-inch (19-mm) latchbolt throw.
   (iii) Deadbolts: Minimum 1-inch (25-mm) bolt throw.

C Lock Backset: 2-3/4 inches (70 mm) unless otherwise indicated.

D 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.
   (i) Bored Locks: BHMA A156.2; Grade 1; Series 4000.
      b. Schlage, Yale, Best

Section 2.05 AUXILIARY LOCKS

A Bored Auxiliary Locks: BHMA A156.36; Grade 1; with strike that suits frame.
   (i) Schlage, Yale, Best

Section 2.06 EXIT LOCKS

A Exit Locks and Alarms: BHMA A156.29, Grade 1.

Section 2.07 MANUAL FLUSH BOLTS

A Manual Flush Bolts: BHMA A156.16; minimum 3/4-inch (19-mm) throw; designed for mortising into door edge.
   (i) Schlage, Yale, Best

Section 2.08 EXIT DEVICES AND AUXILIARY ITEMS

A Exit Devices and Auxiliary Items: BHMA A156.3.

Section 2.09 LOCK CYLINDERS

A Lock Cylinders: Tumbler type, 6 pin, constructed from brass or bronze, stainless steel, or nickel silver. Provide cylinders from same manufacturer of locking devices.

B Standard Lock Cylinders: BHMA A156.5; Grade 1 permanent cores; face finished to match lockset.
(i) Core Type: Removable.

C Construction Master Keys: Provide cylinders with feature that permits voiding of construction keys without cylinder removal. Provide 10 construction master keys.

D Construction Cores: Provide construction cores that are replaceable by permanent cores. Provide 10 construction master keys.

Section 2.10 KEYING

A Keying System: Factory registered, complying with guidelines in BHMA A156.28, appendix. Provide one extra key blank for each lock.

(i) Master Key System: Change keys and a master key operate cylinders.

a. Provide three cylinder change keys and five master keys.

B Provide cylinders for other locking doors that do not require hardware.

Section 2.11 OPERATING TRIM

A Operating Trim: BHMA A156.6; aluminum unless otherwise indicated.

Section 2.12 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 instructions 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.

(i) LCN 4000 Series

Section 2.13 MECHANICAL STOPS AND HOLDERS

A Wall- and Floor-Mounted Stops: BHMA A156.16.

Section 2.14 DOOR GASKETING

A Door Gasketing: BHMA A156.22; with resilient or flexible seal strips that are easily replaceable and readily available from stocks maintained by manufacturer.

B Maximum Air Leakage: When tested in accordance with ASTM E283 with tested pressure differential of 0.3-inch wg (75 Pa), as follows:

(i) Smoke-Rated Gasketing: 0.3 cfm/sq. ft. (3 cu. m per minute/sq. m) of door opening.

(ii) Gasketing on Single Doors: 0.3 cfm/sq. ft. (3 cu. m per minute/sq. m) of door opening.

(iii) Gasketing on Double Doors: 0.50 cfm per ft. (0.000774 cu.) m/s per m) of door opening.

Section 2.15 THRESHOLDS

A Thresholds: BHMA A156.21; fabricated to full width of opening indicated.

Section 2.16 METAL PROTECTIVE TRIM UNITS
A Metal Protective Trim Units: BHMA A156.6; fabricated from 0.050-inch- (1.3-mm-) thick aluminum or stainless steel; with manufacturer's standard machine or self-tapping screw fasteners, brushed finish.

Section 2.17 AUXILIARY DOOR HARDWARE

A Auxiliary Hardware: BHMA A156.16.

Section 2.18 FINISHES

A Provide brushed aluminum or gray finish on all hardware.

Section 2.19 ADA COMPLIANCE

A Adhere to all ADA regulations related to door hardware per ANSI A117.1.

Part 3. EXECUTION

Section 3.01 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.


(ii) Wood Doors: DHI's "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 work. Do not install surface-mounted items until finishes have been completed on substrates involved.

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 (750 mm) of door height, whichever is more stringent, unless other equivalent means of support for door, such as spring hinges or pivots, are provided.

D Intermediate Offset Pivots: Where offset pivots are indicated, provide intermediate offset pivots in quantities indicated in door hardware schedule, but not fewer than one intermediate offset pivot per door and one additional intermediate offset pivot for every 30 inches (750 mm) of door height greater than 90 inches (2286 mm).

E Lock Cylinders: Install construction cores to secure building and areas during construction period.

(i) Replace construction cores with permanent cores as directed by Owner.

(ii) Furnish permanent cores to Owner for installation.

F Provide a Key Cabinet.

(i) Key Control Cabinet: Tag keys and place them on markers and hooks in key control system cabinet, as determined by final keying schedule.

G Thresholds: Set thresholds for exterior doors and other doors indicated in full bed of sealant complying with requirements specified in Section 079200 "Joint Sealants."
(i) All Thresholds to be no greater than ½” from finished surface.

H Stops: Provide floor stops for doors unless wall or other type stops are indicated in door hardware schedule. Do not mount floor stops where they will impede traffic.

I Perimeter Gasketing: Apply to head and jamb, forming seal between door and frame.

(i) Do not notch perimeter gasketing to install other surface-applied hardware.

J Meeting Stile Gasketing: Fasten to meeting stiles, forming seal when doors are closed.

K Door Bottoms: Apply to bottom of door, forming seal with threshold when door is closed.

Section 3.02 ADJUSTING

A 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.

Section 3.03 HARDWARE SCHEDULE

A See Door Schedule in Architectural Drawings.

END OF SECTION 087100
SECTION 08 80 00
GLAZING

Part 1. GENERAL

Section 1.01 SUMMARY

A Section Includes:

(i) Glass products.
(ii) Insulating glass.
(iii) Glazing sealants.
(iv) Glazing tapes.
(v) Miscellaneous glazing materials.
(vi) Mirror.

Section 1.02 COORDINATION

A Coordinate glazing channel dimensions to provide necessary bite on glass, minimum edge and face clearances, and adequate sealant thicknesses, with reasonable tolerances to achieve proper safety margins for glazing retention under each design load case, load case combination, and service condition.

Section 1.03 ACTION SUBMITTALS

A Glass Samples: For each type of glass product other than clear monolithic vision glass; 12 inches (300 mm) square.

Part 2. PRODUCTS

Section 2.01 PERFORMANCE REQUIREMENTS

A Structural Performance: Glazing shall withstand the following design loads within limits and under conditions indicated determined in accordance with the IBC and ASTM E1300:

(i) Design Wind Pressures: As indicated in Structural General Notes.

(ii) Design Snow Loads: As indicated in Structural General Notes.

(iii) Thermal Loads: Design glazing to resist thermal stress breakage induced by differential temperature conditions and limited air circulation within individual glass lites and insulated glazing units.

B Safety Glazing: Where safety glazing is indicated, provide glazing that complies with 16 CFR 1201, Category II.

C Thermal and Optical Performance Properties: Provide glass with performance properties specified, as indicated in manufacturer's published test data, based on procedures indicated below:

(i) U-Factors: Center-of-glazing values, in accordance with NFRC 100 and based on most current non-beta version of LBL's WINDOW computer program, expressed as Btu/sq. ft. x h x deg F (W/sq. m x K).
(ii) SHGC and Visible Transmittance: Center-of-glazing values, in accordance with NFRC 200 and based on most current non-beta version of LBL's WINDOW computer program.

(iii) Visible Reflectance: Center-of-glazing values, in accordance with NFRC 300.

Section 2.02 GLASS PRODUCTS, GENERAL

A Safety Glazing Labeling: Where safety glazing is indicated or required by the international building code, permanently mark glazing with certification label of manufacturer. Label shall indicate manufacturer's name, type of glass, thickness, and safety glazing standard with which glass complies.

B Insulating-Glass Certification Program: Permanently marked either on spacers or on at least one component lite of units with appropriate certification label of the IGCC.

C Thickness: Where glass thickness is indicated, it is a minimum. Provide glass that complies with performance requirements and is not less than thickness indicated.

(i) Strength: Where annealed float glass is indicated, provide annealed float glass, heat-strengthened float glass, or fully tempered float glass. Where heat-strengthened float glass is indicated, provide heat-strengthened float glass or fully tempered float glass. Where fully tempered float glass is indicated, provide fully tempered float glass.

Section 2.03 GLASS PRODUCTS

A Clear Annealed Float Glass: ASTM C1036, Type I, Class 1 (clear), Quality-Q3.

B Clear Heat-Strengthened Float Glass: ASTM C1048, Kind HS (heat strengthened), Type I, Condition A (uncoated) unless otherwise indicated, Type I, Class 1 (clear) as indicated, Quality-Q3.

C Low E Clear Float Glass (Type GL3): Clear float glass Type FG-CF, with low emissivity coating on inner surface. – PPG Solar Ban 60.

(i) U-Value: .29.

(ii) Shading Coefficient: .43

D Ceramic-Coated Vision Glass: ASTM C1048, Condition C, Type I, Class 1 (clear) or Class 2 (tinted) as indicated, Quality-Q3; and complying with Specification No. 95-1-31 in NGA's "Engineering Standards Manual."

Section 2.04 INSULATING GLASS

A Insulating-Glass Units: Factory-assembled units consisting of sealed lites of glass separated by a dehydrated interspace, qualified in accordance with ASTM E2190.

Section 2.05 GLAZING SEALANTS

A General:

(i) 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.

(ii) 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.

B Neutral-Curing Silicone Glazing Sealant, Class 25: Complying with ASTM C920, Type S, Grade NS, Use NT.

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(i) Applications: Single component; chemical or solvent curing; capable of water immersion without loss of properties; non-bleeding, non-staining, cured Shore A hardness of 15 to 25.

a. Color: Match frame color.

Section 2.06 GLAZING TAPES

A Back-Bedding Mastic Glazing Tapes: Preformed, butyl-based, 100 percent solids elastomeric tape; nonstaining and nonmigrating in contact with nonporous surfaces; with or without spacer rod as recommended in writing by tape and glass manufacturers for application indicated; and complying with ASTM C1281 and AAMA 800 for products indicated below:

(i) AAMA 804.3 tape, where indicated.

(ii) AAMA 806.3 tape, for glazing applications in which tape is subject to continuous pressure.

(iii) 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:

(i) AAMA 810.1, Type 1, for glazing applications in which tape acts as primary sealant.

(ii) AAMA 810.1, Type 2, for glazing applications in which tape is used in combination with a full bead of liquid sealant.

Section 2.07 MISCELLANEOUS GLAZING MATERIALS

A Cleaners, Primers, and Sealers: Types recommended by sealant or gasket manufacturer.

B Glazing Splines: ASTM C864, resilient polyvinyl chloride extruded shape to suit glazing channel retaining slot.

(i) Color: Match Window frame color.

C Setting Blocks:

(i) ASTM C864 Neoprene, 80 to 90 Shore A durometer hardness, length of 0.1~ inch for each square foot (25 mm for each square meter) of glazing or minimum 4 inch (100 mm) x width of glazing rabbet space minus 1/16 inch (1.5 mm) x height to suit glazing method and pane weight and area.

D Spacer Shims: ASTM C864, Neoprene, 50 to 60 Shore A durometer hardness, minimum 3 inch (75 mm) long x one half the height of glazing stop x thickness to suit application, self adhesive on one face.

Section 2.08 GLASS SCHEDULE

A See Interior Glazing Details in Architectural Drawings.

(i) Ford Glass

(ii) Guardian Industries, Inc

(iii) Cardinal 1G

(iv) Interpane

(v) Viracon

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(vi) Pilikington LOF
(vii) PPG Industries
(viii) Insulguard corporation

B GL-1 Interior Clear Glazing (Door Relights)
   (i) Heat Strengthened Float Glass
   (ii) 1/4" (6mm) unless otherwise indicated
   (iii) Safety Glazing as required

C GL-2 Exterior Double Paned Low-E Tinted Glass (Exterior Glazing)
   (i) Sealed Double Pane Insulated Glass Unit
   (ii) Tint: Gray

D GL-4 Interior Double Pane Glazing Unit (Interior Doors & Windows, Unless otherwise specified)
   (i) Sealed Double Pane Glass Acoustic Unit
   (ii) Tint: Clear

E GL-3 Plate Glass Mirror
   (i) 1/4" Plate Glass Mirror
   (ii) Trim: Black Full Surround
   (iii) Fully Adhered to Wall Surface

Part 3. EXECUTION

Section 3.01 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 (1270 mm).
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 in accordance with requirements in referenced glazing publications.

Section 3.02 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 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.

F Apply cap bead of elastomeric sealant over exposed edge of tape.

Section 3.03 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 in writing 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 in writing by gasket manufacturer.

E Install gaskets so they protrude past face of glazing stops.

Section 3.04 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.
Section 3.05 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.

   (i) If, despite such protection, contaminating substances do 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.
SECTION 089116
OPERABLE WALL LOUVERS

Part 1. GENERAL

Section 1.01 SUMMARY

A. Section includes mechanical and fixed operable louvers.

Section 1.02 ACTION SUBMITTALS

A Product Data: For each type of product indicated.

(i) For louvers specified to bear AMCA seal, include printed catalog pages showing specified models with appropriate AMCA Certified Ratings Seals.

B Shop Drawings: For louvers and accessories. Include plans, elevations, sections, details, and attachments to other work. Show frame profiles and blade profiles, angles, and spacing.

(i) Wiring Diagrams: For power, signal, and control wiring for motorized operable louvers.

Section 1.03 WARRANTY

1) Special Finish Warranty: Manufacturer agrees to repair or replace components on which finishes fail in materials or workmanship within a 1 year warranty period.

Part 2. PRODUCTS

Section 2.01 PERFORMANCE REQUIREMENT

A Delegated Design: Design louvers, including comprehensive engineering analysis by a qualified professional engineer, using structural performance requirements and design criteria indicated.

B Structural Performance: Louvers shall withstand the effects of gravity loads and the following loads and stresses within limits and under conditions indicated without permanent deformation of louver components, noise or metal fatigue caused by louver-blade rattle or flutter, or permanent damage to fasteners and anchors. Wind pressures to the face of the building shall be considered to act normal.

(i) Wind Loads: Determine loads based on pressures as indicated on Drawings.

C Seismic Performance: As indicated on Drawings.

D Louver Performance Ratings: Provide louvers complying with requirements specified, as demonstrated by testing manufacturer's stock units identical to those provided, except for length and width according to AMCA 500-L.

E UL and NEMA Compliance: Provide motors and related components for motor-operated louvers that are listed and labeled by UL and comply with applicable NEMA standards.

Section 2.02 OPERABLE FORMED-METAL LOUVERS

A Louver Operation: Provide operable louvers with operating mechanisms to suit louver sizes.

(i) Type: As called out in Mechanical Drawings.
(ii) Color: To match the color of the surround finish material that the louver is installed in.

(iii) Motor Operation: As called out in Mechanical Drawings.

Section 2.03 LOUVER SCREENS

A General: Provide screen at each exterior louver.

(i) Screen Location: Interior face unless otherwise indicated.

(ii) Screening Type: Bird and insect screening.

Section 2.04 MATERIALS


(i) Finish Kynar 500 or Baked Enamel: 1.2 mils factory finish

B Fasteners: Use types and sizes to suit unit installation conditions.

(i) Use tamper-resistant screws for exposed fasteners unless otherwise indicated.

(ii) For fastening galvanized steel, use hot-dip-galvanized-steel or 300 series stainless-steel fasteners.

(iii) For color-finished louvers, use fasteners with heads that match color of louvers.

C Post installed Fasteners for Concrete and Masonry: Torque-controlled expansion anchors, fabricated from stainless-steel components, with allowable load or strength design capacities calculated according to ICC-ES AC193 and ACI 318 greater than or equal to the design load, as determined by testing according to ASTM E488/E488M conducted by a qualified testing agency.

D Bituminous Paint: Cold-applied asphalt emulsion complying with ASTM D1187/D1187M.

Section 2.05 FABRICATION

A Fabricate frames, including integral sills, to fit in openings of sizes indicated, with allowances made for fabrication and installation tolerances, adjoining material tolerances, and perimeter sealant joints.

B Join frame members to each other and to fixed louver blades with fillet welds threaded fasteners, or both, as standard with louver manufacturer unless otherwise indicated or size of louver assembly makes bolted connections between frame members necessary.

Section 2.06 STAINLESS-STEEL SHEET FINISHES

A Repair sheet finish by grinding and polishing irregularities, weld spatter, scratches, and forming marks to match surrounding finish.

Part 3. EXECUTION

Section 3.01 INSTALLATION

A Locate and place louvers level, plumb, and at indicated alignment with adjacent work.

B Use concealed anchorages where possible. Provide brass or lead washers fitted to screws where required to protect metal surfaces and to make a weathertight connection.
C Provide perimeter reveals and openings of uniform width for sealants and joint fillers, as indicated.

D Protect unpainted galvanized- and nonferrous-metal surfaces that are in contact with concrete, masonry, or dissimilar metals from corrosion and galvanic action by applying a heavy coating of bituminous paint or by separating surfaces with waterproof gaskets or nonmetallic flashing.

Section 3.02 ADJUSTING

A Test operable louvers and adjust as needed to produce fully functioning units that comply with requirements.

B Restore louvers damaged during installation and construction, so no evidence remains of corrective work. If results of restoration are unsuccessful, as determined by Architect, remove damaged units and replace with new units.

END OF SECTION 089116
SECTION 09 29 00
GYPSUM WALL BOARD

Part 1. GENERAL

Section 1.01 SUMMARY

A Section Includes:

(i) Interior gypsum board.

(ii) Texture finishes.

Part 2. PRODUCTS

Section 2.01 PERFORMANCE REQUIREMENTS

A Fire-Resistance-Rated Assemblies: For fire-resistance-rated assemblies, provide materials and construction identical to those tested in assembly indicated according to ASTM E119 by an independent testing agency.

B STC-Rated Assemblies: For STC-rated assemblies, provide materials and construction identical to those tested in assembly indicated according to ASTM E90 and classified according to ASTM E413 by an independent testing agency.

Section 2.02 GYPSUM BOARD, GENERAL

A Size: Provide maximum lengths and widths available that will minimize joints in each area and that correspond with support system indicated.

Section 2.03 INTERIOR GYPSUM BOARD

A Gypsum Wall Board: ASTM C1396/C1396M

(i) Thickness: 5/8 inch (15.9 mm)

B Gypsum Board, Type X: ASTM C1396/C1396M.

(i) Thickness: 5/8 inch (15.9 mm).

C Gypsum Ceiling Board: ASTM C1396/C1396M.

(i) Thickness: 5/8 inch (15.9 mm).

D Mold-Resistant Gypsum Board: ASTM C1396/C1396M. With moisture- and mold-resistant core and paper surfaces.

(i) Core: 5/8 inch (15.9 mm), Type X.

(ii) Mold Resistance: ASTM D3273, score of 10 as rated according to ASTM D3274.

Section 2.04 TRIM ACCESSORIES

A Outside Corner Interior Trim: ASTM C1047.
(i) **Outside Corner Material: Plastic.** (+0” up to 54”)
   a. **Shapes:**
      a) 90 Degree Outside Corner Trim
      b) Provide 90 degree square at base and picture rail
      c) Architectural reveal “U” bead on all vertical and horizontal surfaces greater than 20'-0” in length. Architect to provide layout.

(ii) **Outside Corner Material: Plastic.** (+54” up to Ceiling)
   a. **Shapes:**
      a) 3/4” Chamfer bead at all outside corners.
      b) Provide transition trim piece between 90 degree and 45 degree trim.

(iii) **Window Outside Corner Trim**
   a. Provide 45 Degree outside Corner – Plastic at all surface except sill (Head & Jamb)

(iv) **Gypsum to Storefront Butt Trim at Windows**
   a. Provide a J-Trim at edge of Drywall where drywall buts against aluminum storefront to prohibit condensation wicking into drywall.

(v) Architectural reveal “U” bead on all vertical and horizontal surfaces greater than 20'-0” in length. Architect to provide layout.

**Section 2.05 JOINT TREATMENT MATERIALS**

A  General: Comply with ASTM C475/C475M.

B  Joint Compound for Interior Gypsum Board: For each coat, use formulation that is compatible with other compounds applied on previous or for successive coats.
   
   (i) Prefilling: At open joints and damaged surface areas, use setting-type taping compound.
   
   (ii) Embedding and First Coat: For embedding tape and first coat on joints, fasteners, and trim flanges, use drying-type, all-purpose compound.
   
   (iii) Use setting-type compound for installing paper-faced metal trim accessories.
   
   (iv) Fill Coat: For second coat, use drying-type, all-purpose compound.
   
   (v) Finish Coat: For third coat, use setting-type, sandable topping compound.
   
   (vi) Skim Coat: For final coat of Level 5 finish, use high-build interior coating product designed for application by airless sprayer and to be used instead of skim coat to produce Level 5 finish.

C  Joint Compound for Tile Backing Panels:
   
   (i) Glass-Mat, Water-Resistant Backing Panel: As recommended by backing panel manufacturer.
   
   (ii) Cementitious Backer Units: As recommended by backer unit manufacturer.

**Section 2.06 AUXILIARY MATERIALS**

601 E. Front Ave. Ste. 201 Coeur d’Alene, Idaho 83814 Ph: 208.664.1773 Email: koln@millerstauffer.com
A. Provide auxiliary materials that comply with referenced installation standards and manufacturer's written instructions.

B. Laminating Adhesive: Adhesive or joint compound recommended for directly adhering gypsum panels to continuous substrate.

C. Steel Drill Screws: ASTM C1002 unless otherwise indicated.
   
   (i) Use screws complying with ASTM C954 for fastening panels to steel members from 0.033 to 0.112 inch (0.84 to 2.84 mm) thick.
   
   (ii) For fastening cementitious backer units, use screws of type and size recommended by panel manufacturer.

**Part 3. EXECUTION**

**Section 3.01 INSTALLATION AND FINISHING OF PANELS**

A. Examine panels before installation. Reject panels that are wet, moisture damaged, and mold damaged.

B. Comply with ASTM C840.

C. Isolate perimeter of gypsum board applied to non-load-bearing partitions at structural abutments. Provide 1/4- to 1/2-inch- (6.4- to 12.7-mm-) wide spaces at these locations and trim edges with edge trim where edges of panels are exposed. Seal joints between edges and abutting structural surfaces with acoustical sealant.

D. Provide plastic J-Molding at all Aluminum Storefront windows to protect edge of drywall from condensation from storefront windows.

E. 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.

F. Prefill open joints and damaged surface areas.

G. Apply joint tape over gypsum board joints, except for trim products specifically indicated as not intended to receive tape.

H. Gypsum Board Finish Levels: Finish panels to levels indicated below and according to ASTM C840:
   
   (i) Level 1: Ceiling plenum areas, concealed areas, and where indicated.
   
   (ii) Level 2: Panels that are substrate for tile and at locations indicated on Architectural Drawings.
   
   (iii) Level 3: Locations indicated on Architectural Drawings
   
   (iv) 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 099123 "Interior Painting."
   
   (v) Level 5: At locations indicated on Architectural Drawings
      
      a. Primer and its application to surfaces are specified in Section 099123 "Interior Painting."

I. Cementitious Backer Units: Finish according to manufacturer's written instructions.

**Section 3.02 APPLYING TEXTURE FINISHES**
A Surface Preparation and Primer: Prepare and apply primer to gypsum panels and other surfaces receiving texture finishes. Apply primer to surfaces that are clean, dry, and smooth.

B Texture Finish Application: Mix and apply finish using powered spray equipment, to produce a uniform texture free of starved spots or other evidence of thin application or of application patterns.

Section 3.03 PROTECTION

A Protect installed products from damage from weather, condensation, direct sunlight, construction, and other causes during remainder of the construction period.

B Remove and replace panels that are wet, moisture damaged, and mold damaged.

END OF SECTION 092900
SECTION 09 30 13
TILING

Part 1.  GENERAL

Section 1.01 SUMMARY

A Section Includes

(i) Wall Tile

(ii) Backsplash Tile

Section 1.02 ACTION SUBMITTALS

A Product Data: For each type of product.

B Samples:

(i) Each type and composition of tile and for each color and finish required. For ceramic mosaic tile in color blend patterns, provide samples of each color blend.

Section 1.03 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.

Section 1.04 QUALITY ASSURANCE

A Schedule an Site Field visit to show a non-grouted tile layout showing anticipated tile layout. Talking about grout and tile patterns.

(i) Items of Final Approval

a. Tile Layout

b. Tile Variances

c. Grout Lines

Part 2.  PRODUCTS

Section 2.01 PRODUCTS, GENERAL

A ANSI Tile Standard: Provide Standard-grade tile that complies with ANSI A137.1 for types, compositions, and other characteristics indicated.

B ANSI Standards for Tile Installation Materials: Provide materials complying with ANSI A108.02, ANSI standards referenced in other Part 2 articles, ANSI standards referenced by TCNA installation methods specified in tile installation schedules, and other requirements specified.

Section 2.02 TILE PRODUCTS

A T-1 Wall Tile (Restroom) - Basis of design or Approved Equal
(i) Manufacturer: Daltile
(ii) Type: Volume 1.0
(iii) Description: 12x24x5/16 - Gray Concrete Look Tile
(iv) Joint Thickness: 1/4” – 3/8”
(v) Color: Thunder
(vi) Shape: Rectangle
(vii) Installation: 1/3 Offset

B T-2 Backsplash Tile (Breakroom)
(i) Manufacturer: Daltile
(ii) Type: Volume 1.0
(iii) Description: 6x6x5/16 – Black Concrete Look Tile
(iv) Joint Thickness: 1/4” – 3/8”
(v) Color: Amplify Black
(vi) Installation: 1/2 Offset

Section 2.03 WATERPROOF MEMBRANES
A General: Manufacturer's standard product that complies with ANSI A118.10 and is recommended by the manufacturer for the application indicated. Include reinforcement and accessories recommended by manufacturer.

Section 2.04 MISCELLANEOUS MATERIALS
A Metal Edge Strips: Angle or L-shape, height to match tile and setting-bed thickness, metallic, designed specifically for tiling applications.
(i) Manufacture: Schluter or Approved Equal
(ii) Finish Color: Black
(iii) Provide Schluter trim at the following locations:
   a. All outside corners
   b. Material transitions (Reducer)
   c. Mirror to Tile Transition
   d. Exposed Edges
   e. Tile to Wood Transition
   f. Alcove Outside Corners
B Tile Sealer: Manufacturer's standard product for sealing grout joints and that does not change color or appearance of grout.

Part 3. EXECUTION

Section 3.01 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.

   (i) 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.

   (ii) Verify that concrete substrates for tile floors comply with surface finish requirements in ANSI A108.01 for installations indicated.

B Proceed with installation only after unsatisfactory conditions have been corrected.

Section 3.02 PREPARATION

A 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.

Section 3.03 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.

B Install tile per manufacturers recommendations.

C Extend tile work into recesses and under or behind equipment and fixtures to form complete covering without interruptions. Terminate work neatly at obstructions, edges, and corners without disrupting pattern or joint alignments.

D Accurately form intersections and returns. Perform cutting and drilling of tile without marring visible surfaces. Carefully grind cut edges of tile abutting trim, finish, or built-in items for straight aligned joints. Fit tile closely to electrical outlets, piping, fixtures, and other penetrations so plates, collars, or covers overlap tile.

E Provide Schlueter metal strips at all transitions, outside corners, and all locations where unfinished tile edges could be exposed.

F Where accent tile differs in thickness from field tile, vary setting bed thickness so that tiles are flush.

G 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.

H Lay out tile wainscots to dimensions indicated or to next full tile beyond dimensions indicated.

I Expansion Joints: Provide expansion joints and other sealant-filled joints, including control, contraction, and isolation joints, where indicated. Form joints during installation of setting materials, mortar beds, and tile. Do not saw-cut joints after installing tiles.
(i) Where joints occur in concrete substrates, locate joints in tile surfaces directly above them.

J  Metal Edge Strips: Install at locations.

K  Tile Sealer: Apply sealer to cementitious grout joints in tile floors according to floor-sealer manufacturer’s written instructions. As soon as the floor sealer has penetrated grout joints, remove excess sealer and sealer from tile faces by wiping with soft cloth.

END OF SECTION 093013
SECTION 09 53 00
ACOUSTICAL CEILING SUSPENSION ASSEMBLIES

Part 1. GENERAL

Section 1.01 SUMMARY

A Section includes:

(i) Acoustical Ceiling Panels

(ii) Exposed grid suspension system

(iii) Wire hangers, fasteners, main runners, cross tees, wall angle moldings and perimeter trim.

Section 1.02 ACTION SUBMITTALS

A Product Data: For each type of product.

B Samples upon request: 6 inch by 6 inch samples / 6 inch in length Suspension System.

Section 1.03 QUALITY ASSURANCE

A Provide products produced by a single manufacturer.

(i) Handle acoustical ceiling units carefully to avoid chipping edges or damaged units in any way.

Section 1.04 DELIVERY, STORAGE, AND HANDLING

A Deliver products in manufacturer's original sealed packaging.

B Deliver, store, and handle products using means and methods that will prevent damage.

(i) Protect against damage from moisture, direct sunlight, surface contamination, and other causes.

C Before installing acoustical ceiling units, permit them to reach room temperature and a stabilized moisture content.

D Handle acoustical ceiling units carefully to avoid chipping edges or damaged units in any way.

Section 1.05 PROJECT CONDITIONS

A Prior to installation, the product must be kept clean and dry, in an environment that is between 32 degrees Fahrenheit and 120 degrees Fahrenheit, not subject to abnormal conditions.

(i) Abnormal conditions include exposure to chemical fumes, vibrations, moisture from conditions such as building or building system leaks, condensation, excessive humidity, or excessive dirt or dust build-up.

(ii) The ceilings must be maintained to avoid excessive dirt or dust build-up that would provide a medium for microbial growth on ceiling panels.

Section 1.06 CLOSEOUT SUBMITTALS

A Product Data & Shop Drawings.
B Extra Materials: Deliver extra materials to Owner. Furnish extra materials described below that match products installed. Packaged with protective covering for storage and identified with appropriate labels.

(i) Acoustical Ceiling Units: Furnish quantity of full-size units equal to 5.0 percent of amount installed.

(ii) Exposed Suspension System Components: Furnish quantity of each exposed suspension component equal to 2.0 percent of amount installed.

Part 2. PRODUCTS

Section 2.01 MANUFACTURERS

A Armstrong World Industries or approved equal.

Section 2.02 ACoustical CeilInG UNITS (Basis of Design)

A Ceiling Type “B”

(i) Armstrong: Kitchen Zone
   a. Sound blocking (CAC): 33
   b. Light Reflectance: 89%
   c. Recycled Content: Up to 36%
   d. Sag and Humidity Resistance
   e. Materials: Mineral Fiber
   f. Fire Performance: Class A (UL)
   g. Disinfectability: Fog, Spray, Wipe
   i. Size: 2'-0” x 4'-0”
   j. Color: White

(ii) Grid: Armstrong Prelude XL 15/16” Exposed Tee
   a. Face Dimension: 15/16”
   b. Exposed Tee
   c. Seismic Category C,DEF
   d. Duty Rating, Heavy & Intermediate Duty
   e. Disinfectability, Fog, Spray, Wipe
   f. Grid: 2’-0” x 4’-0”
B Ceiling Type “C”

(i) Armstrong: 15/16” Ultima Tegular
   a. Sound Absorption (NRC): 0.85
   b. Sound Blocking (CAC): 35
   c. Articulation Class (AC): 170
   d. Light Reflectance: 85%
   e. Recycled Content: 85%
   f. Sag / Humidity Resistance
   g. Materials: Mineral Fiber
   h. Fire Performance: Class A
   i. Disinfectability: Fog, Spray, Wipe
   j. Tegular Edge
   k. Size: 2’-0” x 2’-0” x 1”
   l. Color: White

(ii) Grid: Armstrong Prelude XL 15/16” Exposed Tee
   a. Face Dimension: 15/16”
   b. Exposed Tee
   c. Seismic Category C,DEF
   d. Duty Rating, Heavy & Intermediate Duty
   e. Disinfectability, Fog, Spray, Wipe
   f. Grid: 2’-0” x 2’-0”
   g. Color: White

Part 3. EXECUTION

Section 3.01 EXAMINATION

A Do not proceed with installation until all wet work such as concrete, terrazzo, plastering and painting has been completed and thoroughly dried out.

Section 3.02 PREPARATION
A Measure each ceiling area and establish layout of acoustical units to balance border widths at opposite edges of each ceiling. Avoid use of less than half width units at borders and comply with reflected ceiling plans. Coordinate panel layout with mechanical and electrical fixtures.

B Coordination: Furnish layout for preset inserts, clips, and other ceiling anchors whose installation is specified in other sections.

(i) Furnish concrete inserts and similar devices to other trades for installation will in advance of time needed for coordination of other work.

Section 3.03 INSTALLATION

A Install suspension system and panels in accordance with manufacturer's instructions, and in compliance with ASTM C 636 and with the authorities having jurisdiction.

B Follow the architectural drawings along with the manufacturer’s installation instructions when installing the ceiling panels and suspension system.

C Suspended Ceiling System grid to be installed as shown on reflected ceiling plans. If there is a conflict with the system coordinate with construction manager and architect on adjusted layout.

D Provide adequate bracing and cross bracing of all grids to meet International Building Code requirements for seismic restraint. Coordinate bracing with mechanical and electrical.

Section 3.04 ADJUSTING AND CLEANING

A Replace damaged and broken panels.

B Clean exposed surfaces of acoustical ceilings, including trim, edge moldings, and suspension members.

(i) Comply with manufacturer’s instructions for cleaning and touch up of minor finish damage.

C Remove and replace work that cannot be successfully cleaned and repaired to permanently eliminate evidence of damage.
SECTION 09 65 13
RESILIENT BASE AND ACCESSORIES

Part 1. GENERAL

Section 1.01 SUMMARY
A Section Includes:
   (i) Rubber molding accessories.

Section 1.02 ACTION SUBMITTALS
   (i) Product Data: For each type of product.
   (ii) Samples: For each exposed product and for each color and texture specified.

Part 2. PRODUCTS

Section 2.01 VINYL MOLDING ACCESSORY
A Provide vinyl molding transitions at all floor to flooring transitions.
B Provide vinyl molding reducers at all flooring to flooring transitions that are greater than 1/16” of elevation change.
   (i) If elevation change is greater than 1/4” reducer to include a sloped transition.
C Transitions and reducers to be glued down with metal track.
D Colors and Patterns: Black or Gray depending on location and adjacent materials.

Section 2.02 WALL BASE
A B-1: 6” Wall Base
   (i) Manufacture: Tarkett, or approved equal
   (ii) Description: Johnsonite Traditional Vinyl 1/8” (Type TV)
   (iii) Height: 6”

Section 2.03 FLOOR TRANSITION
A None

Section 2.04 INSTALLATION MATERIALS
A Trowelable Leveling and Patching Compounds: Latex-modified, portland-cement-based or blended hydraulic-cement-based formulation provided or approved by resilient-product manufacturer for applications indicated.
B Adhesives: Water-resistant type recommended by resilient-product manufacturer for resilient products and substrate conditions indicated.

Part 3. EXECUTION

Section 3.01 PREPARATION
A Prepare substrates according to manufacturer’s written instructions to ensure adhesion of resilient products.
B Concrete Substrates: Prepare horizontal surfaces according to ASTM F710.

(i) Verify that substrates are dry and free of curing compounds, sealers, and hardeners.

(ii) Remove substrate coatings and other substances that are incompatible with adhesives and that contain soap, wax, oil, or silicone, using mechanical methods recommended by manufacturer. Do not use solvents.

(iii) Alkalinity and Adhesion Testing: Perform tests recommended by manufacturer. Proceed with installation only after substrate alkalinity falls within range on pH scale recommended by manufacturer.

(iv) Moisture Testing: Perform tests so that each test area does not exceed 1000 sq. ft. (304.8 sq. m), 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 F1869. Proceed with installation only after substrates have maximum moisture-vapor-emission rate of 3 lb of water/1000 sq. ft. (1.36 kg of water/92.9 sq. m) in 24 hours.

b. Relative Humidity Test: Using in-situ probes, ASTM F2170. 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 resilient products until materials are the same temperature as space where they are to be installed.

E Immediately before installation, sweep and vacuum clean substrates to be covered by resilient products.

Section 3.02 RESILIENT BASE INSTALLATION

A Comply with manufacturer's written instructions for installing resilient base.

B Apply resilient base to walls, columns, pilasters, casework and cabinets in toe spaces, and other permanent fixtures in rooms and areas where base is required.

C Install resilient base in lengths as long as 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 On masonry surfaces or other similar irregular substrates, fill voids along top edge of resilient base with manufacturer's recommended adhesive filler material.

G Job-Formed Corners:

(i) Outside Corners: Use straight pieces of maximum lengths possible and form with returns not less than 12 inches (304 mm) in length.

   c. Form without producing discoloration (whitening) at bends.

(ii) Inside Corners: Use straight pieces of maximum lengths possible and form with returns not less than 12 inches (304 mm) in length.

   d. Miter corners to minimize open joints.
Section 3.03 CLEANING AND PROTECTION

A. Comply with manufacturer's written instructions for cleaning and protecting resilient products.

B. Cover resilient products subject to wear and foot traffic until Substantial Completion.

END OF SECTION 096513
SECTION 09 65 19
RESILIENT TILE FLOORING

Part 1. GENERAL

Section 1.01 SUMMARY

A Section includes:

(i) Luxury Vinyl Tile

(ii) Accessories required for a complete installation

Section 1.02 ACTION SUBMITTALS

A Product Data: For each type of product.

B Samples:

(i) Tile: Each Type, Color, Thickness and Finish

(ii) Feature Strips: Each Type, Color, Thickness and Finish

Section 1.03 QUALITY ASSURANCE

A Provide products produced by a single manufacturer.

B Installer Qualifications: A company specializing in installation with minimum three (3) years’ experience and employs experienced flooring installers who have a minimum of 3 years of experience installing resilient tile flooring in a commercial application.

C Furnish product type materials from the same production.

Section 1.04 DELIVERY, STORAGE, AND HANDLING

A Deliver products in manufacturer’s original sealed packaging.

B Deliver, store, and handle products using means and methods that will prevent damage.

(i) Protect against damage from moisture, direct sunlight, surface contamination, and other causes.

C Before installing flooring, permit them to reach room temperature and a stabilized moisture content.

D Handle flooring carefully to avoid chipping edges or damaged units in any way.

Section 1.05 PROJECT CONDITIONS

A Prior to installation, the product must be kept clean and dry, in an environment that is between 32 degrees Fahrenheit and 120 degrees Fahrenheit, not subject to abnormal conditions.

(i) Abnormal conditions include exposure to chemical fumes, vibrations, moisture from conditions such as building or building system leaks, condensation, excessive humidity, or excessive dirt or dust build-up.

(ii) The floors must be maintained to avoid excessive dirt or dust build-up.
(iii) Flooring must be protected from all damage after installation.

Section 1.06 CLOSEOUT SUBMITTALS

A Product Data & Shop Drawings showing locations of access panels.

B Extra Materials: Deliver extra materials to Owner. Furnish extra materials described below that match products installed. Packaged with protective covering for storage and identified with appropriate labels.

(i) Acoustical Ceiling Units: Furnish quantity of full-size units equal to 5.0 percent of amount installed.

(ii) Exposed Suspension System Components: Furnish quantity of each exposed suspension component equal to 2.0 percent of amount installed.

Part 2. PRODUCTS

Section 2.01 MANUFACTURERS

A Shaw Commercial, Mannington, or approved equal.

Section 2.02 LUXURY VINYL TILE (Basis of Design)

A Shaw Contract Commercial: 7 inch x 48 inch tile

(i) Style: Grain Floating, 0364V

(ii) Size: 7 inch x 48 inch

(iii) Actual Dimensions: 7.28 in x 47.72 in

(iv) Construction: Heavy Commercial Luxury Vinyl Tile w. in*step Backing

(v) Edge Profile: Micro-Bevel

(vi) Overall Thickness: 4mm

(vii) Wear layer Thickness: 20 mil

(viii) Finish: Exoguard

(ix) Color: Buff, 64140

(x) Warranty: 15 year commercial limited warranty

Section 2.03 ADHESIVES

A Provide water resistant type adhesive for flooring, base and accessories as recommended by the manufacturer to suit substrate conditions.

B Low VOC: Content to be less than the 50 grams/L when calculated according to 40 CFR 59(EPA Method 24).

Section 2.04 PRIMER AND FLOOR PREPARATION

A Provide primer and floor preparation in accordance with the manufacturer’s instructions and tolerances.
Section 2.05 MOULDING AND FLOORING TRANSITIONS

A Provide flooring transitions as necessary to protect flooring edges and provide ANSI compliant transitions between flooring surfaces.

B Where transitions are required provide aluminum mechanically and adhesive secured transitions.

(i) Note: This facility will see high amount of wheeled traffic and heavy duty transitions are required.

Part 3. EXECUTION

Section 3.01 EXAMINATION

A Do not proceed with installation until all wet work such as concrete, terrazzo, plastering and painting has been completed and thoroughly dried out.

B Maintain flooring materials and areas to receive resilient flooring at a temperature above 20 degrees C (68 degrees F) for three (3) days before application, during application and two (2) days after application, unless otherwise directly by the flooring manufacturer for the flooring being installed. Maintain a minimum temperature of 13 degrees C (55 degrees F) thereafter. Provide adequate ventilation to remove moisture from area and to comply with regulations limiting concentrations of hazardous vapors.

C Do not install flooring until building is permanently enclosed and wet construction in or near areas to receive tile materials is complete, dry and cured.

D Verify substrate is flat, level, and true. Verify concrete finish is compatible with flooring manufacturer recommendations and requirements.

Section 3.02 PREPARATION

A Prepare and test surfaces to receive resilient tile and adhesive.

B Prepare concrete substrates in accordance with ASTM F710.

Section 3.03 INSTALLATION

A Install in accordance with manufacturer's instructions for application and installation.

B Mix tile from at least two containers. An apparent line either of shades or pattern variance is not acceptable.

C Tile Layout:

(i) If layout is not shown on construction documents, lay tile symmetrically about center of room or space with joints aligned. Center on Hallways each way.

(ii) Vary edge width as necessary to maintain full size tiles in the field, no edge tile to be less than 1/2 the field tile size, except where irregular shaped rooms make it impossible.

(iii) Place tile pattern in the same direction; do not alternate tiles unless specifically indicated in the construction documents to the contrary.

D Application:
Adhere floor tile to flooring 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.

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.

Extend floor tiles into toe spaces, door reveals, closets, and similar openings. Extend floor tiles to center of door openings.

Roll tile floor with a minimum 45 kg (100 pound) roller.

Seal joints at all pipes with sealants.

Installation of Edge Strips:

Locate edge strips under center line of doors unless otherwise shown on construction documents.

Set resilient edge strips in adhesive. Anchor metal edge strips with anchors and screws.

Where tile edge is exposed, butt edge strip to touch along tile edge.

Where thin set ceramic tile abuts resilient tile, set edge strip against floor file and against the ceramic tile edge.

Install tile flooring under areas where casework and equipment are located, including laboratory equipment, cubicles, and breakroom appliances.

Extend tile flooring for room into adjacent closets and alcoves.

Section 3.04 ADJUSTING AND CLEANING

Clean adhesive marks on exposed surfaces during the application of resilient materials before the adhesive sets. Exposed adhesive is not acceptable.

Keep traffic off resilient material for a minimum 72 hours after installation.

Clean flooring as recommended in accordance with manufacturer’s printed maintenance instructions and within the recommended time frame. As required by the manufacturer, apply the recommended number of coats and type of polish and/or finish in accordance with manufacturer’s written instructions.

When construction traffic occurs over tile, cover resilient materials with reinforced kraft paper properly secured and maintained until removal is directed by Owner. At entrances and where wheeled vehicles or carts are used, cover tile with plywood, hardboard, or particle board over paper, secured and maintained until removal is directed by Owner.

When protective materials are removed and immediately prior to acceptance, replace damaged tile and moldings, re-clean resilient materials.

A. END OF SECTION 09 65 19
SECTION 09 91 13
EXTERIOR PAINTING

Part 1. GENERAL

Section 1.01 SUMMARY

A Section Includes:

(i) Primers.

(ii) Finish coatings.

(iii) Floor sealers.

Section 1.02 ACTION SUBMITTALS

A Product Data: For each type of product.

Part 2. PRODUCTS

Section 2.01 PAINT PRODUCTS, GENERAL

A Material Compatibility:

(i) Provide materials for use within each paint system that are compatible with one another, and substrates indicated, under conditions of service and application as demonstrated by manufacturer based on testing and field experience.

(ii) For each coat in a paint system, provide products recommended in writing by topcoat manufacturer for use in paint system and on substrate indicated.

B Colors: TBD, Refer to paint schedule by Architect.

Section 2.02 PRIMERS

A Metal Primer

(i) Quick-Drying, Alkyd Metal Primer: Corrosion-resistant, solvent-based, modified-alkyd primer; lead and chromate free; formulated for quick-drying capabilities and for use on cleaned, exterior steel surfaces.

Section 2.03 FINISH COATINGS

A Quick-Drying Alkyd Enamel, Semigloss: Solvent-based, alkyd or modified-alkyd enamel formulated for quick-drying capabilities and for use on exterior, primed, metal and dimensionally stable wood surfaces.

(i) Gloss Level: Manufacturer’s standard semigloss finish.

Section 2.04 FLOOR SEALERS AND PAINTS

A Water-Based, Concrete-Floor Sealer: Clear, water-based, acrylic-copolymer-emulsion sealer formulated for oil, gasoline, alkali, and water resistance and for use on exterior, concrete traffic surfaces.

Section 2.05 EXTERIOR PAINT SCHEDULE
A  Metal Ladder
   (i)  One Coat Exterior Metal Primer
   (ii) Two Coats Exterior Grade Metal Finish Coats – Color Sherwin Williams “Tricorn Black” SW6258
      a.  Semi-Gloss Finish

B  Steel Canopies – Fascia & Underside of Decking
   (i)  One Coat Exterior Metal Primer
   (ii) Two Coats Exterior Grade Metal Finish Coats - Color: Sherwin Williams “Tigereye” SW6362
      a.  Semi-Gloss Finish

C  Bollards
   (i)  One Coat Exterior Metal Primer
   (ii) Two Coats Exterior Grade Metal Finish Coats - Color: Sherwin Williams “Tigereye” SW6362
      a.  Semi-Gloss Finish

D  Hollow Metal Frame
   (i)  One Coat Exterior Metal Primer
   (ii) Two Coats Exterior Grade Metal Finish Coats – Color: Sherwin Williams “Web Gray” SW7075
      a.  Semi-Gloss Finish

E  Insulated Steel Door
   (i)  One Coat Exterior Metal Primer
   (ii) Two Coats Exterior Grade Metal Finish Coats – Color: Sherwin Williams “Web Gray” SW7075
      a.  Semi-Gloss Finish

F  Overhead Coiling Doors
   (i)  Factory Finish: Light Gray

G  Electrical Panels & Switch Gear
   (i)  Not Painted Factory Finish

H  Exhaust Vents
   (i)  One Coat Exterior Metal Primer
   (ii) Two Coats of Exterior Grade Metal Finish Coats – Color: Sherwin Williams “Web Gray” SW7075
      a.  Semi-Gloss Finish
I Roof Top Mechanical Unit

(i) One Coat Exterior Metal Primer

(ii) Two Coats Exterior Grade Metal Finish Coats – Color: Sherwin Williams “Web Gray” SW7075
   a. Semi-Gloss Finish

J Louvers

(i) Factory Finish: Color: Match Sherwin Williams “Tricorn Black” SW6258
   a. Semi-Gloss Finish

Part 3. EXECUTION

Section 3.01 EXAMINATION

A Verify suitability of substrates, including surface conditions and compatibility, with finishes and primers.

(i) Paint only products appropriate for substrate. If additional products are needed to provide a finish that is appropriate for the substrate contact the Architect, Construction Manager, or Owner.

B Proceed with coating application only after unsatisfactory conditions have been corrected.

(i) Application of coating indicates acceptance of surfaces and conditions.

C Adjust paint specifications if painting of galvanized material is required. Select appropriate paint specification for substrate.

Section 3.02 PREPARATION

A Comply with manufacturer's written instructions applicable to substrates and paint systems indicated.

B Remove hardware, covers, plates, and similar items already in place that are removable and are not to be painted. If removal is impractical or impossible because of size or weight of item, provide surface-applied protection before surface preparation and painting.

(i) After completing painting operations, use workers skilled in the trades involved to reinstall items that were removed. Remove surface-applied protection.

C Clean substrates of substances that could impair bond of paints, including dust, dirt, oil, grease, and incompatible paints and encapsulants.

(i) Remove incompatible primers and reprime substrate with compatible primers or apply tie coat as required to produce paint systems specified in this Section.

Section 3.03 INSTALLATION

A Apply paints in accordance with manufacturer's written instructions.

B 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.
Section 3.04 CLEANING AND PROTECTION

A  After completing paint application, clean spattered surfaces. Remove spattered paints by washing, scraping, or other methods. Do not scratch or damage adjacent finished surfaces.

B  Protect work of other trades against damage from paint application. Correct damage to work of other trades by cleaning, repairing, replacing, and refinishing, as approved by Architect, and leave in an undamaged condition.

C  At completion of construction activities of other trades, touch up and restore damaged or defaced painted surfaces.

END OF SECTION 099113
SECTION 09 91 23
INTERIOR PAINTING

Part 1. GENERAL

Section 1.01 SUMMARY
A Section Includes:
   (i) Primers.
   (ii) Wall, Ceiling & Floor Coatings
   (iii) Door & Door Frame
   (iv) Floor sealers and paints.

Section 1.02 ACTION SUBMITTALS
A Product Data: For each type of product.
B Product Schedule: Use same designations indicated on Drawings and in the Interior Painting Schedule to cross-reference paint systems specified in this Section. Include color designations.
C Paint Draw Downs: Provide paint samples on 8 ½” x 11” sheets using the actual product to be used for the appropriate surfaces. Showing sheen and a different colors.

Part 2. PRODUCTS

Section 2.01 PAINT PRODUCTS, GENERAL
A Material Compatibility:
   (i) 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.
   (ii) For each coat in a paint system, products shall be recommended in writing by topcoat manufacturers for use in paint system and on substrate indicated.

Section 2.02 PRIMERS
A Interior Latex Primer Sealer: Water-based latex sealer used on new interior plaster, concrete, and gypsum wallboard surfaces.
B Water-Based Rust-Inhibitive Primer: Corrosion-resistant, water-based-emulsion primer formulated for resistance to flash rusting when applied to cleaned, interior ferrous metals subject to mildly corrosive environments.
C Alkyd Quick-Dry Primer for Metal: Corrosion-resistant, solvent-based, modified-alkyd primer; lead and chromate free; formulated for quick-drying capabilities and for use on cleaned, interior steel surfaces.

Section 2.03 WATER-BASED FINISH COATS
A Interior, Latex, Semigloss: Pigmented, water-based paint for use on primed/sealed interior plaster and gypsum board, and on primed wood and metals.
(i) Gloss Level: Manufacturer's standard semigloss finish.

Section 2.04 SOLVENT-BASED FINISH COATS

A Interior, Alkyd, Semigloss: Pigmented, solvent-based alkyd paint for use on primed/sealed interior plaster, gypsum, wood, and metal walls primarily in residential and moderate traffic commercial environments.

(i) Gloss Level: Manufacturer's standard semigloss finish.

Section 2.05 FLOOR SEALERS AND PAINTS

A Refer to Concrete finish specifications.

Section 2.06 MANUFACTURERS

A Sherwin Williams
B Benjamin Moore Paints and Stains
C Rustoleum
D Olympic
E PPG
F Behr
G Valspar
H Krylon
I Rodda

Section 2.07 PAINT SCHEDULE (Basis of Design)

A Gypsum Wall Board – Ceilings
   (i) Manufacturer: Sherwin Williams, or approved equal.
   (ii) One Coat Primer, Water Based, Low VOC
   (iii) Two Coats Finish Water Based Latex Paint, Low VOC
      a. Color: Extra White SW7006
      b. Gloss: Egg Shell

B Gypsum Wall Board – Walls
   (i) Manufacturer: Sherwin Williams, or approved equal.
      a. One Coat Primer, Water Based, Low VOC
      b. Two Coats Finish Water Based Latex Paint, Low VOC
C  Hollow Metal Door & Window Frames
   (i) Manufacturer: Sherwin Williams, or approved equal.
   (ii) One Coat Primer, Solvent Based, Low VOC
   (iii) Two Coats Finish Solvent Based Alkyd Enamel Paint, Low VOC
      a. Color: Web Gray SW7075
      b. Gloss: Semi-Gloss

D  Steel Doors
   (i) Manufacturer: Sherwin Williams, or approved equal.
   (ii) One Coat Primer, Solvent Based, Low VOC
   (iii) Two Coats Finish Solvent Based Alkyd Enamel Paint, Low VOC
      a. Color: Web Gray SW7075
      b. Gloss: Semi-Gloss

E  Picture Rail Wood Trim
   (i) Manufacturer: Sherwin Williams, or approved equal.
      a. Two Coats of Stain
         a) Stain: Transparent Natural Stain
         b) Finish: Clear
         c) Gloss: Satin

F  Wood Countertop Backsplash
   (i) Manufacturer: Sherwin Williams, or approved equal.
      a. Two Coats of Stain
         a) Stain: Transparent Natural Stain
         b) Finish: Clear
         c) Gloss: Satin

G  EXPOSED SPRINKLER LINES
   a. All exposed sprinkler lines to be painted, except in storage, water, IT, electrical, and mechanical rooms.
b. Manufacturer: Sherwin Williams, or approved equal.
   a) One Coat Primer, Solvent Based, Low VOC
   b) Two Coats Finish Solvent Based Alkyd Enamel Paint, Low VOC
   c) Color: Web Gray SW7075
   d) Gloss: Semi-Gloss

H Interior CMU Wall Surfaces
   a. Manufacturer: Sherwin Williams or approved equal.
      a) One Coat Block Filler
      b) One Coat Primer, Latex, Water Based, Low VOC
      c) Two Coats Finish Coat, Latex, Water Based, Low VOC
      d) Color: Repose Gray SW7015
      e) Gloss: Glossy

I EXPOSED DUCTWORK
   a. All exposed ductwork to be painted, except in storage, water, IT, electrical, and mechanical rooms.
   b. Manufacturer: Sherwin Williams, or approved equal.
      a) One Coat Primer, Solvent Based, Low VOC
      b) Two Coats Finish Solvent Based Alkyd Enamel Paint, Low VOC
      c) Color: Web Gray SW7075
      d) Gloss: Semi-Gloss

J EXPOSED CONDUIT
   (i) All exposed conduits to be painted, except in storage, water, IT, electrical, and mechanical rooms.
   (ii) Match adjacent substrate material color with appropriate paint products for conduit material.

K EXPOSED PLUMBING PIPES
   (i) All Exposed plumbing to be painted, except in storage, water, electrical, and mechanical rooms.
   (ii) Match adjacent substrate material color with appropriate paint products for conduit material.
   (iii) If plumbing is called out to have an insulated covering unless it’s a hard covering the plumbing does not need to
        painted.

Part 3. EXECUTION
Section 3.01 GENERAL

A Provide gypsum wall board ceilings above all acoustical suspended ceilings.
   (i) Gypsum wall board ceilings above suspended acoustical ceilings to be fire taped.
   (ii) Not Painted

B All exposed ductwork to be painted.

C Concealed ductwork does not need to be painted.

D All exposed conduit to be painted. Contractor to make effort to conceal all conduit behind ceilings, but if a conduit
   needs to be exposed then it needs to be held high and painted to match adjacent substrate.

E All exposed sprinkler lines to be painted except heads. Concel sprinkler lines in soffits and within wall/ceiling
   cavities where possible.

F All exposed plumbing pipes without insulated covering shall be painted.

Section 3.02 EXAMINATION

A Verify suitability of substrates, including surface conditions and compatibility, with existing finishes and primers.

B Proceed with coating application only after unsatisfactory conditions have been corrected.

Section 3.03 PREPARATION

A Comply with manufacturer's written instructions and recommendations applicable to substrates and paint systems
   indicated.

B Remove hardware, covers, plates, and similar items already in place that are removable and are not to be
   painted. If removal is impractical or impossible because of size or weight of item, provide surface-applied
   protection before surface preparation and painting.

C After completing painting operations, use workers skilled in the trades involved to reinstall items that were
   removed. Remove surface-applied protection if any.

Section 3.04 INSTALLATION

A Apply paints according to manufacturer's written instructions.

B 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.

Section 3.05 CLEANING AND PROTECTION

A After completing paint application, clean spattered surfaces. Remove spattered paints by washing, scraping, or
   other methods. Do not scratch or damage adjacent finished surfaces.

B Protect work of other trades against damage from paint application. Correct damage to work of other trades by
   cleaning, repairing, replacing, and refinishing, as approved by Architect, and leave in an undamaged condition.

C At completion of construction activities of other trades, touch up and restore damaged or defaced painted
   surfaces.
SECTION 10 14 23
SIGNAGE

Part 1. GENERAL

Section 1.01 SUMMARY

A Section Includes:

(i) Panel signs.
(ii) Dimensional Letters
(iii) Dedication Plaque
(iv) Logo Sign

Section 1.02 ACTION SUBMITTALS

A Product Data: For each type of product.
B Shop Drawings: For panel signs.
   (i) Include fabrication and installation details and attachments to other work.
   (ii) Show sign mounting heights, locations of supplementary supports to be provided by other installers, and accessories.
   (iii) Show message list, typestyles, graphic elements, including raised characters and Braille, and layout for each sign at least half size.
C Samples: For each exposed product and for each color and texture specified.

Section 1.03 CLOSEOUT SUBMITTALS

A Maintenance data.

Part 2. PRODUCTS

Section 2.01 PERFORMANCE REQUIREMENTS

A Accessibility Standard: Comply with applicable provisions in the USDOJ's "2010 ADA Standards for Accessible Design" the ABA standards of the Federal agency having jurisdiction and ICC A117.1.

Section 2.02 PANEL SIGNS

A Panel Sign: Sign with smooth, uniform surfaces; with message and characters having uniform faces, sharp corners, and precisely formed lines and profiles; and as follows:

(i) Solid-Sheet Sign Acrylic sheet with finish specified in "Surface Finish and Applied Graphics" Subparagraph and as follows:

c. Etched and Filled Graphics: Sign face etched or routed to receive enamel-paint infill.

(ii) Sign-Panel Perimeter: Finish edges smooth.

a. Edge Condition at Vertical Edges and at Horizontal Edges: Square cut.

b. Corner Condition in Elevation: Square.

(iii) Frame: None

(iv) Mounting: Manufacturer's standard method for substrates indicated.

(v) Surface Finish and Applied Graphics:

a. Integral Acrylic; Sheet Color: As selected by Architect from full range of industry colors.

b. Painted Finish and Graphics: Manufacturer's standard, factory-applied acrylic polyurethane, in color as selected by Architect from manufacturer's full range.

Section 2.03 PANEL-SIGN MATERIALS

A Acrylic Sheet: ASTM D4802, Type UVF (UV filtering).

B Vinyl Film: UV-resistant vinyl film of nominal thickness indicated, with pressure-sensitive, permanent adhesive on back; die cut to form characters or images as indicated on Drawings and suitable for exterior applications.

C Adhesive: As recommended by sign manufacturer.

D Two-Face Tape: Manufacturer's standard high-bond, foam-core tape, 0.045 inch (1.14 mm) thick, with adhesive on both sides.

Section 2.04 DIMENSIONAL LETTERS

A Provide Metal Dimensional Letter – Brush Aluminum Finish

B Installed using post mounting allowing for letters to be set ½” off finish surface.

Section 2.05 DEDICATION PLAQUE

A Cast Aluminum Dedication plaque with 1/8” border, ITD Logo, Date of Completion, Name of Owner, Board, Director, Governor, Architect, and Construction Manager

(i) Brushed Aluminum Finish on letters, board, and logo.

(ii) Owner to Supply Logo

Section 2.06 LOGO SIGN

A Brushed Aluminum Water jet logo 8’-0” in diameter as shown in drawings.

B Installed on standoff mounts epoxied into CMU substrate.

C Letters, Stars, and circles to be brushed aluminum.
D  State of Idaho to be powdered coated orange to match Sherwin Williams “Tigereye” SW6362

E  “D” letter set in the state to be powder coated navy-blue color.

Section 2.07 SIGN SCHEDULE

A  Plaque Signs
   (i) Provide signs per sheet G1.2 with room names, and restroom signs.
      a. Colors: Orange to Match ITD Logo, Navy Blue Stripe, Black Letter and Graphics

B  Dimensional Letters -1
   (i) Height: 8"
   (ii) Verbiage: DISTRICT #1
   (iii) Finish: Brushed Aluminum

C  Dimensional Letters – 2
   (i) Height: 8"
   (ii) Verbiage: “CENTRAL LABORATORY”
   (iii) Finish: Brushed Aluminum

D  Dimensional Letters – 3
   (i) Height: 4"
   (ii) Verbiage: “PUBLIC ENTRY”
   (iii) Finish: Brushed Aluminum

E  Dimensional Letters – 4
   (i) Height: 4"
   (ii) Verbiage: “EMPLOYEE ENTRY”
   (iii) Finish: Brushed Aluminum

F  Dedication Plaque
   (i) 12x18 with graphics and lettering
      a. Artwork to be Supplied by Owner or Architect

G  Logo Sign
   (i) 8’-0” Diameter Water Jet Aluminum Logo Sign with brushed aluminum & power coated elements
   (ii) Installed using offset posts – epoxied into CMU.
Section 2.08 FABRICATION

A General: Provide manufacturer's standard sign assemblies according to requirements indicated.

(i) Mill joints to a tight, hairline fit. Form assemblies and joints exposed to weather to resist water penetration and retention.

B Shop- and Subsurface-Applied Vinyl: Align vinyl film in final position and apply to surface. Firmly press film from the middle outward to obtain good bond without blisters or fishmouths.

Part 3. EXECUTION

Section 3.01 INSTALLATION

A General: Install signs using mounting methods indicated and according to manufacturer's written instructions.

(i) Install signs level, plumb, true to line, and at locations and heights indicated, with sign surfaces free of distortion and other defects in appearance.

(ii) Install signs so they do not protrude or obstruct according to the accessibility standard.

(iii) Before installation, verify that sign surfaces are clean and free of materials or debris that would impair installation.

B Mounting Methods:

(i) Adhesive: Clean bond-breaking materials from substrate surface and remove loose debris. Apply linear beads or spots of adhesive symmetrically to back of sign and of suitable quantity to support weight of sign after cure without slippage. Keep adhesive away from edges to prevent adhesive extrusion as sign is applied and to prevent visibility of cured adhesive at sign edges. Place sign in position, and push to engage adhesive. Temporarily support sign in position until adhesive fully sets.

(ii) Two-Face Tape: Clean bond-breaking materials from substrate surface and remove loose debris. Apply tape strips symmetrically to back of sign and of suitable quantity to support weight of sign without slippage. Keep strips away from edges to prevent visibility at sign edges. Place sign in position, and push to engage tape adhesive.

(iii) Install all dimensional letters using post mounted method using epoxy when installed over split face CMU. Sign to be held of high point of CMU by 1/2”.

(iv) Install all dimensional letter using post mounted method using adhesive when installed over metal siding. Note: siding is irregular surface. Letters to be held a minimum of 1/4” of highest element of siding.

(v) All plaque signs to be installed using adhesive tape.

(vi) Install dedication plaque using screws with decorative head. Metal siding contractor to provide flat metal panel & trim around dedication plaque with J-Channel. Provide 3/8” gap between cast plaque and J-Channel.

(vii) Install Logo Sign using posts. Posts to be drilled and epoxied into split face CMU substrate.

(viii) Sign supplier to provide template for all dimensional letters and logo sign to locate posts as well as signage spacing.

(ix) Sign supplier to install all signs.

C Remove temporary protective coverings and strippable films as signs are installed.
END OF SECTION 101423
SECTION 10 26 00
WALL AND DOOR PROTECTION

Part 1. GENERAL

Section 1.01 SUMMARY

A Section Includes:
   (i) Corner guards.
   (ii) Door Kickplates

Section 1.02 ACTION SUBMITTALS

A Product Data: For each type of product.

B Shop Drawings: For each type of wall and door protection showing locations and extent.

C Samples: For each exposed product and for each color and texture specified.

Part 2. PRODUCTS

Section 2.01 CORNER GUARDS

A Stainless Steel Corner Guards type 304 with #4 Satin Finish 18 Guage
   (i) 1” x 1” Legs
   (ii) 48” Height

B Gypsum Wall Board to install 90 Degree plastic drywall trim from 0 feet to 4’-6” with transition to 45-degree chamfer above. Contractor to coordinate proper installation of corner guards at locations shown in drawings with gypsum wall board installer to provide 90 degree surface needed for corner guard installation.

Section 2.02 DOOR KICKPLATES

A Provide door kickplates at all doors, excluding storefront doors.

B Stainless Steel type 304 with #4 Satin Finish – 18 Gauge

C 12” Height – Full Width of Door.

D Secured with fasteners.

Part 3. EXECUTION

Section 3.01 INSTALLATION

A Installation Quality: Install wall and door protection according to manufacturer’s written instructions, level, plumb, and true to line without distortions. Do not use materials with chips, cracks, voids, stains, or other defects that might be visible in the finished Work.

B Mounting Heights: Install wall and door protection in locations and at mounting heights indicated on Drawings.
C  Floor Base to stop at either side of corner guard. Corner guard to extend to floor.

(i)  Accessories: Provide splices, mounting hardware, anchors, trim, joint moldings, and other accessories required for a complete installation.

D  Provide anchoring devices and suitable locations to withstand imposed loads.

END OF SECTION 102600
SECTION 10 28 00
TOILET, BATH, AND LAUNDRY ACCESSORIES

Part 1. GENERAL

Section 1.01 SUMMARY

A Section Includes:

(i) Public-use washroom accessories.

(ii) Under lavatory guards.

(iii) Custodial accessories.

Section 1.02 ACTION SUBMITTALS

A Product Data: For each type of product.

Section 1.03 CLOSEOUT SUBMITTALS

A Maintenance data.

Part 2. PRODUCTS

Section 2.01 PERFORMANCE REQUIREMENTS

A Structural Performance: Design accessories and fasteners to comply with the following requirements:

(i) Grab Bars: Installed units are able to resist 250 lbf (1112 N) concentrated load applied in any direction and at any point.

Section 2.02 PUBLIC-USE WASHROOM ACCESSORIES

A Toilet Tissue (Roll) Dispenser:

(i) Supplied by owner & installed by Contractor.

B Paper Towel (Roll) Dispenser:

(i) Supplied by Owner & Installed by Contractor.

C Waste Receptacle:

(i) Supplied by Owner and installed by Contractor.

D Soap Dispenser:

(i) Supplied by Owner and installed by Contractor.

E Baby Changing Station

(i) Supplied by Owner and installed by Contractor.
F Feminine Hygiene Waste Receptacles
   (i) Supplied by Owner and installed by Contractor.

G Toilet Seat Cover Dispenser
   (i) Supplied by Owner and installed by Contractor.

H Grab Bar: (Supplied & Installed by Contractor)
   (i) Mounting: Flanges with concealed fasteners.
   (ii) Material: Stainless steel, 0.05 inch (1.3 mm) thick.
      a. Finish: Smooth, ASTM A480/A480M No. 4 finish (satin) on ends and slip-resistant texture in grip area.
   (iii) Outside Diameter: 1-1/4 inches (32 mm).
   (iv) Configuration and Length: As indicated on Drawings.

I UNDER LAVATORY GUARDS (Supplied & Installed by Contractor)
   (i) Under lavatory Guard:
      a. Description: Insulating pipe covering for supply and drain piping assemblies that prevents direct contact with
         and burns from piping; allow service access without removing coverings.
      b. Material and Finish: Antimicrobial, molded plastic, white.

Section 2.03 CUSTODIAL ACCESSORIES

A Custodial Utility Shelf:
   (i) Description: With exposed edges turned down not less than 1/2 inch (13 mm) and supported by two triangular
      brackets welded to shelf underside.
   (ii) Size: 36 inches (914mm) long by 6 inches (152 mm) deep <Insert dimensions>.
   (iii) Material and Finish: Not less than nominal 0.05-inch- (1.3-mm-) thick stainless steel, ASTM A480/A480M No. 4
      finish (satin).

B Custodial Mop and Broom Holder:
   (i) Description: Unit with shelf, hooks, holders, and rod suspended beneath shelf.
   (ii) Length: 36 inches (914 mm).
   (iii) Hooks: Four.
   (iv) Mop/Broom Holders: Three, spring-loaded, rubber hat, cam type.
   (v) Material and Finish: Stainless steel, ASTM A480/A480M No. 4 finish (satin).
      a. Shelf: Not less than nominal 0.05-inch- (1.3-mm-) thick stainless steel.
b. Rod: Approximately 1/4-inch- (6-mm-) diameter stainless steel.

C Custodial Paper Towel (Roll) Dispenser:
   (i) Supplied by Owner & Installed by Contractor

D Custodial Soap Dispenser:
   (i) Supplied by Owner & Installed by Contractor.

Section 2.04 LABORATORY ACCESSORIES

A Paper Towel (Roll) Dispenser:
   (i) Supplied by Owner & Installed by Contractor.

B Waste Receptacle:
   (i) Supplied by Owner and installed by Owner.

C Soap Dispenser:
   (i) Supplied by Owner and installed by Contractor.

Section 2.05 FABRICATION

A Keys: Provide universal keys for internal access to accessories for servicing and resupplying. Provide minimum of ten (10) keys to Owner’s representative.

Part 3. EXECUTION

Section 3.01 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.

   (i) Remove temporary labels and protective coatings.

B Grab Bars: Install to comply with specified structural-performance requirements.

END OF SECTION 102800
SECTION 10 44 13
FIRE PROTECTION CABINETS

Part 1. GENERAL

Section 1.01 SUMMARY

A Section Includes:

(i) Fire-protection cabinets for portable fire extinguishers.

Section 1.02 ACTION SUBMITTALS

A Product Data: For each type of product.

Section 1.03 CLOSEOUT SUBMITTALS

A Maintenance data.

Section 1.04 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

Section 2.01 FIRE-PROTECTION CABINET

A Cabinet Type: Suitable for fire extinguisher.

B Cabinet Construction: Nonrated, unless noted otherwise on plans. Coordinate with code plans.

C Cabinet Material: Cold-rolled steel 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).

(i) Square-Edge Trim: 1-1/4- to 1-1/2-inch (32- to 38-mm) backbend depth.

E Cabinet Trim Material: Steel sheet.

F Door Material: Steel sheet.

G Door Style: Full acrylic bubble, frameless.

H Door Glazing: Molded acrylic bubble.

(i) Acrylic Bubble Color: Clear, transparent.

I Door Hardware: Manufacturer's standard door-operating hardware of proper type for cabinet type, trim style, and door material and style indicated.
J Accessories:

(i) Mounting Bracket: Manufacturer's standard steel, designed to secure fire extinguisher to fire-protection cabinet, of sizes required for types and capacities of fire extinguishers indicated, with plated or baked-enamel finish.

(ii) Lettered Door Handle: One-piece, cast-iron door handle with the word "FIRE" embossed into face.

(iii) 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."

   a) Location: Applied to cabinet door.

   b) Application Process: Pressure-sensitive vinyl letters.

   c) Lettering Color: Red.

   d) Orientation: Vertical.

(iv) Materials:

   b. Cold-Rolled Steel: ASTM A1008/A1008M, Commercial Steel (CS), Type B.

   a) Finish: Baked enamel, TGIC polyester powder coat, HAA polyester powder coat, epoxy powder coat, or polyester/epoxy hybrid powder coat, complying with AAMA 2603.

   b) Color: As selected by Architect from manufacturer's full range.

Section 2.02 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.

Part 3. EXECUTION

Section 3.01 INSTALLATION

A Prepare recesses for semi-recessed fire-protection cabinets as required by type and size of cabinet and trim style.

B Install fire-protection cabinets in locations and at heights acceptable to authorities having jurisdiction.

C Fire-Protection Cabinets: Fasten cabinets to structure, square and plumb.

D Identification: Apply vinyl lettering at locations indicated.

E Adjust fire-protection cabinet doors to operate easily without binding. Verify that integral locking devices operate properly.

END OF SECTION 104413
SECTION 10 44 16
FIRE EXTINGUISHERS

Part 1. GENERAL

Section 1.01 SUMMARY
A Section includes portable, hand-carried fire extinguishers and mounting brackets for fire extinguishers.

Section 1.02 ACTION SUBMITTALS
A Product Data: For each type of product.

Section 1.03 CLOSEOUT SUBMITTALS
A Operation and maintenance data.

Section 1.04 COORDINATION
A Coordinate type and capacity of fire extinguishers with fire-protection cabinets to ensure fit and function.

Part 2. PRODUCTS

Section 2.01 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.

Section 2.02 PORTABLE, HAND-CARRIED FIRE EXTINGUISHERS
A Fire Extinguishers: Type, size, and capacity for each fire-protection cabinet and mounting bracket indicated.

(i) Instruction Labels: Include pictorial marking system complying with NFPA 10, Appendix B, and bar coding for documenting fire-extinguisher location, inspections, maintenance, and recharging.

B Carbon Dioxide Type: UL-rated [5-B:C, 5lb (2.3-kg) normal capacity, with carbon dioxide in manufactures standard enameled-metal container.

Section 2.03 MOUNTING BRACKETS
A Mounting Brackets: Manufacturer's standard steel, designed to secure fire extinguisher to wall, within cabinet, or structure, of sizes required for types and capacities of fire extinguishers indicated, with plated or red baked-enamel finish.

B Identification: Lettering complying with authorities having jurisdiction for letter style, size, spacing, and location. Locate as indicated by Architect.

(i) Identify bracket-mounted fire extinguishers with the words "FIRE EXTINGUISHER" in red letter decals applied to mounting surface.
Part 3. EXECUTION

Section 3.01 INSTALLATION

A Examine fire extinguishers for proper charging and tagging.
   (i) Remove and replace damaged, defective, or undercharged fire extinguishers.

B Install fire extinguishers and mounting brackets in locations indicated and in compliance with requirements of authorities having jurisdiction.
   (i) Mounting Brackets: Top of fire extinguisher to be at code required height above finished floor.

C Mounting Brackets: Fasten mounting brackets to surfaces, square and plumb, at locations indicated.

END OF SECTION 104416
SECTION 11 30 13
APPLIANCES & EQUIPMENT

Part 1. GENERAL

Section 1.01 SUMMARY

A Section Includes:

(i) Refrigeration Appliances.

(ii) Dishwasher

(iii) Garbage Disposal

(iv) Microwave

(v) Copier and Printers

(vi) Computers

Part 2. PRODUCTS

Section 2.01 PERFORMANCE REQUIREMENTS

A Electrical Appliances: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

B Appliances are to be UL listed.

Section 2.02 CONTRACTOR SUPPLIED AND INSTALLED EQUIPMENT

A Garbage Disposal

Section 2.03 OWNER SUPPLIED AND CONTRACTOR INSTALLED EQUIPMENT

A Dishwasher

Section 2.04 OWNER SUPPLIED AND INSTALLED EQUIPMENT

A Refrigerator / Freezer

B Microwave

C Copier and Printers

D Computers

Section 2.05 REFRIGERATOR/FREEZER

A Refrigerator/Freezer; Basis of design information, appliance supplied and installed by owner.

(i) Manufacture: GE or approved equal.
(ii) Type: Freestanding Bottom Freezer unit

(iii) Storage Capacity:

(iv) General Features:
   a. Interior light in refrigeration compartment.
   b. Interior light in freezer compartment.
   c. Door Alarm
   d. Temperature Control
   e. 2 Humidity Control Drawers
   f. Snack Drawer
   g. Icemaker

(v) ENERGY STAR: Provide appliances that qualify for the EPA/DOE ENERGY STAR product-labeling program.

(vi) Front Panel: Manufacturer's standard, Stainless.

Section 2.06 DISHWASHER

A Dishwasher, Basis of design information, appliance supplied and installed by contractor.

(i) Manufacturer: GE

(ii) Type: 24” Standard Height dishwasher

(iii) Features
   a. Stainless Steel Interior
   b. Hidden Controls
   c. 3-Level Wash
   d. Auto Sense Cycle
   e. Stainless Steel front
   f. Removable filter
   g. ADA Compliant (ADA Counter Height)

Section 2.07 GARBAGE DISPOSAL

A In Sink Kitchen Garbage Disposal, supplied and installed by contractor.
Section 2.11 LAB EQUIPMENT

A. Commercial rated Microwave appliance supplied and installed by owner.

(i) Manufacturer: Insinkerator
(ii) Model: Evolution
(iii) Horsepower: 3/4
(iv) Grind Stages: 3 Stage
(v) Features:
   a. Easy Connect
   b. Quiet
   c. Finest Grind
   d. Stainless Steel components
   e. Continuous Feed
   f. 9-year min. Warranty

Section 2.9 COPIER

A. Floor Mounted Multi-function copier/printer, supplied and installed by owner.

(i) Features:
   a. Counter Mounted
   b. Plug-in Connection
   c. Wattage as determined by Owner.
   d. Stainless Steel Finish

Section 2.10 COMPUTERS

A. Desktop computers by owner and installed by owner.

(i) Note: These are some connections and spacing planning for equipment that is going to be in the future.
Section 3.01 INSTALLATION

A  Built-in Equipment: Securely anchor unit with concealed fasteners. Verify that clearances are adequate for proper functioning and that rough openings are completely concealed.

B  Install per manufacturer instructions.

C  Provide necessary connections as shown in the drawings and as stated on the owner supplied cut sheets.

Section 3.02 FIELD QUALITY CONTROL

A  Perform the following tests and inspections:

   (i) Perform visual, mechanical, and electrical inspection and testing for each appliance according to manufacturers’ written recommendations. Certify compliance with each manufacturer's appliance-performance parameters.

   (ii) Leak Test: After installation, test for leaks. Repair leaks and retest until no leaks exist.

   (iii) Operational Test: After installation, start units to confirm proper operation.

   (iv) Test and adjust controls and safeties. Replace damaged and malfunctioning controls and components.

B  An appliance will be considered defective if it does not pass tests and inspections.

C  If it is an owner supplied contractor installed appliance notify owner of defective equipment and coordinate replacement with a new piece of equipment.

END OF SECTION 11 30 13
SECTION 12 24 00
WINDOW SHADES

Part 1. GENERAL

Section 1.01 SUMMARY

A Section includes:

(i) Cloth Window Shades.

a. Provide window shades complete, including brackets, valance, fittings, and hardware.

Section 1.02 ACTION SUBMITTALS

A Product Data: For each type of product.

B Product Schedule

Section 1.03 SAMPLES

A Shade cloth, each specified type, 24” square.

B Valance: 2x2 sample, each specified type

Section 1.04 CLOSEOUT SUBMITTALS

A Operation and maintenance data.

Section 1.05 WARRANTY

A Manufacturer's Standard Warranty: 3 years minimum from date of installation covering all manufacturer's defects including workmanship.

B Full Warranty: 1-year full warranty covering replacement of all parts, including cost of labor to replace defective, damaged, or non-working products.

Section 1.06 DELIVERY, STORAGE, AND HANDLING

A Do not deliver window shades until the building is enclosed and construction with spaces which require shades is substantially complete.

B Deliver products in manufacturer’s unopened, original, undamaged containers with all labels intact.

C All containers and shades to be labeled according to the window shade schedule.

D All products are to be stored in manufacturer’s unopened packaging until site is ready for installation.

Section 1.07 COORDINATION

A Coordinate width of and height of shades with window construction.

(i) Provide Necessary backing and support for mounting window shades.
Part 2. PRODUCTS

Section 2.01 COMMERCIAL CLOTH SHADES (TYPE 1)

A Light-Filtering shade cloth: Woven fabric, stain and fade resistant.

B Color: Charcoal

C Operation: Manual, Chain Driven

D Locations: Exterior Storefront windows in all rooms and spaces
   (i) Exclude: All interior windows and doors.
   (ii) Exclude: All exterior swing doors but include shades on sidelights and above doors (Transoms).

E Valance, Mounting Hardware, and Fittings
   (i) Brushed Aluminum with clear anodized finish.
   (ii) Chain Finish: Brushed Aluminum or Chrome.

Section 2.02 ROLLER SHADE COMPONENTS

A Rollers: Extruded aluminum or corrosion-resistant aluminum tubes sized to accommodate roller operating mechanisms and specific shades without deflection. Equip with permanently lubricated drive end and idle-end assemblies configured to allow removal of shades for servicing.
   (i) Shade-to-Roller Attachment: Manufacturer’s standard method.

B Chain-and-Clutch Operating Mechanism: Continuous-loop bead chain and clutch that stops shade movement when bead chain is released; with upper and lower limit stops; permanently adjusted and lubricated.
   (i) Bead Chains: #10 qualified stainless-steel chain rated to 90lbs minimum breaking strength.
      a. Loop Length: Full Length of roller shade.
      b. Chain-Tensioner type: Jamb Mounted.
         a) Color: Clear

C Mounting Hardware: Manufacturer’s standard brackets or endcaps, corrosion resistant and compatible with roller assembly, operating mechanism, installation accessories, and mounting location and conditions.
   (i) Bracket to be a minimum of one sixteenth (1/16) inch stamped steel, or heavier as required.

D Shade Bottom:
   (i) Manufacturer’s Standard bottom rail: to match shade color.

E Installation Accessories:
   (i) Front Fascia: Aluminum extrusion that conceals front and underside of roller and operating mechanism and attaches to roller endcaps without exposed fasteners.
a. Shape: L-Shape

b. Height: Fabricators standard height required to conceal roller and shade assembly when shade is rolled up, but not less than two (2) inches in height.


d. Endcaps to match Front Fascia

Section 2.03 ROLLER WINDOW SHADE FABRIC

A Light Filtering Fabrics

(i) SheerWeave Style 2000 (5%) by Phifer: Openness Factor: Approximately 5%. Composition: 37% Fiberglass, 63% Vinyl on Fiberglass. Fire Classification: California U.S. Title 19 (small scale) NFPA 701-2004 TM#1 (small scale), NFPA 101 (Class A Rating), UBC (Class 1), ASTM D3273, Includes Microban antimicrobial additives.

a. V22 Charcoal/Gray.

Section 2.04 ROLLER WINDOW SHADE UNIT FABRICATION

A Roller window shade unit sizes: Fabricate units in sizes required to fill openings in configuration indicated.

(ii) Inside of jamb installation: Width and length equal to opening size less clearances recommended by manufacturer.

Part 3. EXECUTION

Section 3.01 FIELD MEASURE

A Field measure all openings at time of rough opening. Account for all finishes to be applied.

B Determine measurements prior to ordering, don’t rely off drawings for measurements, verify measurements in field and as-built condition.

Section 3.02 EXAMINATION

A Examine roller window shade unit substrates with installer for compliance with approved submittals and other conditions affecting performance of the Work.

B Proceed with installation once unsatisfactory conditions have been corrected.

Section 3.03 PREPARATION

A Contractor shall clean surfaces thoroughly prior to installation.

B Coordinate requirements for blocking and structural supports to ensure adequate means for installation of window shades.

C Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

Section 3.04 INSTALLATION
A Install roller window shade units’ level, plumb, square, and aligned with adjacent units according to fabricator’s written instructions.

B Install all windows as designated in the window roller shade schedule.

C Adjust and balance roller shades to operate smoothly, easily, safely, and free from binding tracking or malfunction throughout entire operational range.

Section 3.05 CLEANING AND PROTECTION

A Clean roller window shade unit surfaces, after installation, according to manufacturer’s written instructions.

B Provide final protection and maintain conditions that ensure that roller window shade units are without damage at time of substantial completion.

C Protect installed products until completion of project.

D Replace damaged roller window shade units that cannot be repaired, before time of substantial completion.

END OF SECTION 122400
SECTION 13 35 53
STAINLESS STEEL LABORATORY CASEWORK

Part 1. GENERAL

Section 1.01 SUMMARY

A Section Includes:

(i) Stainless Steel Casework

Section 1.02 ACTION SUBMITTALS

A Product Data: Showing typical construction materials, features, options, testing, and information data.

B Show Drawings: Showing models used, dimensional data, and configuration. Plans and elevations must be included.

C Color Chips: Provide one complete set of color chips representing the manufacturer’s full range of available colors. Minimum sample size 2 inches by 2 inches.

Section 1.03 INFORMATIONAL SUBMITTALS

A Maintenance information and product cut sheets.

Section 1.04 QUALITY ASSURANCE

A Manufacture Qualifications:

(i) The manufacture must have been manufacturing stainless steel laboratory casework for the last 5 years.

(ii) The products must be tested by an independent testing laboratory.

B Installer Qualifications:

(i) The installer must have experience installing stainless steel cabinets or installation of custom wood cabinets.

(ii) Do not proceed with installation until all products have been approved by the Architect, Owner, and Construction Manager.

Section 1.05 DELIVERY, STORAGE AND HANDLING

A Packaging, Shipping, Handling and Unloading

(i) Packaging: Products shall have packaging adequate enough to protect finished surfaces from soiling or damage during shipping, delivery and installation.

(ii) Delivery: Casework delivery shall only take place after painting, utility rough-ins and related activities are completed that could otherwise damage, soil or deteriorate casework in installation areas.

(iii) Handling: Care, such as the use of proper moving equipment, experienced movers, etc., shall be used at all times to avoid damaging the casework. Util installation takes place, any wrapping, insulation or method of protection applied to products from the factory will be left in place to avoid accidental damage.

B Acceptance at Site:

601 E. Front Ave. Ste. 201 Coeur d’Alene, Idaho 83814 Ph: 208.664.1773 Email: koln@millerstauffer.com
(i) Casework will not be delivered or installed until the conditions specified under Part 3, installation section of this document have been met.

C Storage:

(i) Casework shall be stored in the area of installation. If, prior to installation, it is necessary for casework to be temporarily stored in an area other than the installation area, the environmental conditions shall meet the environmental conditions specified by the manufacturer and these specifications.

D Waste Management and Disposal:

(i) The supplier or installer of the casework is responsible for removing any waste or refuse resulting from the installation of, or work pertaining to the casework, thereby leaving the project site clean and free of debris. Trash containers to be provided by others.

Section 1.06 PROJECT SITE CONDITIONS

A Building must be enclosed (Windows and doors sealed and weather-tight);

B An operational HVAC system that maintains temperature and humidity at occupancy levels must be in place;

C Adjacent and related work shall be complete;

D Ceiling, overhead ductwork and lighting must be installed;

E Site must be free of any further construction such as “wet work”;

F Required backing and reinforcement must be installed accurately and the project must be ready for casework installation.

Section 1.07 WARRANTY

A Furnish a written warranty that Work performed under this Section shall remain free from defects as to materials and workmanship for a period of two (2) years from date of shipment. Defects in materials and workmanship that may develop within this time are to be replaced without cost or expense to the Owner.

(i) Defects include but are not limited to:

a. Ruptured, cracked, or stained coating.

b. Discoloration or lack of finish integrity.

c. Cracking or peeling of finish.

d. Slippage, shift, or failure of attachment to wall, floor, or ceiling.

e. Welding or structural failure.

f. Warping or unloaded deflection of components.

g. Failure of hardware.

Part 2. PRODUCTS

Section 2.01 MANUFACTURERS
A Acceptable Manufacture (Basis of Design):

(i) Labscape Furniture & Equipment: 100 Hilltop Rd. Ramsey, NJ 07446 Phone: 1 (800) 898-6649 Email: info@labscape.com

(ii) Other Approved Manufacturers: Mott Manufacturing LTD by New England Laboratory Casework Co., Inc

B Substitutions

(i) Must meet all specifications requirements and have prior approval to bidding.

(ii) Requests after bidding will only be accepted if approved manufactures cannot meet project timeline and will cause delay to project.

Section 2.02 CASEWORK MATERIALS

A Stainless Steel:

(i) Sheet: ASTM A240, Type 304 or 316 alloy.

(ii) Finish: Painted finish, Colors: Manufacture full range of colors.

   a. Chemical resistant baked on epoxy powder.

B Galvanized Sheet Steel:

(i) Commercial quality galvanized sheet steel to ASTM 653, designation Z275.

C Glass:

(i) Clear Float, 6mm and 3 mm thick, conforming to CAN2 12.3-M76, Glazing Quality. Laminated glass: CAN/CGSB-12.1-M90, Type 1 clear pvb interlayer. Total nominal thickness of laminated glass 6mm.

D Sealant:

(i) One component, RTV silicone sealant. Color to suit application.

E Resilient Base and Adhesive:

(i) Top set coved, 3mm (1/8") thick, 100 mm (4") high as indicated for base units, including pre-molded stops and external corners as selected from the manufactures full range of colors. Continuous lengths. Adhesive for rubber shall be trowelled on giving 100% coverage. Use an adhesive compatible with both surfaces, as recommended by the base manufacturer.

Section 2.03 CASEWORK CONSTRUCTION

A Materials and Thickness:

(i) Use the following minimum steel thicknesses for furniture manufacturing:

   b. 3mm (11 Ga) leveling bolt gusset plates.

   c. 1.9mm (14 Ga) drawer slides and side suspension channels.

   d. 1.5mm (16 Ga) for tubular rails, legs for tables, gusset plates, cabinet top and intermediate horizontal rails.
- 1.2mm (18 Ga) for door and drawer fronts, cabinet floor, cabinet sides, vertical front members, cabinet toe kick, service cover panels, table and kneehole frames, front rails, gable legs and dust caps, false panels, furring and filler panels.

- 0.9mm (20 Ga) for drawer backs, door backs, vertical closure channel, removable back panels, shelves, drawer bodies, drawer dividers, bin bodies, and pull-out shelves.

**B  Cabinet Frame:**

(i) Provide one-piece die-formed cabinet bottom construction with return side flanges turned down. Spot weld flanges to cabinet sides.

(ii) Cabinet bottoms shall be turned down at front to form 32mm (1-1/4”) “U” channel to accept toe kick and turn down 133mm (5-1/4”) at back with 16mm (5/8”) return to form the back lower member of cabinet base. Provide punched 19mm (3/4”) dia. corner holes for access to levelers and to accept PVC press plugs. It shall be possible to access levelers from above cabinet without removing drawers or drawer supports.

(iii) Provide additional vertical 75mm (3”) “HAT” shaped channels, spot-welded to or formed with the rear vertical corner. Channel shall be provided with pre-punched holes to receive shelf clips, and slotted holes to receive drawer suspension tracks. Cabinets 762mm (30”) wide and larger shall be provided with intermediate 117mm (4-5/8”) “HAT” channels to brace cabinet and accept shelf clips and drawer tracks.

(iv) Where applicable, the front corner posts shall be pre-punched and slotted to accept drawer suspension systems and suspension pull-out shelves. Front vertical posts shall form inboard flush front construction for doors and drawers acting as the cabinet main member side gable tying the cabinet bottom and horizontal member together to form a rigid case. Front post rear closure channels shall be “J” shaped 9mm (11/32”) x 33mm (1-5/16”) x 49mm (1-15/16”). Provide channel with pre-punched holes to receive shelf clips.

(v) Doors and drawers shall overlay top intermediates and floor horizontal members.

(vi) Top horizontal front framing member shall form a “J” shaped section 75mm (3”) wide, 10mm (3/8”) return by 25mm (1”) deep with 16mm (5/8”) return.

(vii) Intermediate horizontal framing members shall form a “U” 32mm (1-1/4”) high with a 25mm (1”) return on top and 16mm (5/8”) return on bottom.

(viii) Top rear horizontal framing member shall be 50mm (2”) x 32mm (1-1/4”) angle section welded to back corner lapped post and side gables with welded corner gusset plates acting as cabinet bracing and counter top material fixing member.

(ix) Enclose cabinetry toe space shall be 75mm (3”) deep x 100mm (4”) high and shall act as a total enclosure to bottom of cabinet. Toe space section shall key up into “U” shaped front floor member and act as reinforcement. Toe space, front floor of cabinet and corner post sections shall be spot welded together forming one structural member.

(x) The toe space members, side gable returns, and back lower member shall form all welded structural corner to accept leveler gussets and 10mm (3/8”) levelling bolts.

(xi) Cabinet construction shall be electro spot-welded to form a strong well-fitted, one-piece unit.

(xii) Exposed horizontal structural cabinet members between doors and drawers shall be unacceptable.

**C  Cabinet Hardware:**

(i) Pulls: Provide handles for drawers and hinged doors in 100mm (4”) stainless steel.
(ii) Door Hinges: Provide five knuckle-type barrel door hinges of 1.9mm (14 Ga) steel screwed into door and fastened to cabinet side stile with two counter sunk #8-32 zinc plated machine screws & captive serrated tooth washer nuts. Hinge finish shall be stainless steel.

D Base Cabinet Components:

(i) Provide removable back panels for cupboard base cabinets. Provide partial back panels 229mm (9") in height to accommodate plumbing at sink units. When requested, provide back panels and security panels on cabinets requiring locks.

(ii) Shelving edges; turned down on all four sides 25mm (1"), and returned under on front and back 25mm (1"). Shelves 914mm (36") and longer shall be provided with HAT channel reinforcement at front edge.

(iii) Doors:

a. Fabricate doors of 2 telescoping metal panels, 19mm (3/4") thick, with a sound deadening material extending continuously full-width, and top to bottom. Reinforce hinged side of door adequately with hinge machine screws to prevent sagging. Secure recessed hinges to cabinet posts with machine screws and concealed self-locking nuts. Provide nylon roller friction catches, mounted on horizontal top or intermediate members pull side of doors. Provide each hinged door with 2 rubber bumpers.

b. Doors, drawers, tracks and back panels shall be replaceable in the field without requiring special tools.

c. All standard double door cabinets shall be designed without center stiles to maximize access to the cabinet.

(iv) Drawers:

a. Fabricate drawer fronts of 2 telescoping metal panels and totally filled with sound deadening material to eliminate possible drumming effect. Form removable outside panel with lip to fit over inside panel on top edge, and to lock into position at bottom with rivets to form a rigid, one-piece 19mm (3/4") thick drawer front.

b. Provide drawer operation on Full Extension Drawer Slides, 508mm (20") extension, load capacity 45kg (100 pounds). Equal to: Knape & Vogt #8400B.

c. Drawer body shall consist of one piece stainless steel construction including the bottom, two sides, back and inner front flanged end which shall be welded to the interior drawer front head. The exterior drawer front shall have a channel formation on the top edge with ground smooth and fully finished return edges telescoping together to form fully sounded-deadened drawer front. Drawer bodies shall have a reinforcing bend on top edges.

d. Provide built-in stops to prevent inadvertent removal of drawers, with allowance for drawer to be removed by lifting front of drawers and pulling out. e) Provide drawer pulls in central location of drawer face. Two handles shall be provided on units 762mm (30") and larger.

(v) Tables:

a. Fabricate tables from metal skirting panels formed into 95mm (3-3/4") channel sections, and welded into a rigid frame construction. Notch corners and reinforce to receive 50mm (2") square metal tubular legs bolted securely in place. Provide leg with 10mm (3/8") leveling devices and slip-on type black PVC shoes.

b. Construct mobile tables the same as standard laboratory tables, except for the table legs which shall be designed to receive swivel casters.

c. Casters shall be as manufactured by Colson Casters. Casters shall be non-marking type urethane tires in grey color.
d. **Table Bracing:** Table bracing members shall consist of 25mm (1") x 50mm (2") removable tube members, installed between legs according to two table bracing configurations. Removable bracing shall be mechanically fixed to concealed "U" shaped mounting bracket welded on each leg. Where called for, provide table braces welded to legs as a fixed rigid bracing system.

e. **Table Drawers:** Where called for, drawers located in table aprons shall be supplied in a maximum width of 381mm (15") with two drawers supplied in tables 1219mm (48") and wider. Drawer suspension shall be with 25mm (1") nylon ball bearing rollers and self-closing action, and custom manufactured 1.5mm (16 Ga) suspension system.

(vi) **Leg Sets:**

a. Leg sets shall consist of two 50mm (2") square metal tubular legs complete with steel bolt levelers and slip on PVC shoes.

b. Legs, when secured together, shall be provided with 25mm (1") x 50mm (2") steel rail centered 203mm (8") up from bottom of leg.

c. Top of legs, both standing and sitting heights, shall have a 1.9mm (14 Ga) triangular mounting plate welded in position for securing to underside of countertop.

(vii) **Apron Drawer Assembly:**

a. Apron drawer assembly shall be fabricated from metal channel shaped skirting panels of modular widths the same as standard base cabinets. Rails 95mm (3-3/4") high channel ends shall be turned to fit into end mounting brackets. Drawer suspension framing shall be mechanically fixed to channels, welded integrally with front and back channel sections formed into a rigid one-piece frame.

b. Where called for, drawers located in table aprons shall be supplied in a maximum width of 381mm (15") with two drawers supplied in tables 1219mm (48") and wider. Drawer suspension shall be with 25mm (1") nylon ball bearing rollers and self-closing action, custom manufactured 1.5mm (16 Ga) suspension system.

(viii) **Front Rails:**

a. Front rail units shall be fabricated from a single metal channel-shaped skirting panel in modular widths the same as standard base cabinets. Channel ends shall be turned to fit into end mounting brackets. Rails are 95mm (3-3/4") high.

(ix) **Gable Legs:**

a. Gable legs shall consist of two telescoping side panels totally enclosed on all four sides and welded to form a strong rigid unit.

b. Gables shall be 38mm (1-1/2") thick with 75mm x 100mm (3" x 4") toe space and designed to be secured in a concealed fashion to the adjacent kneehole assembly or to the bench top material.

c. Gable legs shall be provided with two levelling devices.

(x) **File Drawer Cabinets:**

a. Construct file drawer cabinets in similar manner to standard base cabinets, and consisting of 1 or 2 double height file drawers for low height or standard height file cases.

b. Provide each file drawer complete with 2 file supports and hanger rods.

c. The file drawer shall be provided with 508mm (20") full extension telescoping drawer tracks.
d. Hanger rods are adjustable to accommodate legal or letter size files.

(xi) Filler Panels:

a. Fabricate front filler panels complete with flanges on both sides and a 75mm x 100mm (3” x 4”) toe space along the working face.

b. Scribe filler panels shall be flanged on one side and flat on the other, to be cut on jobsite to suit wall conditions, and shall fit into double angles secured to the wall. No visible mounting screws permitted.

c. Corner filler panels shall be a two-piece construction, one fixed panel and the other a variable panel to facilitate room dimensions. Each shall have flanges and an integral 75mm x 100mm (3” x 4”) toe space filler to interlock with its counterpart.

d. End closing filler panels shall be flanged on one side 25mm (1”) and secured to back of cabinet. The edge extending to wall shall be flat and fit into a double angle secured to wall. No visible mounting screws permitted.

(xii) Safety Storage Cabinets; Fume Hood Base Type (optional UL approved Model):

a. Construct storage cabinets of double wall, welded sheet steel construction with double panel door; overall thickness, 50mm (2”). Provide cabinets with 4 adjustable levelling devices to compensate for approximately 25mm (1”) base building floor differential. Raise door sill 50mm (2”) above bottom of the cabinet to form a liquid-tight well. Overlap cabinet frame with hinged doors having continuous piano type hinges with three-point locking mechanism ship lapped at opening stile. Shiplap shall be provided with braided fiberglass gasket.

b. Walls, back, side and top of cabinet shall be insulated with two inch (50mm) thick mineral fiber insulation.

c. Provide adjustable galvanized sheet steel shelves with four edges turned down 25mm (1”) and additionally returned under 16mm (5/8”) on all edges. Provide 13mm (1/2”) incremental shelf adjustment.

d. Provide 50mm (2”) vents, complete with fire baffle covers on each vent, with 50mm (2”) dia. fine metal filter.

e. Provide overlaid red warning letters 50mm (2”) high on doors as follows: “FLAMMABLE -- KEEP FIRE AWAY”.

f. Construction shall meet requirements of OSHA Standard 1910-106(d)(3), considered as organized storage centers for flammable and combustible liquids. Cabinets shall comply with National Fire Protection Association’s flammable and combustible liquids Code #30 and #45, 1996. Provide grounding screw lug in accordance with Codes.

g. Construct safety storage cabinets sized for under-counter and under fume hood configurations as required by Drawings. h) Cabinet shall be listed and labelled to the UL1275 standard.

E Floor/Wall Cabinet Components:

(i) Materials and Thicknesses: Use the following standard steel thicknesses for this furniture manufacturing:

a. 1.2mm (18 Ga) leveled prime grade furniture steel for sides, top, back, bottom, false bottom, dust caps and bases on tall storage cabinets.

b. 3mm (11 Ga) cold rolled steel for levelling device brackets on floor storage cabinets only.

(ii) Wall Storage Cabinets Sliding Glass Door or Open Type:
a. Cabinet sides, bottom and top shall be flat panels die-formed "U" shaped flange on front edge and a return flange on back edges. Provide top and bottom panels with 40mm (1-9/16") flanges on both ends with double returns. Reinforce front flanges on both sides and top with a flanged "U" shaped member. Both front side stile reinforcing channels shall contain a vertical row of shelf support clip holes 5mm (3/16") round or square and 13mm (1/2") o.c. Reinforce bottom with "U" channel.

b. Design of cabinet shall enable it to be easily converted to a sliding glass door cabinet.

c. Wall cabinets shall be provided with a flush bottom enclosure interlocking with front floor of cabinet as a telescoping panel with flange at rear and secured through the cabinet back.

d. Provide shelves with edges turned down on 4 sides 25mm (1"), and return under on front and back by 25mm (1"). Provide shelf adjustment on 13mm (1/2") increments for full height of cabinet interior. Provide a minimum of four plated shelf clips per shelf. Provide shelves 914mm (36") and longer with "HAT" channel reinforcement at front edge.

e. Provide sliding glass doors in 6mm (1/4") sheet glass with "H" shaped extruded aluminum shoes fixed to and running the full width of the door bottom. Provide vinyl glazing channel fixed into shoe. Provide 2 removable spring steel and nylon wheel assemblies, one located at each end. The door assembly shall run on an inverted double "Y" shaped extruded aluminum track. Provide each door at top with 2 PVC guides running in double "U" shaped extruded aluminum track. One finger pull per door shall be ground into glass on side of door next to cabinet frame.

f. Install bumpers on vertical reinforcement members of the cabinet frame.

(iii) Wall Storage Cabinets; Sliding Metal Doors & Framed Glass Doors:

a. Fabricate cabinet the same as above, with modified front side posts to accept sliding metal doors, generally as specified.

b. Doors shall be guided at the bottom with a full width black PVC double "U" channel fixed to floor of cabinet.

c. Upper track for sliding metal and framed glass doors shall be galvanized; double-track, "V" grooved, and painted to match furniture. Provide 2 suspended rollers per door, with special set of brackets for fixing to sliding doors. Nylon rimmed ball bearing rollers as specified for drawer track assemblies.

d. 3mm (1/8") glass shall be provided for frame glass doors.

(iv) Wall Storage Cabinets: Hinged Metal Doors:

a. Fabricate cabinets as specified above with two front side frames modified to minimize dust penetration. Provide intermediate exposed vertical members in a double "U" shaped channel. The front edges of the top panel shall have a channel formation reinforced with a flanged "U" channel. The exterior bottom panel shall have a channel formation at front and fitted with a flanged interior floor.

b. Hinged metal doors shall be as specified above.

(v) Floor Storage Cabinets; Sliding Glass Doors and Open Type:

a. Fabricate cabinet bottom as specified above with vertical height divided into two equal sections, each with a set of sliding doors and track system. Provide a finished floor full width and depth of interior with return flanges turned down on all four edges in both upper and lower sections and welded in place. Fabricate cabinet floor flush with front flange.

b. Provide a shelf separating upper and lower sections, with 40mm (1-9/16") flanges on all four sides, fixed and spot welded in place.
c. Provide built-in toe space 100mm (4”) high extending full width of cabinet recessed back 75mm (3”) from front face with a 10mm(3/8”) diameter steel threaded bolt type levelling device in each corner.

d. Provide sliding glass doors in 6mm (1/4”) sheet glass with "H" shaped extruded aluminum shoes fixed to and running the full width of the door bottom. Provide vinyl glazing channel fixed into shoe. Provide 2 removable spring steel and nylon wheel assemblies, one located at each end. The door assembly shall run on an inverted double "Y" shaped extruded aluminum track. Provide each door at top with 2 PVC guides running in double "U" shaped extruded aluminum track. One finger pull per door shall be ground into glass on side of door next to cabinet frame.

(vi) Floor Storage Cabinets - Hinged Metal Doors:

a. a) Construct cabinets as specified above.

b. Hinged metal doors as specified above.

(vii) Dust Cap:

a. Dust caps shall be fabricated from 1.2mm (18 Ga) steel, and shall mount flush with the front edge of the cabinet and extend back at an angle of 30 degrees to a point perpendicular to the rear of the cabinet. Ends shall be finished and flanged so as to allow attachment to the cabinet below.

Part 3. EXECUTION

Section 3.01 EXAMINATION

A Site Verification of Conditions:

(i) Casework will not be delivered or installed until the following conditions have been met:

a. Building must be enclosed (windows and doors sealed and weather-tight);

b. An operational HVAC system that maintains temperature and humidity at occupancy levels must be in place;

c. Ceiling, overhead ductwork and lighting must be installed;

d. Site must be free of any further construction such as “wet work.”

e. Required backing and reinforcements must be installed accurately and the project must be ready for casework installation.

Section 3.02 INSTALLATION

A Casework Installation:

(i) Casework shall be set with components plumb, straight and square, securely anchored to building structure with no distortion. Concealed shims shall be used as required.

(ii) Cabinets in continuous runs shall be fastened together with joints flush, uniform and tight with misalignment of adjacent units not to exceed 1/16 of an inch.

(iii) Wall casework shall be secured to solid material, not lath, plastic or gypsum board.

(iv) Top edge surfaces shall be abutted in one true plane. Joints are to be flush and gap shall not exceed 1/8 of an inch between tops units.
(v) Casework and hardware shall be adjusted and aligned to allow for accurate connection of contact points and efficient operation of doors and drawers without any warping or binding.

B  B. Countertop Installation:

(i) Countertops are to have been fabricated in lengths according to drawings, with ends abutting tightly and sealed with corrosion resistant sealant.

(ii) Tops will be anchored to base casework in a single true plane with ends abutting at hairline joints with no raised edges at joints.

(iii) Joints shall be factory prepared having no need for in-field processing of top and edge surfaces.

(iv) Joints shall be dressed smoothly, surface scratches removed and entire surface cleaned thoroughly

Section 3.03 CLEANING

A  Ensure all products are unsoiled and match factory finish. Remove or repair damaged or defective units.

B  Clean all finished surfaces, including drawers and cabinet shelves, and touch up as necessary.

C  Countertops shall be cleaned and free of grease or streaks.

Section 3.04 PROTECTION

A  Countertops and ledges shall be protected with ¼ inch ribbed cardboard for the remainder of the construction process.

B  Examine casework for damaged or soiled areas; replace, repair, and touch up as required.

C  Touch-up, repair or replace damaged products before substantial completion.

END OF SECTION 123553
SECTION 12 36 16
STAINLESS STEEL COUNTERTOPS

Part 1. GENERAL

Section 1.01 SUMMARY

A Section includes:
   (i) Stainless Steel Countertops

Section 1.02 ACTION SUBMITTALS

A Product Data: For each type of product.
B Shop Drawings
   (i) Show dimensions of section and method of assembly.
   (ii) Show details of construction at ½ scale.
C Samples
   (i) (1) 6” x 6” square sample of each top
      a. Include front edge detail, backsplash, and end or side detail.

Section 1.03 CLOSEOUT SUBMITTALS

A Maintenance data.

Part 2. PRODUCTS

Section 2.01 STAINLESS STEEL COUNTERTOPS

A Material:
   (i) Stainless Steel Type 304, Low Carbon Steel with chromium approx.. 10% min.
B Width:
   (i) As shown in plans and details.
C Depth:
   (i) As shown in plans and details.
D Gauge: 16 gauge.
E Front / Side Edge Height: 1 ½”
F Backsplash: 4” Integrated
G Fully Welded Seams.
H Edge Profile: Square
I Finish: Brushed Finish

Part 3. EXECUTION

Section 3.01 EXAMINE
A Examine field conditions, verify all base cabinets have been installed. All plumbing rough in has been completed.
B Make sure the project site is secure, weathertight, and the spaces are controlled for humidity and temperature.
C Verify the project site is clean adjacent coordinating work has been completed.
D Make sure base cabinets are plumb, square, and level.

Section 3.02 INSTALLATION

A Before installing countertops verify that wall surfaces have been finished as specified and that mechanical and electrical service locations have been installed and coordinated.
B Secure countertops to supporting rails of cabinets with metal fastening devices, or screws though tabs and hidden fasteners.
   (i) Where type, size or spacing of fastenings is not shown or specified, submit shop drawings showing proposed fastenings and method of installation.
   (ii) Use round head bolts and screws.
   (iii) Use sealant at all wall to counter connections.
C Factory or shop cut out for all plumbing and electrical fixtures. Obtain templates from appropriate contractors.
D Use as large as possible sections of countertops to minimize seams. Coordinate length with construction to confirm access.
E Install countertops true and plumb. Shim counters as necessary to provide level surfaces.
F Field weld seams to provide continuous counters.
G Coordinate all countertop construction with mechanical, electrical, and stainless steel cabinets.
H Remove all burs and ease all edges where possible.
I Brush all field welded seams to provide a uniform brushed finish.

Section 3.03 PROTECTION AND CLEANING

A Tightly cover and protect against dirt, water, chemicals, or mechanical damage.
B Remove all waste and packaging.
C Clean at completion of work.
D Provide documentation for maintenance of countertops.

END OF SECTION 123616
DIVISION 21 – FIRE SUPPRESSION
SECTION 21 00 00
FIRE SPRINKLER SYSTEMS

PART 1 - GENERAL

1.1 SCOPE:

A. General:

1. Specification Section 220000, Plumbing General Requirements, is to be included as part of this Section of the specification.

B. Work Included:

1. This section covers the work necessary to design and install a complete, satisfactory, and ready to operate wet pipe fire protection system for heated areas and dry pipe fire protection system for non-heated areas (areas subject to freezing). Hazard classification shall be as required by the State Fire Marshal, local City, IBC, IFC, and applicable NFPA Standards.

C. Qualifications of Installer:

1. All work shall be performed by a qualified, competent, licensed Fire Sprinkler Contractor who can furnish a verified list of satisfactory installations of this type and size, for a period of 5 years or more. Fire sprinkler contractor shall be licensed by the Idaho State Fire Marshal, and shall have in his employ an Engineering Technician (Level III), certified by NICET (National Institute for Certification in Engineering Technologies).

D. System Responsibility:

1. All work required for the fire protection system, including design and installation, shall be the responsibility of the Fire Sprinkler Contractor. Coordination with other trades is critical. Contractor shall coordinate his work with all ductwork, piping, electrical, etc., to ensure that all systems can be installed with a minimum of interference. Sprinkler heads shall be located in the center of ceiling tiles in the 2’ dimension and quarter spaced on 12” increments in the 4’ dimension. All piping penetrations through finished walls shall be provided with chrome escutcheons. Submittals which are required are only for the purpose of general coordination. Architect/Engineer assumes no responsibility or liability for the design of the system.

2. All monitoring of valves not shown on the electrical drawings shall be within the scope of work for the fire sprinkler contractor. This shall include, but not be limited to, the following: All conduit and wiring as required to monitor post indicator valves, tamper switches, and any other devices required to be supervised by the fire alarm panel. The sprinkler contractor shall also provide all power, wiring and conduit required for a complete and operational dry-pipe system (if required), unless such electrical is shown on the electrical drawings.

3. All dry piping shall be graded to drain back to the riser, regardless of location or presence of heat. Where not possible, piping may be graded to auxiliary drum drip drains. All locations of drains are to be approved by the Architect/Engineer prior to installation. All
exposed piping shall be installed as close to ceilings as possible while maintaining appropriate sprinkler deflector clearances and while providing minimum pipe grade per NFPA 13 requirements. Piping shall be designed and installed in a neat and symmetrical manor and shall be coordinated with all other trades and building features.

4. All wet piping may be installed flat and level but shall be installed so as to minimize the requirements for auxiliary drains. All exposed piping shall be installed as close to ceilings as possible while maintaining appropriate sprinkler deflector clearances. Piping shall be designed and installed in a neat and symmetrical manor and shall be coordinated with all other trades and building features.

5. Existing buildings without sprinkler systems: If an existing building has not previously had a fire sprinkler system, the Sprinkler Contractor is responsible to consult with a Structural Engineer and verify, in writing, that the existing building structure is capable of supporting the required new active sprinkler system.

6. Submittals are required are only for the purpose of general coordination. Architect/Engineer assumes no responsibility or liability for the design of the system.

7. The fire sprinkler system engineering documents must include as a minimum:
   a. The hazard classification, density, water flow and pressure requirements for the sprinkler system design.
   b. The storage arrangement and classification of commodities to be protected.
   c. Confirmation of adequate water supply based on water purveyor data.
   d. Riser location and feed main routing.

1.2 CODES AND STANDARDS:

A. The sprinkler system is to be designed and installed in accordance with the latest applicable building codes, State and Local Fire Marshals requirements, and all applicable NFPA Standards.

PART 2 - PRODUCTS

2.1 SUBMITTALS:

A. The Engineering Technician shall prepare and submit the following submittal data:
1. Complete equipment list of all equipment to be installed, including manufacturer's name and catalog number.
2. Layout drawing of complete sprinkler system indicating relationship of all other overhead items, including ductwork, lights, and structural members.
3. Complete details and sections as required to clearly define and clarify the design.
4. Plot plan indicating location of all underground connections, piping, valves, and related items.
5. Complete building section showing location of piping, sprinklers and applicable equipment in relation to other construction features.
6. Grooved joint couplings and fittings shall be shown on drawings and product submittals, and be specifically identified with the applicable style or series number.
7. Sprinklers shall be referred to on drawings, submittals and other documentation, by the sprinkler identification or model number as specifically published in the appropriate agency listing or approval. Trade names or other abbreviated designations shall not be allowed.
8. Sprinklers valve and equipment model numbers shall be specifically identified on drawings and shall match submittal data provided.

2.2 MATERIALS AND EQUIPMENT:

A. All materials shall be as specified below, or in accordance with applicable NFPA Standards:

1. Piping shall be black steel per NFPA 13 requirements and shall have a factory applied interior MIC or corrosion resistant coating. Piping shall be new and relatively free of exterior rust or corrosion. Piping with excessive rust or corrosion may be rejected. Threadable, thin wall piping will not be allowed. CPVC is allowed for underground only.
2. Fittings shall be 125 psi screwed cast or malleable iron for all threaded piping.
3. Fittings shall be Victaulic FireLock®, Anvil Gruviok, Grinnell or Shurjoint fire protection products for all grooved or plain end piping. Couplings shall consist of two ductile iron housings conforming to ASTM A536, a pressure responsive elastomer gasket, and zinc electroplated carbon steel bolts and nuts. Rigid type or flexible type where necessary.
   a. Rigid Type: Housings shall be cast to provide system rigidity and support and hanging in accordance with NFPA 13. Tongue and recess rigid type couplings shall only be permitted if the contractor uses a torque wrench for installation. Required torque shall be in accordance with the manufacturer’s recommendations. Contractor shall remove and replace any improperly installed joints. 11/4” and Larger: Standard rigid joint equal to Victaulic FireLock® Style 009 or equal.
   b. Flexible Type: Use in seismic areas where required by NFPA 13, Victaulic Style 75 or 77 or equal.
4. Dry pipe valves shall be installed in system risers per local water purveyor requirements.
   a. Dry Pipe Valve: Reliable EX Low Pressure Dry Valve (or preapproved equal, prior to award) shall be provided. Low differential, latched clapper design, black enamel coated ductile iron body, aluminum bronze clapper, with external reset and
nitrogen system trim package. Valve internal parts shall be replaceable without removing the valve from the installed position and be externally resettable. Valve shall be pre-trimmed with shut-off valve, 3-way ball valve, and actuator. Required system pressure shall be per manufacturer’s requirements. Valve shall have grooved ends for vertical installation only.

b. Dry pipe systems shall not exceed 750 gallons of total system volume for any reason, regardless of code allowances. The Fire Sprinkler Contractor is to determine how many systems are required and provide the correct number of systems as determined by their design.

5. Wet pipe risers shall be equipped with a Reliable brand (or equal) alarm valve / system check valve.
6. Butterfly control valves with supervisory tamper devices shall be installed for system control.
7. All materials and equipment shall conform to the requirements of Underwriter Laboratories (UL) or Factory Mutual Global (FMG), and shall be so stamped.
8. Pressure switches (water flow device) shall be installed in each system riser (dry pipe systems).
9. Flow switches (water flow device) shall be installed in each system riser (wet pipe systems).
10. Alarm Bell shall be 10-inch outdoor electric bell. Furnish for installation by the electrical contractor.
11. Sway Bracing, both lateral and longitudinal, shall be required and shall be installed per applicable NFPA Standards.
12. Fire Department Connection shall be provided for each system riser or manifold assembly. Install a 90-degree elbow with drain connection at each fire department connection to allow for system drainage to prevent freezing.
13. Sprinkler heads in main entry type areas and main conference room type areas shall be concealed flush mounted style with white paintable covers. All other sprinkler heads shall be Reliable Designer Model F1, (or equal), recessed with compression type escutcheon, below finished ceilings. Where surface mounted obstructions are installed, two-piece escutcheons and pendent sprinklers may be used, if required. Where sprinkler heads are subject to damage such as gymnasiums or mechanical lofts all sprinkler heads shall be provided with protective covers. Escutcheons shall be listed, supplied, and approved for use with the sprinkler by the sprinkler manufacturer. Where piping is exposed, install
standard bronze upright or pendant sprinklers. Quick response dry sidewall sprinklers shall be used as required to comply with IBC requirements for exterior canopies.

14. Provide 12 extra sprinkler heads mounted together in a suitable cabinet. Include Reliable brand sprinkler head wrenches matching each type of sprinkler head. Include spares of all types of sprinklers installed in the building.

15. Hangers, drains, and Inspectors Test Connections shall be installed in accordance with applicable NFPA Standards.

16. Test and Drain Valve: Globe design valve providing test port with ½” integral orifice and drain port in one unit. Bronze body with copper alloy internals, polycarbonate sight glasses, Nitrile o-rings and EPDM valve seats.


18. Post indicator valves as required by the State and Local Fire Marshall, or as shown on plans.

19. All piping penetrations through finished walls shall be provided with chrome escutcheons.

B. Underground piping materials and installation shall comply with N.F.P.A. #24 and local water company specifications.

PART 3 - EXECUTION

3.1 INSPECTION:

A. Upon completion of the system, secure the inspection of the required authorities and perform such tests as may be required to demonstrate compliance with local and state standards. Upon acceptance of the system by the inspecting authority, inform the Architect/Engineer in writing, showing proof of acceptance. Submit all required test certificates to required authorities.

B. The Fire Sprinkler Contractor shall monitor the nitrogen percentages until the system has reached 98% pure nitrogen and shall provide written verification, signed and acknowledged by the Owner’s representative of such achievement. This shall occur each time that the system is taken in and out of service for any reason connected to the requirements of the project.

3.2 INSTALLATION:

A. Grooved joint piping systems shall be installed in accordance with the manufacturer’s guidelines and recommendations. All grooved couplings, fittings, valves and specialties shall be supplied by a single manufacturer. The gasket style and elastomeric material (grade) shall be verified as suitable for the intended service as specified. Gaskets shall be supplied by grooved pipe manufacturer. Grooved end shall be clean and free from indentations, projections and roll marks in the area from pipe end to groove for proper gasket sealing. Contractor’s field personnel shall be properly trained in the installation of the manufacturer’s grooved piping products. A Factory trained representative shall periodically review the product installation. Contractor shall remove and replace any improperly installed products.

B. The sprinkler bulb protector must remain in place until the sprinkler is completely installed and before the system is placed in service. Remove bulb protectors carefully by hand after
installation. Do not use any tools to remove bulb protectors.

3.3 PROJECT CLOSEOUT

A. Operations & Maintenance Manual:

The Contractor shall provide an operations and maintenance manual at least thirty days prior to completion of work. The manual shall be of the three-ring binder type, entitled "Operations and Maintenance Manual", with the job name and year of completion also included. O & M manuals shall be submitted in a single package. In addition, the contractor shall provide two consolidated electronic versions on two separate thumb drives. Individual items will not be accepted independently unless approved by the Engineer. The manual shall be in accordance with NFPA 25 requirements.

END OF SECTION 210000
PART 1 - GENERAL

1.1 SCOPE:

A. General:

1. The Bidding Requirements, Contract Requirements, and the General Requirements (Division 01) of these specifications shall govern all parts of the work.

B. Work Included:

1. Install work in accordance with these specifications and the accompanying plans. Furnish all labor, material, and equipment together with all incidental items not specifically shown or specified which are required by good practice to provide the complete plumbing systems as described.

C. Coordination and Site Visits:

1. This section of the work requires examination of and reference to all architectural, structural, utility, and electrical drawings for construction conditions that may affect the work. Inspect the building site and existing facilities for verification of existing conditions. Base all measurements from established benchmarks. Any discrepancy between actual measurements and those indicated, which prevents following good practices or the intent of the drawings and specifications, shall be reported to the Architect/Engineer, and work halted until instructions are received from the Architect/Engineer.

1.2 CODES, PERMITS, FEES:

A. Install all work in accordance with applicable codes and standards. Obtain all required permits; pay all required fees including utility connections or extensions, in connection with this portion of the construction. Obtain all required certificates of inspection for the work.

PART 2 - PRODUCTS

2.1 MATERIALS AND WORKMANSHIP:

A. Materials:

1. All materials and equipment shall be of first quality, new, full size and weight, standard in every respect, and suitable for the space required. Use the same manufacturer for
products of similar class or service, such as valves and pumps. Protect all materials against loss, theft, or damage before and after installation.

2. Furnish and install all necessary foundations, supports, pads, bases, and piers required for all materials and equipment furnished under this contract.

3. Provide all required firestopping at piping penetrations of fire rated walls, floors, ceilings, and roofs. Firestopping shall be 3M Fire Barrier Sealant CP 25WB+ or 3M Fire Barrier Rated Foam FIP 1-Step, or approved equal.

4. Provide a heat-expanding fire collar for all non-metallic piping up to 6” size at penetrations of fire rated walls, floors, and ceilings per ASTME 814.

B. Workmanship:

1. All materials and equipment shall be installed in a neat and workmanlike manner by competent specialists for each subtrade. Work shall be installed to the satisfaction of the Architect/Engineer with unsatisfactory work removed and reinstalled to his satisfaction at no extra cost to the Owner.

2. Provide all cutting and patching necessary to install the work specified in this section. Patching shall match adjacent surfaces. No structural members shall be cut without the approval of the Architect/Engineer. Provide all sleeves and inserts required before the floors and walls are built.

3. Locate all equipment that must be serviced in fully accessible positions. Provide clearance for removal of replacement parts and components, and with necessary couplings or flanges to remove the component for maintenance.

2.2 SUBMITTALS AND SUBSTITUTIONS:

A. Prebid Approval:

1. Manufacturer’s trade names and catalog numbers stated herein are intended to indicate the quality of equipment or materials desired. All manufacturers not specifically listed require prior approval. Submit catalog data, including specifications, of the proposed equipment to the Architect/Engineer for his approval at least 10 calendar days prior to bid opening. Notice of such approvals will be published in an addendum. Approval of listed alternate equipment manufacturers is for bidding only. Final approval is to be based on requirements of the plans and specifications.

B. Submittals:

1. Within thirty days after award of this contract, provide an electronic copy of a complete list of all materials and equipment proposed for this project. List shall contain make, type, manufacturer’s name, and trade designation of all materials and equipment. Submittal shall also include manufacturer’s complete specification for each item, including ratings, and dimensions as required to check space requirements. The scheduled equipment is the basis of design for physical size, etc. Alternate manufacturers shall not exceed the weight or physical size. Any changes to the Architectural, Structural and Mechanical systems due to alternate manufactures shall be the responsibility of the Contractor and Supplier. Submittals for fixtures, trim, and other plumbing related items, requiring submittals, shall be
submitted in a single complete package. Individual items will not be reviewed independently unless approved by the Engineer.

2. Approval of submittals shall not relieve the contractor from responsibility for deviations from the plans or specifications, unless he has, in writing, called the Architect's/Engineer's attention to deviations at the time of submission, and obtained his written approval. Approval of submittals does not relieve the contractor from responsibility for errors in shop drawings or literature.

C. Equipment Requiring Submittals:

1. Plumbing Fixtures & Trim
2. Valves
3. Cast Iron Soil Piping
4. Pipe Stands
5. Air Compressor

PART 3 - EXECUTION

3.1 ACCESSIBILITY & SAFETY:

A. Accessibility:

1. All equipment which must be serviced or operated shall be located in fully accessible position. Minor changes from the drawings may be made to allow for better accessibility. All changes shall be approved prior to actual installation.

2. Access panels shall be provided if required for accessibility. Access panels to be steel, flanged, hinged doors by Cendrex, model AHD, or equal. Size as required for installation. Subcontractor shall furnish the required panels to the General Contractor and the required location for all access panels, unless otherwise specified in the Architectural specifications. Panels shall be installed by the General Contractor.

B. Safety:

1. No water piping shall run immediately over or within a 3-foot plan view clearance of any electrical panel or motor starter. Where piping must be located within these zones, install piping inside a conduit to prevent water access to electrical equipment.

3.2 COORDINATION:

A. Coordinate all work with the various trades involved to provide a complete and satisfactory installation. The exact details of piping and equipment are not shown. No additional compensation will be made for offsets or relocation required in coordination with other trades.

B. Alterations required due to improper supervision by the subcontractor shall be made at no extra cost, to the satisfaction of the Architect/Engineer.
3.3 EXCAVATION & BACKFILL:

A. Excavate trenches required for underground piping to proper elevation and grade. Provide trenches with solid bottoms to allow support of piping along entire length with excavation at bells as required for jointing and inspection. Provide repairing of finished surfaces, and all required shoring, bracing, pumping, and protection for safety of persons and property. Observe all Local or State Safety Codes. Verify that elevations of existing utilities will allow for proper grading of piping connecting to existing utilities.

B. Excavation and Backfill shall be in accordance with the requirements of Division 31, of these specifications.

3.4 IDENTIFICATION AND CODING:

A. General:

1. The Contractor shall use ASME 13 standards for all piping identifications, color coding, and compliance.

B. Painting:

1. All painting of equipment, accessories, and piping shall be furnished and applied under the Architectural section of these specifications. All painting shall be completed before any identification markings are applied.

C. Piping:

1. Piping shall be labeled with the fluid conveyed and the direction of flow:
   
a. On both sides of wall or floor penetrations.
   
b. Once on every straight run of pipe.
   
c. No more than 20-foot intervals.
   
d. No more than 10-foot intervals in congested areas.
   
e. Within 3 feet of each piece of equipment, valve, or control device.

D. Label Color and Size Requirements:

All Piping shall be All pipes, and equipment shall be labeled according to ANSI standard A13.1. See table below for examples.

<table>
<thead>
<tr>
<th>Label Color Schedule Per ANSI A13.1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Water (Heating, chilled, potable, boiler feed, etc.)</td>
</tr>
<tr>
<td>Compressed Air</td>
</tr>
<tr>
<td>Natural Gas / Refrigerant / Steam</td>
</tr>
<tr>
<td>Fire Suppression</td>
</tr>
<tr>
<td>Equipment Labels*</td>
</tr>
</tbody>
</table>

*Label all equipment that is on generator power with a Red Background and White Letters
### Text Height Requirements

<table>
<thead>
<tr>
<th>Equipment Labels</th>
<th>Main Designation</th>
<th>Supplemental Info</th>
<th>Large Equipment w/viewing distances beyond 10 feet</th>
</tr>
</thead>
<tbody>
<tr>
<td>Piping</td>
<td>O.D. of ¾” to 1-⅛”</td>
<td>Letter Size: ½” high</td>
<td>Marker Size: 8” wide</td>
</tr>
<tr>
<td></td>
<td>O.D. of 1-⅛” to 2-⅜”</td>
<td>Letter Size: ¾” high</td>
<td>Marker Size: 8” wide</td>
</tr>
<tr>
<td></td>
<td>O.D. of 2-⅜” to 7-⅞”</td>
<td>Letter Size: 1-¼” high</td>
<td>Marker Size: 12” wide</td>
</tr>
<tr>
<td></td>
<td>O.D. of 8” to 10”</td>
<td>Letter Size: 2-½” high</td>
<td>Marker Size: 24” wide</td>
</tr>
<tr>
<td></td>
<td>O.D. over 10”</td>
<td>Letter Size: 3-⅝” high</td>
<td>Marker Size: 32” wide</td>
</tr>
<tr>
<td>Ceiling Labels</td>
<td></td>
<td>Letter height: ½” Minimum</td>
<td></td>
</tr>
</tbody>
</table>

### E. Valves:

1. Regardless of size, all valves shall be tagged with a numbered brass tag, 1-1/2 inches by 3 inches minimum in size and 0.051 inch thick. A valve chart indicating valve tag number, location, service, and normal position shall be mounted in a suitable framed and glassed cover in the main mechanical room or as directed. Valve chart shall be duplicated in the Maintenance and Operations Manual.

### F. Backflow Prevention Devices:

1. Regardless of size, all backflow prevention devices shall be tagged with a numbered brass tag, 1-1/2 inches by 3 inches minimum in size and 0.051 inch thick. A backflow prevention device chart indicating backflow prevention device tag number, location, and service shall be mounted in a suitable framed and glassed cover in the main mechanical room or as directed. A backflow prevention device chart shall be duplicated in the Maintenance and Operations Manual.

### 3.5 TESTING:

#### A. Piping:

1. All plumbing piping (drainage, water, gas) shall be tested in accordance with the requirements of local adopted plumbing code, latest edition. Other piping systems shall be tested hydrostatically to 1.5 times the operating pressure but not less than 100 psi, for a minimum period of two hours. If the test pressure falls more than 5 percent during the test period, the leak shall be located, repaired, and the test repeated.

2. Piping shall be tested before insulation has been installed. Delicate control mechanisms shall be removed during tests to prevent shock damage. The use of chemicals or compounds to stop leaks shall not be permitted.

3. A test report shall be submitted for each piping system test. Test report forms are part of Specifications Section 220100, or are available from the Engineer.

#### B. Systems:
1. All plumbing systems shall be tested at the completion of the building to establish that the systems operate as specified and required.

3.6 CLEANING AND ADJUSTING:

A. Thoroughly clean all parts of the system at the completion of the work. Flush all water circulating systems with fresh water and then drain. Clean all strainers and refill system. Adjust all devices for proper operation and lubricate all equipment as required. Repaint any painted surface that has been damaged.

B. All potable water systems shall be flushed and disinfected after tests are completed. Disinfection shall be in accordance with local municipal and State Plumbing Inspector’s criteria. In lieu of such criteria, the following procedure shall be followed for disinfection:

1. Completely flush system. Add alkali or acid (hydrochloric) to bring water ph level to between 7.4 and 7.6.
2. Inject chlorine (liquid, powder, tablet, or gas) throughout the system to obtain 50 to 80 mg/L residual.
3. Bleed water from outlets to ensure distribution, and test for residual at a minimum of 15 percent of the outlets.
4. Maintain disinfection in system for 24 hours.
5. If final disinfectant residual tests less than 25 mg/L, repeat treatment.
6. Flush disinfectant from system until residual is equal to that of incoming water, or 1.0 mg/L.
7. Take samples no sooner than 24 hours after flushing, from 10 percent of the outlets and the incoming water.

3.7 PROJECT CLOSEOUT:

A. Operations & Maintenance Manual:

The Contractor shall provide an operations and maintenance manual at least thirty days prior to completion of work. The manual shall be of the three ring binder type, entitled "Operations and Maintenance Manual", with the job name and year of completion also included. O & M manuals shall be submitted in a single package. Individual items will not be accepted independently unless approved by the Engineer. The manual shall include, as a minimum:
1. Maintenance instructions for all equipment, including lubrication requirements.
2. Fixture suppliers names, addresses, and telephone numbers.
3. Fixture catalog cuts, ratings tables, model numbers, serial numbers, and accessories.
4. Parts numbers for all replaceable parts.
5. Valve tagging chart as hereinbefore specified.
7. Any additional information required to enable the Owner to properly maintain the building plumbing system.
8. After approval of the Operations and Maintenance Manual by the Architect/Engineer, the Contractor shall furnish two copies of the manual to the Owner.

B. As-Built-Drawings:

1. Provide two sets of red-line mechanical drawings showing the work as it was actually installed. The drawings shall indicate all departures from the contract drawings and shall locate all underground utility lines with dimensions from established building lines. Make all notations neat and legible, with red indelible pencil. At the completion of the work, these as-built drawings shall be signed and dated by the Plumbing Contractor and returned to the Architect/Engineer.

C. Guarantee:

1. All work furnished under this section shall be guaranteed in writing to be free from defective work or materials for a period of one year after acceptance of the contract. All repairs or replacements because of defective materials or workmanship or noncompliance with code shall be provided without additional cost to the Owner. Contractor shall furnish a letter indicating above guarantee with space for date of acceptance and expiration of guarantee. Letter shall be included in O & M Manual.

END OF SECTION 220000
SECTION 22 01 00
PLUMBING

PART 1 - GENERAL

1.1 SCOPE:
   A. This section covers the work necessary for the plumbing system, complete. The Plumbing General Requirements, Section 220000, are to be included as a part of this section of the specifications.

1.2 CODES:
   A. The plumbing system shall be installed in accordance with the requirements of local adopted plumbing code, latest edition, International Fuel Gas Code, latest edition; and all local and State Codes.

1.3 FIXTURES & EQUIPMENT:
   A. General:

      1. Plumbing fixtures and equipment shall be as listed on the drawings. In addition to those specifically listed, the following manufacturers are approved for bidding only. All other manufacturers require prior approval. Final approval for installation is based on submittal data furnished:

         d. Stainless Steel Sinks: Elkay, Just.
         g. Valves and Trim: Brasscraft, Dearborn Brass, ProFlo, Sloan & T&S Brass.
         o. Wash Fountains: Acorn, Bradley, Intersan, Sloan, & Willoughby.
         p. Service Sinks: Acorn, Fiat, Mustee, Proflo, Stern Williams, & Zurn.
         q. Water Heaters (Tank): American, A.O. Smith, Bock, Bradford-White, Heat Transfer-
Phoenix, Lochinvar Shield, PVI, & Rheem.
r. System Valves: Apollo, Nebco & Red-White Valve Corp.
s. Backflow Preventers: Conbraco/Apollo, Watts, & Wilkins.
t. Hose Bibbs: Josam, J.R. Smith, Prier, MiFAB, Woodford, & Zurn.

2. Plumbing Fixture Standards:

All plumbing fixtures shall meet or exceed the following standards:

a. ANSI A112.6.1 - Supports for Off-the-Floor Plumbing Fixtures for Public Use.
b. ANSI A112.18.1 - Finished and Rough Brass Plumbing Fixture Fittings.
d. ANSI A112.19.2 - Vitreous China Plumbing Fixtures.
e. ANSI A112.19.3 - Stainless Steel Plumbing Fixtures (Designed for Residential Use).
f. ANSI A112.19.4 - Porcelain Enameled Formed Steel Plumbing Fixtures.
g. ANSI A112.19.5 - Trim for Water-Closet Bowls, Tanks, and Urinals.
h. ANSI Z358.1 - Emergency Eye Wash and Shower Equipment.
i. ARI 1010 - Drinking Fountains and Self-Contained Mechanically Refrigerated Drinking Water Coolers.
j. AWSI/ASSE 1001 – Atmospheric Vacuum Breaker
k. ANSI/ASSE 1012 - Backflow Preventers with Immediate Atmospheric Vent.
l. ANSI/ASSE 1011 - Hose Connection Vacuum Breakers.
m. ANSI/ASSE 1013 - Backflow Preventers, Reduced Pressure Principle.
n. ANSI/ASSE 1015 – Backflow Preventers, Double Check Principle
o. ANSI/ASSE 1019 - Wall Hydrants, Frost Proof Automatic Draining Anti-Backflow Types.
p. AWSI/ASSE 1020 – Pressure Vacuum Breaker
q. AWSI/ASSE – 1-52 – Hose Connection, Double Check
r. ANSI A112.21.1 - Floor Drains.
s. ANSI A112.21.2 - Roof Drains.
u. PDI WH-201 - Water Hammer Arresters.
v. ANSI/AWWA C606 – Grooved and Shouldered Joints
w. NSF/ANSI Standard 61 – Drinking Water System Components – Health Effects

PART 2 - PRODUCTS

2.1 PLUMBING FIXTURES & TRIM:

A. All plumbing fixtures shall be provided complete with all required trim for a complete and operational system. All piping penetrations through finished walls shall be provided with chrome escutcheons. All plumbing fixtures shall be caulked and sealed to surrounding surfaces. All sink traps shall be provided with a cleanout plug in the bottom of the trap. All interior exposed pipe, valves, and fixture trim shall be chrome plated, including kitchen compartment sinks. Braided stainless steel pipe risers are approved for concealed locations only, such as behind casework doors or lav shields. Each fixture shall be provided with stop valves and the stop valves shall be quarter-turn brass ball type. All fixtures and trim must be lead free. All floor drains and floor sinks shall be provided with trap primers (PPP, Zurn or Wade as needed for appropriate use. Provide ball valve type shut-off valve upstream of all trap primer valves).

2.2 PIPING AND FITTINGS:
A. General:

1. Underground sanitary sewer and storm drain lines shall be installed at 1/4” per foot slope, unless otherwise indicated. If such slope is not possible due to existing inverts, approval shall be obtained from the Architect/Engineer and the authority having jurisdiction before any piping is installed at a lesser slope.

2. Connections between piping of dissimilar materials shall be made with dielectric waterway fittings or unions.

3. Provide standard manufactured water hammer arresters at all flush valves. Size and locate per manufacturers recommendations. Provide access panels for access to all water hammer arresters.

B. Domestic & Non-Potable Hot and Cold Water:

1. Piping inside building above slab or above grade in crawl space shall be ASTM B88, Type "L", hard drawn copper. Fittings shall be ANSI/ASME B16.22 cast brass, or ANSI/ASME B16.29 wrought copper. Joints shall be ANSI/ASTM B32 solder, Grade 95-5, lead free.


   b. Piping Option – Mechanically Formed Extruded Outlets:

      1) Mechanically formed extruded outlets shall be perpendicular to the axis of the run tube (header). They shall be formed by drilling a pilot hole and drawing out the tube surface to form a collar having a height of not less than three times the thickness of the branch wall and shall conform to ASME B31.9 and NFPA 99. T-Drill or approved equal.

      2) Branch tubes shall not restrict the flow in the run tube. To ensure this by conforming the branch tube to the shape of the inner curve of the run tube, a dimple / depth stop shall be formed in the branch tube to ensure that penetration into the collar is of the correct depth. For inspection purposes, a second dimple shall be placed 0.25 inch above the first dimple. Dimples shall be aligned with the tube run.

      3) Branches can be formed up to the run tube size as shown in ASTM F 2014. Forming procedures shall be in accordance with the tool manufacturer’s recommendations.

      4) Joints shall be made with the use of approved brazing alloys BCup2 thru BCup5 (0-15% silver content). Brazed with a filler that has a melting point above 540 deg. Centigrade (1000 deg. F). Soft soldered joints are not allowed.

      5) K and L copper types allowed.

      6) Soft and Hard copper allowed.

      7) Each model used for making branch connections shall be permanently marked with manufacturer’s name and appropriate model number.

      8) Mechanically formed extruded outlets can (but not limited to) be used on commercial and residential buildings.

      9) Fitter / Plumber shall be trained and certified to operate the equipment.

2. Piping underground within 5 feet of the building line, smaller than 4 inches, shall be ASTM B88, Type "K", hard drawn copper. Piping below floor slab, smaller than 4 inches, shall be type "K", soft annealed copper. Fittings shall be ANSI/ASME B16.29 wrought copper. Joints shall be ANSI/ASTM B32 solder, Grade 95-5, lead free. No joints shall be installed.
beneath concrete floor slabs, unless approved by the Engineer. Underground or underslab copper piping shall be provided with a polyethylene jacket, ANSI/AWWA C105, or shall be wrapped with double layer, half-lapped, 10 mil polyethylene tape.

a. Underground (below slab) Piping Option- ½” to 4”, High Density Polyethylene (HDPE) pressure pipe. ASTM D3350, ASTM D3035 & ASTM F714. AWWA C901 & AWWAC906, NSF. Fittings shall be HDPE, solvent weld. Piping shall be rated for not less than 150 psig.

b. Trap Primer Piping (below floor or concealed only)
   1) ½” type K hard drawn copper, wrapped as indicated above.

3. Piping underground beyond 5 feet from building line shall be Schedule 40 PVC, ASTM D1785 or D2241. Fittings shall be PVC, ANSI/ASTM D2466. Joints shall be solvent weld, ASTM D2855, or gasketed, ASTM F477. Piping shall be rated for not less than 150 psig pressure.

C. Sanitary Sewer and Vent:

1. Piping and fittings shall be Schedule 40 PVC-DWV (cellular core), per ASTM F1488 and ASTM F891, solvent welded per solvent manufacturer's instructions, or ABS Schedule 40 piping and fittings per either ASTM D2661 or ASTM F628 with solvent cement conforming to ASTM D2235. All sewer risers (2 story or more) shall be service weight cast iron, no-hub or single-hub, ASTM A74. All piping penetrations through fire rated walls, floors, or ceilings, and all piping located above ceilings used as return air plenums shall also be cast iron or galvanized steel, ASTM A53. Underground PVC-DWV piping shall be installed per ASTM D-2321.

2. Piping and fittings beyond 5 feet from the building line shall be PVC, ASTM D3033 or D3034, SDR 35. Joints shall be ASTM F477 with elastomeric gaskets. Underground piping shall be installed per ASTM D-2321.

3. All 90 degree waste line elbows shall be formed per the latest issue of the adopted plumbing code, latest edition.

4. All exposed vent piping located in occupied areas or rooms, is to be cast iron with cast iron fittings.

5. All flush valve fixtures that are installed back to back shall have offset waste outlet fittings.

6. Cleanouts shall be provided at each horizontal drainage pipe, at its upper terminal, and each run of piping which is more than 100 feet and shall be provided for each 100 feet developed length, or fraction thereof of such piping. An additional cleanout shall be provided for each aggregate horizontal change of direction exceeding one hundred and thirty-five degrees, per applicable plumbing code. This shall be provided regardless of what is shown on the drawings.

7. All floor drains, floor sinks, and hub drains shall be installed with a trap primer.

   a. Flush Valve Primer: Trap primer shall be Precision plumbing products model FVP-1VB with vacuum breaker.
   b. Pressure Activated Primer: Trap primer shall be Precision Plumbing products Model CPO-500 with DU distribution unit if required.
   c. Tail Piece Primer: Trap primer shall be Precision Plumbing Products Model LTP-1500 with ½” clear poly flexible priming make up water line and chrome plated
escutcheons plates.

8. All vent’s through roof (VTR’S) shall be extended at least 1 foot above the roof surface, or to the top of the closest adjacent parapet wall, whichever is greater.

9. All piping exposed to exterior conditions with heat trace shall be insulated. Contractor to coordinate all instances with electrical.

D. Storm Drains:

1. Piping and fittings shall be Schedule 40 PVC-DWV (cellular core), per ASTM F1488 and ASTM F891, solvent welded per manufacturer’s instructions, or ABS Schedule 40 piping and fittings per either ASTM D2661 or ASTM F628 with solvent cement conforming to ASTM D2235. All piping located above ceilings used as return air plenums, and all piping penetrations through fire rated walls, floors, or ceilings shall be service weight cast iron, ASTM888 no-hub or single hub, ASTM A74. Underground piping shall be installed per ASTM D-2321.

2. Piping underground beyond 5 feet from the building line shall be PVC, ASTM D3033 or D3034, SDR 35, with PVC fittings. Joints shall be ASTM F477 with elastomeric gaskets. Underground piping shall be installed per ASTM D-2321.

3. Cleanouts shall be provided at each horizontal drainage pipe, at its upper terminal, and each run of piping 2” size which is more than 50 feet and shall be provided for each 50 feet developed length. 4” size or larger which is more than 100 feet developed length, or fraction thereof of such piping. Contractor shall coordinate with architect as to exact location of all storm water cleanouts as they exit the building, as cleanouts may need to be positioned within certain block elevations. An additional cleanout shall be provided for each aggregate horizontal change of direction exceeding one hundred and thirty-five degrees, per applicable plumbing code. This shall be provided regardless of what is shown on the drawings. Final determination of cleanout spacing shall be per local jurisdiction and code requirements and shall be installed accordingly.

4. Compressed Air:

5. Piping shall be Schedule 40 black steel pipe, ASTM A53, with black banded 200 pound malleable iron fittings and couplings.

6. Piping 2” and below may be ASTM A-312, Type 304/304L, Schedule 5S stainless steel in lieu of soldered copper.

   a. Fittings shall be precision, cold drawn austenitic stainless steel with elastomer O-ring seals. (O-ring shall be grade “E” EPDM for oil free compressed air, or grade “T” Nitrile for air with oil vapors) Vic-Press 304 or equal.

7. Alternate material - Piping inside building above slab or above grade shall be ASTM B88, Type “L”, hard drawn copper. Fittings shall be ANSI/ASME B16.23 cast brass or ANSI/ASME B16.29 wrought copper. Joints shall be ANSI/ASME B32 solder, Grade 95-5, lead free.

E. Natural Gas:
1. Piping shall be Schedule 40 black steel pipe, ASTM A53. Exposed fittings 2 inches and smaller shall be ANSI/ASME B16.3, screwed, black malleable iron.

2. Fittings larger than 2 inches and all underground fittings shall be Schedule 40 steel butt-welded type. Underground piping shall be provided with a polyethylene jacket, ANSI/AWWA C105, or shall be wrapped with double layer, half-lapped, 10 mil polyethylene tape.

   a. Contractors Option for Underground Pipe:
      2) Piping and fittings underground and outside the building line may be JM Eagle UAC 2000 MDPE, medium-density polyethylene yellow gas pipe or an approved equal. Piping shall be installed in accordance with JM Eagle Publication JME-12B, "Polyethylene Yellow Gas Distribution Installation Guide." JM Eagle’s UAC 2000 system can be joined by butt heat fusion, socket fusion, or saddle fusion. Installing contractor shall be licensed for fusion pipe installation of polyethylene pipe. ASTM D2513.

3. All exterior piping exposed to the weather shall be coated with a rust inhibitor – Rustoleum #866 Pro-Guard Primer – yellow or gray color – or approved equal.

F. Condensate Drain Piping:

1. Interior: Piping shall be Type L hard drawn copper, ASTM B88, with solder joints, grade 95TA, or maybe Schedule 40 PVC. Copper piping shall not be used on 90% condensing type equipment. Provide a neoprene or rubber gasket at all copper piping support hangers to inhibit corrosion.

   a. Inside Mechanical Rooms: Piping shall be Type L hard drawn copper, ASTM B88, with solder joints, grade 95TA, for durability reasons

2. Exterior to building (connected to roof mounted equipment): Piping shall be Schedule 40 PVC. A union shall be installed directly at the roof top equipment for ease of replacement in the future.

G. Hanger and Supports:

1. Pipe hangers shall be provided to adequately support all piping systems. Hangers shall be vertically adjustable to provide for proper pitch and drainage. Hangers shall allow for expansion and contraction of the piping system. Reference “General Regulations” of the latest edition of the adopted plumbing code, latest edition.

2. Hangers for pipe sizes 1/2 to 6 inches shall be adjustable clevis type, or unistrut saddles with all-thread hanger rod.

3. Hangers for hot pipe, sizes 6 inches and over shall be adjustable steel yoke, cast iron roll, double hanger type.


5. All insulated piping shall be provided with minimum 18 gauge galvanized insulation shields, 12 inches long, and oversized hangers. Pipe sizes 2 inches and over shall also be
provided with 12 inch long calcium silicate insulating blocks between the piping and the galvanized insulation shield.

a. Alternate: Insulated pipe support inserts may be provided at hanger, support, and guide locations on piping requiring insulation. The insert should consist of either Hydrous Calcium Silicate or Polyisocyanurate Foam insulation (Urethane) encircling the entire circumference of the pipe with a 360 deg. PVC (1.524 mm thick) or galvanized steel jacket and installed during the installation of the piping system. These insulated pipe support inserts shall be provided by the Mechanical Contractor and installed by the same during pipe support installation.

6. Hanger rod sizing and spacing for pipe shall be as follows:

<table>
<thead>
<tr>
<th>Pipe Size</th>
<th>Minimum Rod Diameter</th>
<th>Maximum Spacing</th>
</tr>
</thead>
<tbody>
<tr>
<td>To 1-1/4 inches</td>
<td>3/8 inch</td>
<td>6.5 feet</td>
</tr>
<tr>
<td>To 2 inches</td>
<td>3/8 inch</td>
<td>10 feet</td>
</tr>
<tr>
<td>To 3 inches</td>
<td>1/2 inch</td>
<td>10 feet</td>
</tr>
<tr>
<td>To 6 inches</td>
<td>5/8 inch</td>
<td>10 feet</td>
</tr>
<tr>
<td>8 to 12 inches</td>
<td>7/8 inch</td>
<td>12 feet</td>
</tr>
<tr>
<td>PVC &amp; ABS (all sizes)</td>
<td>3/8 inch</td>
<td>4 feet</td>
</tr>
<tr>
<td>Cast Iron No-Hub</td>
<td>5/8 inch</td>
<td>5 feet and</td>
</tr>
<tr>
<td></td>
<td></td>
<td>at joints</td>
</tr>
</tbody>
</table>

7. Provide hangers within 12 inches of each horizontal elbow.

8. Provide hangers with minimum 1-1/2 inches vertical adjustment.

2.3 INSULATION:

A. General:

1. Installer Qualifications: Skilled mechanics who have successfully completed an apprenticeship program or another craft training program certified by the Department of Labor, Bureau of Apprenticeship and Training.

2. Fire-Test-Response Characteristics: Insulation and related materials NFPA 255, UL Classified per UL 723 or meeting ASTM E 84, by a testing and inspecting agency acceptable to authorities having jurisdiction. Factory label insulation and jacket materials and adhesive, mastic, tapes, and cement containers, with appropriate markings of applicable testing and inspecting agency.

   a. Insulation Installed Indoors: Flame-spread index of 25 or less, and smoke-developed index of 50 or less.
   b. Insulation Installed Outdoors: Flame-spread index of 75 or less, and smoke-developed index of 150 or less.

B. Piping Insulation:

1. All domestic, potable & non-potable, hot and cold water lines, exposed waste and vent, and rain drains shall be insulated with preformed insulation.

   a. Fiberglass insulation with a vapor barrier jacket. Insulation shall have a conductivity
not exceeding 0.28 Btu-inch/hour-sq. ft.-degrees F. Laps and butt joints shall be sealed with pressure sensitive joint sealing tape of the same finish as the insulation jacket to provide a continuous vapor seal. Fittings and valves shall be insulated with PVC fitting covers and fiberglass insulation inserts, or with hydraulic setting insulating cement and four ounce canvass jacket with vapor barrier adhesive.

b. Alternate material for Cross-Linked Polyethylene Tubing (PEX): One piece preformed flexible elastomeric closed cell foam with built-in vapor barrier. Seal laps and butt joints with moisture resistant adhesive to provide a continuous vapor seal. Insulation shall have a conductivity rating not exceeding 0.27 Btu-inch/hour-sq. ft.-°F.

Insulation thicknesses shall be as follows:

<table>
<thead>
<tr>
<th>System</th>
<th>Pipe Sizes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Domestic Cold Water (pot. &amp; non-pot.)</td>
<td>½“</td>
</tr>
<tr>
<td>Domestic Hot Water &amp; Recirc. (pot. &amp; non-pot.)</td>
<td>1“</td>
</tr>
<tr>
<td>Roof Drain Piping</td>
<td>½“</td>
</tr>
<tr>
<td>Overflow Drain Piping</td>
<td>½“</td>
</tr>
<tr>
<td>Waste and Vent Piping (Exposed to exterior conditions)</td>
<td>½“</td>
</tr>
</tbody>
</table>

2. Roof and overflow drain sumps shall be insulated with 1/2“ thick fiberglass with a vapor barrier, extending 2“ onto adjacent insulation.
3. Insulation shall be installed in strict accordance with manufacturer’s instructions.
4. Insulation shall be continuous through penetrations.
5. All insulation shall be installed in a neat and workmanlike manner.

Fiberglass insulation with a vapor barrier jacket. Insulation shall have a conductivity not exceeding 0.28 Btu-inch/hour-sq. ft.-degrees F. Laps and butt joints shall be sealed with pressure sensitive joint sealing tape of the same finish

2.4 VALVE & STRAINERS:

A. Gate Valves:

1. Valves 2-inches and smaller shall be cast bronze body, ASTM B-62, rising stem, 200 psi WOG. Stems shall be dezincification-resistant silicon bronze, ASTM B-371, or low-zinc alloy, ASTM B-99, NSF/ANSI 61-8 Annex F&G, NSF 372 Lead Free. If unable to use a rising stem valve due to inadequate clearance, use non-rising stem gate valve. Valves shall comply with MSS SP-80. Valves over 2-inches shall be iron body, bronze trim, rising stem and hand wheel, flanged ends. Valves shall comply with MSS SP-70. Valves mounted higher than 7'-0” A.F.F. shall be provided with chain, wheel, and guides. Basis of design: Apollo # 101T-LF/101S-LF Lead Free Bronze, Apollo #611F-LF Lead Free Cast Iron, or equal.

B. Globe Valves:

1. Valves 2-inches and smaller shall be cast bronze body, ASTM B-62, renewable composition disc, 200 psi WOG, ASTM B-62, rising stem and hand wheel. Stems shall be of dezincification-resistant silicon bronze, ASTM B-371, or low-zinc alloy, ASTM B-99,
NSF/ANSI 61-8 Annex F&G, NSF 372 Lead Free. Valves over 2-inches shall be iron body, bronze trim, rising stem and hand wheel, plug type disc, flanged ends. Valves shall comply with MSS SP-85. Valves mounted higher than 7'-0" A.F.F. shall be provided with chain, wheel and guides. Basis of design: Apollo #120T-LF/120S-LF Lead Free Bronze, Apollo #711F-LF Lead Free Cast Iron, or equal.

C. Ball Valves:

1. Valves 2-inches and smaller shall be lead free cast bronze body, chrome-plated brass ball, teflon seats, and lever handle, 600 psi CWP. Valves shall comply with MSS SP-110, NSF/ANSI 61, NSF/ANSI 372 Lead Free. Valves over 2-inches shall be cast steel body, chrome plated steel ball, teflon seats, and lever handle. Victaulic, Anvil Gruvlok, Grinnell, or Shurjoint ball valves are acceptable if grooved piping is used. Valves mounted higher than 7'-0" A.F.F. shall be provided with chain, wheel, and guides. Basis of design: Apollo #77CLF-A Series or equal.

D. Butterfly Valve:

1. Valves 12-inches and smaller shall be ductile iron lug body, ASTM A-536, 316 stainless steel disc, EPDM Liner, 316 stainless steel stem, and safety twist-lock multi-position lever handle with open-closed lockout capabilities. Valve shall be rated at 175 psig WOG. Valves mounted higher than 7'-0" A.F.F. shall be provided with chain wheel and guides. Valves shall comply with MSS SP-67. Victaulic, Anvil Gruvlok, Grinnell, or Shurjoint butterfly valves are acceptable if grooved piping is used.

E. Check Valves:

1. Valves 2-inches and smaller shall be bronze body Y-pattern, ASTM B-62, swing check, bronze disc, 200 psi WOG. Valves shall comply with MSS SP-80, NSF/ANSI 61-8 F&G, NSF/ANSI 372 Lead Free. Valves, over 2-inches shall be iron body, ASTM A-126, bronze trim, swing check, renewable disc and seat. Valves shall comply with MSS SP-71. Victaulic, Anvil Gruvlok, Grinnell, or Shurlock check valves are acceptable if grooved piping is used. Basis of design: Apollo # 161T-LF/161S-LF Lead Free Bronze, Apollo # 920F-LF Lead Free Cast Iron, or equal.

2. Swing check valves with outside lever and spring (not center guided) is to be used on sewage ejector or storm-water sump pumps. Basis of design: Apollo # 910FLW-LF Lead Free Cast Iron or equal.

F. Pressure Reducing Valves:

1. Valves 2-inches and smaller shall be bronze body, stainless steel and thermoplastic internal parts, fabric reinforced diaphragm, strainer, and single union end. Basis of design: Apollo # 36ELF Series Lead Free Bronze or equal.

G. Balance Valve:
1. Valve shall have a twin tube 316 S.S. design with blowout proof attachment to station body. Ports shall include \( \frac{3}{4} '' \) port for thermometer, \( \frac{1}{4} '' \) port for pressure gauge, air vent, and \( \frac{1}{2} '' \) drain port.

2. The instrument station shall be 120/150-flanged construction.

3. The butterfly valve shall be lug pattern with a rating of 200 WP, 250 deg. F. The valve shall have an infinite position operator with memory stop (6" and smaller), worm gear with memory stop (8" and larger).

H. Y-Pattern Strainers:

1. Body: ASTM A 126, Class B, cast iron with bolted cover and bottom drain connection.

2. End Connections: Threaded ends for NPS 2 (DN 50) and smaller; flanged ends for NPS 2-1/2 (DN 65) and larger.

3. Strainer Screen: 40-mesh startup strainer and perforated stainless-steel basket with 50 percent free area.

4. CWP Rating: 125 psig (862 kPa).

I. Install strainers on inlet side of each control valve, pressure-reducing valve, solenoid valve, inline pump, and elsewhere as indicated. Install NPS \( \frac{3}{4} '' \) (DN 20) nipple and ball valve in blowdown connection of strainers NPS 2 (DN 50) and larger. Match size of strainer blow-off connection for strainers smaller than NPS (DN50).

PART 3 - EXECUTION

3.1 WORKMANSHIP:

A. General:

1. Install all piping, fixtures, equipment, and accessories as shown, and in strict accordance with the plumbing laws, rules, and regulations of the State and/or City. All work shall be done in a neat and orderly fashion and left in a condition satisfactory to the Architect/Engineer.

B. Piping:

1. All piping shall be run parallel or perpendicular to established building lines. Install piping so as to allow for expansion. Waste and vent piping occurring above floor slab shall be installed true and plumb. Extend vents at least 1 foot above roof, or to the top of the closest adjacent parapet wall, whichever is greater, and provide watertight flashing sleeves. Excavation and backfill shall be in accordance with Section 220000 of these specifications.

C. Fixtures:

1. Install fixtures true and plumb with building walls. Caulk all plumbing fixtures at joints along walls, countertops, and other intersecting surfaces. Locate fixtures as shown and per
manufacturer's instructions. Furnish all required trim for fixtures to provide a complete and workable installation.

3.2 TESTS:

A. General:

1. All piping, fixtures, and equipment shall be inspected and approved before concealing or covering. All work shall be tested as required by Section 220000 of these specifications and shall be leak proof before inspection is requested. All tests shall be repeated if required by those making the inspection.

2. All potable water systems shall be flushed and disinfected in accordance with Section 220000 of these specifications. Following disinfection, system shall be flushed and water sampled to show compliance with requirements of public health authority having jurisdiction. If tested water does not meet requirements, disinfecting shall be repeated until water quality meets requirements.

3. Grooved ends shall be clean and free from indentations, projections, and roll marks in the area from pipe end to groove. Gasket shall be molded and produced by Victaulic Company, Gruvlok, or Grinnell Mechanical Products, or equal. Verify gasket grade is suitable for the intended service. The grooved coupling manufacturer’s factory trained representative shall provide on-site training for contractor’s field personnel the use of grooving tools, application of groove, and installation of grooved end products.

   a. All grooved joint couplings, fittings, valves and specialties shall be the products of Victaulic Company, Gruvlok, Grinnell Mechanical Products, or equal.

4. Install the grooved piping in accordance with the latest recommendations as published by the manufacturer. Pipe shall be square cut, +/-0.30", properly deburred and cleaned. Mark pipe ends at the required location using a gauge supplied by the manufacturer to ensure full insertion into the coupling or fitting during assembly. Use a manufacturer’s tool with the proper sized jaw for pressing.

B. Fixtures and Equipment:

1. Fill all plumbing fixtures with water and check for leaks or retarded flow. Repair as required. Adjust each piece of plumbing equipment as required to ensure proper functioning. Leave all fixtures and equipment in first class operating condition.

2. The Plumbing Contractor is responsible for all backflow devices to be inspected by a certified backflow technician before use of the building potable water system.

C. Smoke Test:

1. A smoke test shall be performed on the entire waste and vent system before building occupancy. After all fixtures are permanently connected and traps are filled with water, fill entire drainage systems with smoke under pressure of 1.3 pKa (1 inch of water) with a smoke machine. If leaks are detected, they shall be repaired and the smoke test shall be performed again until no leaks are found.
PIPING SYSTEM TEST REPORT

STRUCTURE/BUILDING: ____________________________    TEST NUMBER: ____________
LOCATION: ____________________________    CONTRACT NO. ____________

DESCRIPTION OF SYSTEM/PIPING BEING TESTED: ____________________________

<table>
<thead>
<tr>
<th>Description of Test Performed</th>
<th>Test Pressure</th>
<th>Test Duration</th>
<th>Pass/Fail</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hydrostatic: ___________</td>
<td>P.S.I.</td>
<td>___________</td>
<td>__________</td>
</tr>
<tr>
<td>Inert Gas: ________________</td>
<td>P.S.I.</td>
<td>___________</td>
<td>__________</td>
</tr>
<tr>
<td>Compressed Air: _____________</td>
<td>P.S.I.</td>
<td>___________</td>
<td>__________</td>
</tr>
<tr>
<td>Waste &amp; Vent Smoke Test: ______</td>
<td>1&quot; Water Column</td>
<td>___________</td>
<td>__________</td>
</tr>
</tbody>
</table>

NAME AND TITLE OF PERSON IN CHARGE OF PERFORMING TEST’S FOR CONTRACTOR:

Name: ____________________________    Title: ____________________________

Signature: ____________________________

I hereby certify that the above described system has been tested as indicated above and found to be entirely satisfactory as required in the contract specifications.

Signature of Inspector: ____________________________    Date: ____________________________

REMARKS: ____________________________

________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
END OF SECTION 220100
SECTION 22 0 800
COMMISSIONING OF PLUMBING

PART 1 - GENERAL

1.1 SCOPE:

A. General:

1. The purpose of the plumbing start-up is to provide the owner of the facility with a high level of assurance that the plumbing system has been installed and operates per the requirements of the mechanical construction plans and specifications. The Plumbing General Requirements, Section 220000, is to be included as a part of this section of the specifications.

B. Pre-start and Start-up checklist:

1. The contractor shall be responsible for the completion of the pre-start and start-up checklist forms. These forms can usually be obtained from the equipment manufacturer. If the forms can not be obtained from the manufacturer, forms may be obtained from the Engineer.

2. After completion of pre-start and start-up checklists, the contractor shall provide a copy of the pre-start and start-up checklist to the engineer for review and approval prior to substantial completion.

PART 2 - START-UP PROCESS

2.1 RESPONSIBILITIES

A. Plumbing Contractor:

1. Coordinate with other trades involved in the installation of mechanical equipment to complete the requirements of mechanical start-up specifications.

2. Complete the pre-start and start-up checklist forms obtained from the equipment manufacturer or the Engineer.

3. Notify the mechanical engineer of tests to be witnessed. Contractor shall give the engineer a minimum of 48 hours notice prior to test.

B. Engineer:

1. Review the completed pre-start and start-up check lists provided by the plumbing contractor.

2. At final inspection, spot check items on the pre-start and start-up checklist forms to ensure that they have been completed.

2.2 EQUIPMENT PRE-START

A. Before starting any equipment or system, complete the system pre-start checklist with forms
provided. As part of the pre-start process, the following items shall be completed as applicable:

1. Piping systems shall be pressure tested as specified, found to be tight, with reports submitted.
2. Piping systems shall be flushed and cleaned as specified, all required reports submitted, and the system shall be filled or charged per plans.
3. Seismic restraints shall be installed per plans and specifications.
4. Electrical services shall be installed and checked.
5. Safety controls shall be installed and operation checked.
6. Equipment has been thoroughly cleaned (interior and exterior of units), of construction debris.
7. Deficiencies or incomplete work shall be corrected and pre-start shall be repeated until the installation is ready for operation.

2.3 TESTING

A. Piping:

1. All plumbing piping (drainage, water, gas) shall be tested in accordance with the requirements of the Idaho State Plumbing Code, latest edition. Other piping systems shall be tested hydrostatically, to 1.5 times the operating pressure, but not less than 100 psi, for a minimum period of two hours. If the test pressure falls more than 5 percent during the test period, the leak shall be located, repaired, and the test repeated.
2. Piping shall be tested before insulation has been installed. Delicate control mechanisms shall be removed during tests to prevent shock damage. The use of chemicals or compounds to stop leaks shall not be permitted.
3. A test report shall be submitted for each piping system test. Test report forms are available from the Engineer.

2.4 CLEANING AND ADJUSTING:

A. Thoroughly clean all parts of the system at the completion of the work. Flush all water circulating systems with fresh water and then drain. Clean all strainers and refill system. Adjust all devices for proper operation and lubricate all equipment as required. Repaint any painted surface that has been damaged.

B. All potable water systems shall be flushed and disinfected after tests are completed. Disinfection shall be in accordance with local municipal and State Plumbing Inspector's criteria. In lieu of such criteria, the following procedure shall be followed for disinfection:
1. Completely flush system. Add alkali or acid (hydrochloric) to bring water pH level to between 7.4 and 7.6.
2. Inject chlorine (liquid, powder, tablet, or gas) throughout the system to obtain 50 to 80 mg/L residual.
3. Bleed water from outlets to ensure distribution, and test for residual at a minimum of 15 percent of the outlets.
4. Maintain disinfection in system for 24 hours.
5. If final disinfectant residual tests less than 25 mg/L, repeat treatment.
6. Flush disinfectant from system until residual is equal to that of incoming water, or 1.0 mg/L.
7. Take samples no sooner than 24 hours after flushing, from 10 percent of the outlets and the incoming water.

**PART 3 - EXECUTION**

A. The following systems and equipment shall be completed under the plumbing start-up plan as described above and documented with equipment pre-start and start-up forms provided. The following forms are provided at the end of this specification section:

1. Domestic Hot Water Tank (Water Heater)

B. Pre-start and start-up forms are to be provided to the engineer for final approval before substantial completion.

C. Approved forms shall be included in the operations and maintenance manual.
PIPING SYSTEM TEST REPORT

<table>
<thead>
<tr>
<th>STRUCTURE/BUILDING:</th>
<th>TEST NUMBER:</th>
</tr>
</thead>
<tbody>
<tr>
<td>TEST LOCATION:</td>
<td>CONTRACT NO.:</td>
</tr>
<tr>
<td>DESCRIPTION OF SYSTEM/PIPING BEING TESTED:</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Description of Test Performed</th>
<th>Test Pressure</th>
<th>Test Duration</th>
<th>Pass/Fail</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hydrostatic:</td>
<td>P.S.I.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Inert Gas:</td>
<td>P.S.I.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Compressed Air:</td>
<td>P.S.I.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other (describe below):</td>
<td>P.S.I.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

NAME AND TITLE OF PERSON IN CHARGE OF PERFORMING TEST'S FOR CONTRACTOR:

Name: ____________________________ Title: ____________________________
Signature: ________________________

I hereby certify that the above described system has been tested as indicated above and found to be entirely satisfactory as required in the contract specifications.

Signature of Inspector: ____________________________ Date: ________________

REMARKS: ____________________________________________________________________________________________

______________________________________________________________________________________________

______________________________________________________________________________________________

______________________________________________________________________________________________
END OF SECTION 220800
DIVISION 23 – HEATING VENTILATING AND AIR CONDITIONING
SECTION 23 00 00
HVAC GENERAL REQUIREMENTS

PART 1 - GENERAL

1.1 SCOPE:

A. General:

1. The Bidding Requirements, Contract Requirements, and the General Requirements (Division 1) of these specifications shall govern all parts of the work.

B. Work Included:

1. Install work in accordance with these specifications and the accompanying plans. Furnish all labor, material, and equipment together with all incidental items not specifically shown or specified which are required by good practice to provide the complete mechanical systems as described.

2. The HVAC Contractor(s) and all Sub-tier Contractors shall provide installed equipment cut sheets and purchase orders required for utility rebates.

C. Coordination and Site Visits:

1. This section of the work requires examination of and reference to all architectural, structural, utility, and electrical drawings for construction conditions that may affect the work. Inspect the building site and existing facilities for verification of existing conditions. Base all measurements from established benchmarks. Any discrepancy between actual measurements and those indicated, which prevents following good practices or the intent of the drawings and specifications, shall be reported to the Architect/Engineer, and work halted until instructions are received from the Architect/Engineer.

1.2 CODES, PERMITS, FEES:

A. Install all work in accordance with applicable codes and standards. Obtain all required permits; pay all required fees including utility connections or extensions, in connection with this portion of the construction. Obtain all required certificates of inspection for the work.

PART 2 - PRODUCTS

2.1 MATERIALS AND WORKMANSHIP:

A. Materials:

1. All materials and equipment shall be of first quality, new, full size and weight, standard in every respect, and suitable for the space required. Use the same manufacturer for products of similar class or service, such as valves, pumps, controls, and air handlers. Protect all materials against loss, theft, or damage before and after installation.

2. Furnish equipment that will operate under all conditions of load without any sound or
vibration that is objectionable in the opinion of the Architect/Engineer. Vibration or noise considered objectionable will be corrected by the Subcontractor at his expense.

3. Furnish and install all necessary foundations, supports, pads, bases, and piers required for all materials and equipment furnished under this contract.

4. Provide all required firestopping at duct and piping penetrations of fire rated walls, floors, ceilings, and roofs. Firestopping shall be 3M Fire Barrier Sealant CP 25WB+ or 3M Fire Barrier Rated Foam FIP 1-Step, or approved equal.

5. Piping penetrations through walls, finished floors, and ceilings shall include one-piece stamped-steel escutcheons or one-piece floor plates.

B. Workmanship:

1. All materials and equipment shall be installed in a neat and workmanlike manner by competent specialists for each subtrade. Work shall be installed to the satisfaction of the Architect/Engineer with unsatisfactory work removed and reinstalled to his satisfaction at no extra cost to the Owner.

2. Provide all cutting and patching necessary to install the work specified in this section. Patching shall match adjacent surfaces. No structural members shall be cut without the approval of the Architect/Engineer. Provide sleeves at all piping penetrations of exterior walls and floors on grade. Provide all sleeves and inserts required before new floors and walls are built.

3. Locate all equipment that must be serviced in fully accessible positions. Provide clearance for removal of replacement parts and components, and with necessary couplings or flanges to remove the component for maintenance.

C. Protection of Equipment During Construction:

1. At the end of each shift, all duct openings and open ends shall be covered with a plastic poly sheeting film to protect against dust and construction contamination from entering the ductwork.

2.2 SUBMITTALS AND SUBSTITUTIONS:

A. Prebid Approval:

1. Manufacturer’s trade names and catalog numbers stated herein are intended to indicate the quality of equipment or materials desired. All manufacturers not specifically listed require prior approval. Submit catalog data, including specifications, of the proposed equipment to the Architect/Engineer for his approval at least 10 calendar days prior to bid opening. Notice of such approvals will be published in an addendum. Approval of listed alternate equipment manufacturers is for bidding only. Final approval is to be based on requirements of the plans and specifications.

B. Submittals:

1. Within thirty days after award of this contract, provide an electronic copy of a complete list of all materials and equipment proposed for this project. List shall contain make, type, manufacturer’s name, and trade designation of all materials and equipment. Submittal shall
also include manufacturer's complete specification for each item, including capacities, ratings, etc., and dimensions as required to check space requirements. The scheduled equipment is the basis of design for capacity, weights, physical size, etc. Alternate manufacturers shall not exceed the weight or physical size. Any changes to the Architectural, Structural, Mechanical, Electrical, and Control systems due to alternate manufactures shall be the responsibility of the Contractor and Supplier. Submittals for each major trade (i.e., dryside HVAC, wetside HVAC, or Plumbing) shall be submitted in a single complete package. Individual items will not be reviewed independently unless approved by the Engineer.

2. Approval of submittals shall not relieve the contractor from responsibility for deviations from the plans or specifications, unless he has, in writing, called the Architect's/Engineer's attention to deviations at the time of submission, and obtained his written approval. Approval of submittals does not relieve the contractor from responsibility for errors in shop drawings or literature.

C. Equipment Requiring Submittals:

1. Air Handling Units
2. Boilers
3. Pumps
4. DDC
5. Air Valves
6. Hot Water Reheat Coils
7. Exhaust Fans
8. Humidifier
9. Grilles / Diffusers
10. Pipe Stands
11. Flex Duct
12. Snorkel Hoods
13. Canopy Hoods
14. Control Valves
15. Electric Heaters
16. Mechanical Specialty Equipment
17. Ducted Split Systems
18. Ductless Split Systems
19. Louvers
20. Penthouses
21. Sound Attenuator

PART 3 - EXECUTION

3.1 ACCESSIBILITY & SAFETY:

A. Accessibility:

1. All equipment which must be serviced or operated shall be located in fully accessible position. Minor changes from the drawings may be made to allow for better accessibility. All changes shall be approved prior to actual installation.

2. Access panels shall be provided if required for accessibility. Access panels to be steel, flanged, hinged doors by Cendrex, or equal. Sized as required for installation. Subcontractor shall furnish the required panels to the General Contractor and the required location for all access panels, unless otherwise specified in the Architectural specifications. Panels shall be installed by the General Contractor.

B. Safety:

1. Subcontractor shall provide guards for all belt drives and rotating machinery.

3.2 COORDINATION:

A. Coordinate all work with the various trades involved to provide a complete and satisfactory installation. The exact details of ductwork and equipment are not shown. No additional compensation will be made for offsets or relocation required in coordination with other trades.

B. Alterations required due to improper supervision by the subcontractor shall be made at no extra cost, to the satisfaction of the Architect/Engineer.

3.3 ELECTRICAL:

A. Electric motors required for equipment specified in this section shall be provided and installed by this Subcontractor. Motor starters, disconnects, relays, pilot lights, etc., are in general, to be furnished and installed by the Electrical Contractor. Starters, relays, controls, etc., which are factory assembled into packaged equipment shall be furnished by the Mechanical Contractor under this section of the specifications.

B. All motors shall be provided with adequate starting and protective equipment as specified or required. Motor capacity shall be sufficient to operate driven device under all conditions of operation and load without overload. Minimum horsepower shall be as specified.

3.4 IDENTIFICATION AND CODING:

A. Painting:
1. All painting of mechanical equipment, accessories and ductwork shall be furnished and applied under the Architectural section of these specifications. All painting shall be completed before any identification markings are applied.

B. Pipe Labeling:

1. Piping shall be labeled with the fluid conveyed and the direction of flow:
   a. On both sides of wall or floor penetrations.
   b. Once on every straight run of pipe.
   c. No more than 20-foot intervals.
   d. No more than 10-foot intervals in congested areas.
   e. Within 3 feet of each piece of equipment, valve, or control device.

C. Equipment Labeling:

1. Equipment tags shall be color coded and attached in visible location. Labels shall include:
   a. Component identification designation (coordinated with construction drawings).
   b. Area served (including areas or equipment of critical impact if equipment is shut-off).
   c. Filter Size (when applicable).
   d. Power Source (coordinated with electrical).

D. Label Color and Size Requirements

1. All Piping shall be All pipes, and equipment shall be labeled according to ANSI standard A13.1. See table below for examples.

<table>
<thead>
<tr>
<th>Equipment</th>
<th>Main Designation</th>
<th>Supplemental Info</th>
<th>Large Equipment w/viewing distances beyond 10 feet</th>
<th>Marker Size</th>
</tr>
</thead>
<tbody>
<tr>
<td>Piping</td>
<td>O.D. of ¾” to 1-⅜”</td>
<td>Letter Size: ½” high</td>
<td>¾” high text minimum</td>
<td>Marker Size: 8” wide</td>
</tr>
<tr>
<td></td>
<td>O.D. of 1-⅜” to 2-⅜”</td>
<td>Letter Size: ¾” high</td>
<td>⅛” high text minimum</td>
<td>Marker Size: 8” wide</td>
</tr>
<tr>
<td></td>
<td>O.D. of 2-⅜” to 7-⅞”</td>
<td>Letter Size: 1-¾” high</td>
<td>3” high text main label</td>
<td>Marker Size: 12” wide</td>
</tr>
<tr>
<td></td>
<td>O.D. of 8” to 10”</td>
<td>Letter Size: 2-⅛” high</td>
<td></td>
<td>Marker Size: 24” wide</td>
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<td></td>
<td>O.D. over 10”</td>
<td>Letter Size: 3-⅛” high</td>
<td></td>
<td>Marker Size: 32” wide</td>
</tr>
</tbody>
</table>

Label Color Schedule Per ANSI A13.1

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Water (Heating, chilled, potable, boiler feed, etc.)</td>
<td>Green Background with White Letters</td>
</tr>
<tr>
<td>Compressed Air</td>
<td>Blue Background with White Letters</td>
</tr>
<tr>
<td>Natural Gas / Refrigerant / Steam</td>
<td>Yellow Background with Black Letters</td>
</tr>
<tr>
<td>Fire Suppression</td>
<td>Red Background with White Letters</td>
</tr>
<tr>
<td>Equipment Labels*</td>
<td>Black Background with White Letters</td>
</tr>
<tr>
<td>Supply Duct</td>
<td>Green Background with White Letters</td>
</tr>
<tr>
<td>Exhaust Air Duct</td>
<td>Yellow Background with Black Letters</td>
</tr>
<tr>
<td>Return / Relief Duct</td>
<td>Blue Background with White Letters</td>
</tr>
<tr>
<td>Outside Air Duct</td>
<td>Blue Background with White Letters</td>
</tr>
</tbody>
</table>

*Label all equipment that is on generator power with a Red Background and White Letters

Text Height Requirements
### 3.5 TESTING:

**A. Systems:**

1. All systems, including heating, ventilating and air conditioning, shall be tested at the completion of the building to establish that the systems operate as specified and required. Testing shall be performed after air balancing is completed.
2. All controls shall be calibrated accurately and all equipment shall be adjusted for satisfactory operation. Excessive vibration or noise from any system shall be corrected.
3. The air conditioning system shall be tested for satisfactory operation when the outside air temperature reaches 60 degrees F. or warmer. All other systems shall be tested at building completion. All tests shall be performed in the presence of the Architect/Engineer or his representative.

### 3.6 BALANCING:

**A. Scope:**

1. Prior to final acceptance by the Owners, all air and water systems shall be balanced to deliver the quantities as specified or directed. The air and water balance shall be performed by an independent agency specializing in balancing and is certified by the National Environmental Balancing Bureau.
2. Balance contractor's main office shall be located within 50 miles from the project site. Approved balance contractors are Evolve Engineering, NWESI, Building Systems Technologies, and Blue-Sky Commissioning. All other contractors must receive prior approval from the Engineer, in writing, before bidding the project.
3. The Mechanical Contractor shall provide assistance to the Balancing Contractor by identifying all installed mechanical systems and assisting access to all installed mechanical systems. All mechanical systems shall be completely operational and functional prior to the Balancing Contractor performing their specified work.

**B. Air balancing:**

1. Balancing of the air system shall consist of:
   
   a. Adjust all air volumes to the quantities shown, with allowable variation of plus 10, minus 10 percent.
   b. Record all system, zone, diffuser, grille, and register C.F.M. Use volume control devices to regulate air quantities only to the extent that adjustments do not create
objectionable air motion or sound levels. Balancing Engineer shall work with the Contractor to set minimum & maximum CFM quantities for zone dampers, or zone dampers/heaters.

c. Test and record all system static pressures, inlet and discharge, on all packaged units, fans, and terminal units. Vary total system air quantities by adjustment of fan speeds. Provide drive changes as necessary. Vary branch air quantities by damper regulation.

d. Test and record motor full load amps and nameplate amps.

e. Test and record entering and leaving temperatures at all coils.

f. Adjust all automatically operated dampers, in cooperation with the Control Contractor, to the required settings. Adjust outside air automatic dampers, outside air, return air, and exhaust dampers for design conditions within specified tolerances. Where modulating dampers or economizers are provided, take measurements at full return air, minimum outside air, and 100 percent outside air mode of operation.

g. Adjust diffusers and grilles for proper deflection, throw, and coverage. Eliminate drafts and excessive noise where possible.

h. Mark final positions of all balance dampers with a red felt pen.

i. Air systems shall be balanced in accordance with standard procedures and recognized practices of the Associated Air Balance Council, and the Testing Adjusting, and Balancing Bureau.

C. Water Balancing:

1. Balancing of the water system shall consist of:

   a. Adjust all heating and cooling water system flows to within 10 percent of the design quantities shown.

   b. Record all system and terminal unit g.p.m.’s.

   c. Test and record all pump, coil, boiler, heat transfer elements, and chiller entering and leaving water temperatures and pressures.

   d. Test and record all pump full load amps and nameplate amps.

   e. Mark all final positions of all balancing cocks, valves, and operators with a centerpunch.

D. Quality Assurance:

1. The Balancing Contractor shall demonstrate to the Engineer of record, flow verification for at least 10% of the balanced devices as selected by the Engineer. If more than 25% of the tested devices do not meet the designed or balance report, then the entire system balance must be rebalanced.

E. Balance Reports:

1. Submit four copies of the air and water system balance reports to the Architect/Engineer for evaluation and approval. Reports shall be on TABB/SMACNA forms that indicate information addressing each of the testing methods, readings, and adjustments.

3.7 CLEANING AND ADJUSTING:

A. Thoroughly clean all air conditioning units, air handling units, and all associated parts of the system at the completion of the work. Install new, clean air filters in all systems. Adjust all devices for proper operation and lubricate all equipment as required. Repaint any painted surface that has been damaged.
3.8 PROJECT CLOSEOUT:

A. Operations & Maintenance Manual:

The Contractor shall provide an operations and maintenance manual at least thirty days prior to completion of work. The manual shall be of the three-ring binder type, entitled "Operations and Maintenance Manual", with the job name and year of completion also included. O & M manuals shall be submitted in a single package. In addition, the contractor shall provide two consolidated electronic versions on two separate thumb drives with sections digitally bookmarked. Individual items will not be accepted independently unless approved by the Engineer. The manual shall include, as a minimum:

1. Maintenance instructions for all equipment, including lubrication requirements.
2. Equipment suppliers’ names, addresses, and telephone numbers.
3. Equipment catalog cuts, ratings tables, model numbers, serial numbers, and accessories.
4. Parts numbers for all replaceable parts.
5. Air and/or water systems balance report as hereinbefore specified.
6. Control diagram or drawing and operation sequence.
7. Valve tagging chart as hereinbefore specified.
8. Filter chart listing unit callout, size of filters, and quantity of filters.
9. Guarantee letter as specified below.
10. Any additional information required to enable the Owner to properly maintain the building mechanical system.
11. Mechanical Equipment Start-up forms, which are included in this specification, if they are required.
12. After approval of the Operations and Maintenance Manual by the Architect/Engineer, the Contractor shall furnish two copies of the manual to the Owner.

B. Mechanical System Training Period:

1. After the mechanical system is completely installed and operational, the mechanical contractor shall provide a minimum of 40 hours training and instruction time for the building Owner or his representative. During this period, the contractor shall instruct the Owner in the operation and maintenance of all parts of the mechanical system, using the O & M manual where applicable. The contractor shall provide a copy of the Project Owner Mechanical Systems Training Form (attached to this specification), with proper signatures, to the Engineer prior to substantial completion and ensure that a copy is inserted into the project O & M manuals.

C. As-Built-Drawings:

1. Provide two sets of red-line mechanical drawings showing the work as it was actually installed. The drawings shall indicate all departures from the contract drawings. Make all
notations neat and legible, with red indelible pencil. At the completion of the work, these
as-built drawings shall be signed and dated by the Mechanical Contractor, and returned to
the Architect/Engineer.

D. Guarantee:

1. All work furnished under this section shall be guaranteed in writing to be free from
defective work or materials for a period of one year after acceptance of the contract. All
repairs or replacements because of defective materials or workmanship or noncompliance
with code shall be provided without additional cost to the Owner. Contractor shall furnish a
letter indicating above guarantee with space for date of acceptance and expiration of
guarantee. Letter shall be included in O & M Manual.

END OF SECTION 230000
NAME OF PROJECT: ____________________________________________

__________________________________ ________________________________
Owner’s Representative Contractor

__________________________________ ________________________________
Signature Signature

________________________  _______________________
Date Date

OWNER MECHANICAL SYSTEM TRAINING FORM

Upon completion of the equipment and systems installation and connections, the contractor shall assemble all required equipment factory representative and subcontractors together for system Owner training.

These people shall assist in Owner training their system(s) and remain at the site until the total system operations is acceptable and understood by the Owner’s representative(s), maintenance and/or operation personnel, on operation and maintenance of their equipment. To prove acceptance of operation and instruction by the Owner’s representative(s), the contractor shall provide a copy of this form, with proper signatures, to the Engineer prior to substantial completion, and ensure that a copy is inserted into the project Operation and Maintenance manuals.

“I, the Contractor, associated factory representative and subcontractors, have started each system and the total system(s); and have proven their normal operation to the Owner’s representative(s) and maintenance/operation personnel and have instructed him/them ___________, hours in the operation and maintenance thereof.”

Owner’s Representative Contractor

Signature Signature

________________________  _______________________
Date Date
SECTION 23 0 100
HEATING, VENTILATING, AND AIR CONDITIONING

PART 1 - GENERAL

1.1 SCOPE

A. This section covers the work necessary for the heating, ventilating, and air conditioning system, complete. The HVAC General Requirements, Section 230000, is to be included as a part of this section of the specifications.

1.2 CODES & STANDARDS

A. The heating, ventilating, and air conditioning system shall be installed in accordance with the latest edition of the following codes and standards:

1. International Mechanical Code (IMC)
2. International Building Code (IBC)
3. American Society of Heating, Refrigeration, and Air Conditioning Engineers (ASHRAE)
4. National Fire Protection Association (NFPA)
5. Sheet Metal and Air Conditioning Contractors National Association, Inc. (SMACNA)

PART 2 - PRODUCTS

2.1 PACKAGED AIR HANDLING UNIT

A. General Description:

1. Each unit shall be specifically designed for outdoor rooftop application and include a weatherproof cabinet.
2. Furnish unit configuration, layout, performance and electrical characteristics as shown on project plans and schedule.
3. The unit shall undergo a complete factory run test prior to shipment. The factory test shall include final test of all fan assemblies, a refrigeration circuit run test, a unit control system operations checkout, a unit refrigerant leak test, and a final unit inspection.
4. The complete unit shall be ETL listed.
5. Unit shall be completely factory assembled and shipped in one piece.
6. Unit to be shipped fully charged with R410A.
7. All units shall have decals and tags to indicate caution areas and aid unit service. Unit nameplates shall be fixed to the main control panel door. Electrical wiring diagrams shall be attached to the control panels. Installation, operating and maintenance bulletins and start-up forms shall be supplied with each unit.
8. Submittals must demonstrate that scheduled unit leaving air temperature (LAT) is met, that fan and motor heat temperature rise (TR) have been considered, and scheduled entering air temperature (EAT) equals mixed air temperature (MAT). Draw-thru cooling - Scheduled EAT equals cooling coil EAT and scheduled unit LAT equals cooling coil LAT plus TR.

B. Cabinet:

1. Unit construction for all walls, doors, ceiling and floor shall be double wall with a solid galvanized steel liner with a thermal break integral to the panel construction that provides a cleanable interior, prevents conductive heat transfer through the panel, and prevents exterior condensation on the panel.

2. Unit construction for all walls, doors, ceiling and floor shall be double wall with a solid stainless steel liner with a thermal break integral to the panel construction that provides a cleanable interior, prevents conductive heat transfer through the panel and prevents exterior condensation on the panel.

3. Foam Insulation shall provide a minimum thermal resistance R-value of 13.0.

4. Unit construction shall be designed to operate at total static pressures up to 8.0 inches w.g..

5. Provide quality unit construction with performance tested in accordance with ASHRAE Std 111 – cabinet air leakage shall not exceed leak class 6 (CL = 6), at +/- 6 in. w.c. casing pressure, where maximum cabinet leakage (cfm/100 ?ft^2 of casing surface area) = CL x P^0.65.

6. Provide quality unit construction with air leakage less than 0.5% of design airflow up to 5 in. w.c..

7. Provide quality unit construction with air leakage less than 1.0% of design airflow up to 8 in. w.c..

8. Exterior surfaces shall be constructed of painted galvanized steel, for aesthetics and long-term durability.

9. Paint finish will include a base primer with a high-quality polyester resin topcoat. Finished, unabraded panel surfaces shall be exposed to an ASTM B117 salt spray environment and exhibit no visible red rust at a minimum of 3,000 hours exposure. Finished, abraded surfaces shall be tested per ASTM D1654, having a mean scribe creepage not exceeding 1/16” at 1,000 hours minimum exposure to an ASTM B117 salt spray environment. Measurements of results shall be quantified using ASTM D1654 in conjunction with ASTM D610 and ASTM D714 to evaluate blister and rust ratings.

10. Access shall be provided to filters, dampers, cooling coils, fan sections, compressors and electrical and controls components.

11. Access doors shall be provided for each critical maintenance section in order to provide user easy access to components. All access doors shall be mounted on full length stainless steel piano hinges and shall be secured by linkage and latch system that is operated by a single handle. The latch system shall feature a staggered engagement for ease of operation and a safety catch shall protect the user from injury in case a positive pressure door is opened while the fan is operating. Doors secured by multiple, mechanical fasteners are not acceptable.
12. The unit base frame shall be constructed of 13 gauge pre-painted steel to prevent base rail corrosion.

13. The unit base shall overhang the roof curb for positive water runoff and shall have a formed recess that seats on the roof curb gasket to provide a positive, weathertight seal. Lifting brackets shall be provided on the unit base with lifting holes to accept cable or chain hooks.

14. Safety Grates
   
   a. Walk on Safety grates shall be provided in the bottom supply air opening and able to support a concentrated load of 1000lbs at mid-span.
   
   b. Walk on safety grates shall be provide in the bottom return air opening and able to support a concentrated load of 1000lbs at mid-span.
   
   c. Walk on safety grates shall be provided in the bottom supply and return air openings and be able to support a concentrated load of 1000lbs at mid-span.

C. Acoustics:

   1. Equipment sound performance shall meet the scheduled discharge and return sound power
   
   2. Discharge Plenum sections shall be lined with a perforated acoustic liner to enhance sound attenuation.
   
   3. Discharge and Return Plenum sections shall be lined with a perforated acoustic liner to enhance sound attenuation.

D. Fans

   1. All Supply, Return and Exhaust Fans shall be configured in an array with a minimum number fans specified in the schedule for each unit.
   
   2. Redundancy
      
      a. Size all fans for N-1 per the schedule
      
      b. Each supply, exhaust, and return fan motor shall have an independent integral inverter or a dedicated variable frequency drive per motor for redundancy.
      
      c. Provide the supply fan array with a backdraft damper section to prevent recirculation during redundant operation.

   3. All Fans shall be dynamically balanced as an assembly in planes as per DIN / ISO 21940 to balancing grade G6.3 or better or provide 2” Spring isolation for each fan.

   4. All fans shall be provided with totally enclosed maintenance-free ball bearings and permanent lubrication. Bearings shall be selected for a minimum life in excess of 350,000 hrs (L50) at selected operating point.

   5. Fan airflow measuring
      
      a. All Supply Fans shall include a factory installed flow measuring station. Airflow needs to be readable through the unit controller and building automation system.
      
      b. All Supply and Exhaust Fans shall include a factory installed flow measuring station. Airflow needs to be readable through the unit controller and building automation system.
c. All Supply and Return Fans shall include a factory installed flow measuring station. Airflow needs to be readable through the unit controller and building automation system.

6. ECM Supply Fans

a. All fans shall be a single width, single inlet (SWSI) airfoil centrifugal fan. The fan wheel shall be Class II construction with aluminum fan blades that are continuously welded to the hub plate and end rim. The fan shall be a direct drive fan mounted to the motor shaft. Belts and sheaves are not acceptable due to the additional maintenance.

b. The fan motor shall be a totally enclosed electrically commutated motor that is speed controlled by the rooftop unit controller. The motor shall include thermal overload protection and protect the motor in the case of excessive motor temperatures. The motor shall have phase failure protection and prevent the motor from operation in the event of a loss of phase. Motors shall be premium efficiency.

E. Electrical

1. Unit wiring shall comply with NEC requirements and with all applicable UL standards. All electrical components shall be UL recognized where applicable. All wiring and electrical components provided with unit shall be number and color coded and labeled according to the electrical diagram provided for easy identification.

2. The unit shall be provided with a factory wired weatherproof control panel. Unit shall have a power terminal block for main power connection. A terminal board shall be provided for low voltage control wiring. Branch circuit short circuit protection, 115 volt control circuit transformer and fuse, system switches, and a high temperature sensor. Each compressor and condenser fan motor shall be furnished with contactors and inherent thermal overload protection. Supply and return fan motors shall have contactors and external overload protection. Knockouts shall be provided in the of the main control panels for field wiring entrance.

3. All 115-600 volt internal and external wiring between control boxes and components shall be protected from damage by dedicated electrical raceways.

4. The receptacle shall be powered by a field supplied 115V source.

5. Single non-fused disconnect switch shall be provided for connecting electrical power at the unit. Disconnect switches shall be mounted internal to the control panel and operated by an externally mounted handle.

6. Unit SCCR Rating to be 10 kAIC minimum.

7. Unit shall be provided with phase, voltage and brown out protection which shuts down all motors in the unit if the electrical phases are more than 10% out of balance on voltage or on phase reversal.

8. Unit shall be provided with a safety shutdown terminal for installation of field emergency input.

9. All electrical options shall have a +/- 10 percent voltage utilization range to protect against voltage variation.
F. Safety Options

1. Unit shall be provided with a safety shutdown terminal for installation of field emergency input
2. Unit shall be provided with factory installed supply air smoke detector.

G. Cooling Coil

1. The cooling coil section shall be installed in a draw through configuration, upstream of the supply air fan. The coil section shall be complete with factory piped cooling coil and sloped drain pan.
2. Direct expansion (DX) cooling coils shall be fabricated of seamless 1/2" diameter high efficiency copper tubing that is mechanically expanded into high efficiency aluminum plate fins. Coils shall be a multi-row, staggered tube design with a minimum of 4 rows. All units shall have two independent refrigerant circuits and shall use an interlaced coil circuiting that keeps the full coil face active at all load conditions.
3. Each refrigeration circuit shall be equipped with a thermostatic expansion valve for control refrigerant flow control.
4. The refrigerant suction lines shall be fully insulated from the expansion valves to the compressors.
5. The distributor tubes shall be sleeved or coated to provide longevity and protection from leaks.
6. All coils shall be factory leak tested with high pressure air under water.
7. The drain pan shall be stainless steel and designed to comply with ASHRAE-62.1 double sloped requirements drain pan shall be provided with the cooling coil. The drain pan shall extend beyond the leaving side of the coil and underneath the cooling coil connections. The drain pan shall have a minimum slope of 1/8" per foot to provide positive draining. The drain pan shall be connected to a threaded drain connection extending through the unit base. Units with stacked cooling coils shall be provided with a secondary drain pan piped to the primary drain pan.
8. Insulation under the drain pan should be a closed cell structure to prevent moisture from wicking under the drain pan. Fiberglass is not allowed.

H. Modulating Hot Gas and Liquid Reheat

1. Hot Gas Reheat: Unit shall be equipped with a fully modulating hot gas reheat coil with hot gas coming from the unit condenser.
2. Hot gas reheat coil shall be a Microchannel design. The aluminum tube shall be a micro channel design with high efficiency aluminum fins. Fins shall be brazed to the tubing for a direct bond. The capacity of the reheat coil shall allow for a 20°F temperature rise at all operating conditions.
3. The modulating hot gas reheat systems shall allow for independent control of the cooling coil leaving air temperature and the reheat coil leaving air temperature. The cooling coil and reheat coil leaving air temperature set points shall be adjustable through the unit controller. During the dehumidification cycle the unit shall be capable of 100% of the cooling capacity. The hot gas reheat coil shall provide discharge temperature control within +/- 2°F.

4. Each coil shall be factory leak tested with high-pressure air under water.

5. Dehumidification operation with Hot gas reheat shall use direct air temperature feedback from the leaving face of the evaporator coil for controlling the compressor cooling capacity and the reheat will be fully modulate to maintain the leaving/supply air temperature set point. The leaving/supply air temperature set point can be reset based on outside, space, and return temperature or humidity.

I. Gas Heat

1. The gas furnace design shall be factory installed downstream of the supply air fan in the heat section.

2. The heat exchanger shall include a 439 grade Stainless steel. Aluminized steel heat exchangers are not acceptable. The heat exchanger design shall collect condensate in a collection point and have a condensate drain.

3. The furnace will be supplied with a modulating induced draft burner. The burner shall be controlled for low fire start. The burner shall be capable of continuous modulation between 5% and 100% (20:1 control) of rated capacity.

4. The burner shall be specifically designed to burn natural gas and shall include a micro-processor based flame safeguard control, combustion air proving switch, pre-purge timer and spark ignition. Status and alarm codes are available at the unit controller via a network connection and are available for BAS integration.

5. Provide with a 15 year gas heat exchanger warranty.

J. Draw Through Filters

1. All units shall be provided with clogged filter switches and alarm enunciation

2. All units shall be provided with a through the wall magnehelic filter gauge that displays filter loading.

3. Unit shall be provided with a draw-through filter section.

K. Outdoor Section

1. Unit shall be provided with a Metal Mesh pre-filter in the outdoor air hood/section to prefilter large particulate to prevent early filter clogging.

2. Unit shall be provided with a 100% Outside Air damper. The outdoor air hood shall be factory installed and constructed from galvanized steel finished with the same durable paint finish as the main unit. The hood shall include moisture eliminator filters to drain water away from the entering air stream. The outside dampers shall be sized to handle 100% of
the supply air volume. The dampers shall be parallel blade design.

3. Damper blades shall be gasketed with side seals to provide an air leakage rate of 1.5 cfm / square foot of damper area at 1” differential pressure in accordance with testing defined in AMCA 500.

4. Control of the dampers shall be by a factory installed direct coupled actuator.

L. Humidifier

1. A factory Installed Humidifier Section will be provided with a drain pan only, or a factory installed grid.

2. There will be doors on both sides of the section. The Factory installed grid will have an option to be insulated or non-insulated tubes and will have multiple tube options to cover the humidification operating range of the product. There will be space in the cabinet for through the floor supply and condensate piping locations downstream of the grid.

M. Discharge Plenum Options

1. A bottom supply air discharge plenum shall be provided.

N. Condensing Section

1. All Units shall provide the Energy Efficiency specified EER and IEER per the schedule equipment or higher.

2. Condenser fans shall be direct drive, axial type designed for low tip speed and vertical air discharge. Fan blades shall be constructed of steel and riveted to a steel center hub. Condenser fan motors shall be heavy-duty, inherently protected, three-phase, non-reversing type with permanently lubricated ball bearing and integral rain shield.

3. Condenser coils shall be an all aluminum design, and mounted on polymer brackets, to minimize di-electric corrosion. The aluminum tube shall be a micro channel design with high efficiency aluminum fins. Fins shall be brazed to the tubing for a direct bond. Each condenser coil shall be factory leak tested with high-pressure air under water.

4. Condenser coils shall be protected from incidental contact to coil fins by a coil guard. Coil guard shall be constructed of cross wire welded steel with PVC coating.

5. Units shall have at least one condenser fan controlled to maintain positive head pressure. Condenser fan speed control shall be added to the last fan off on each refrigeration circuit to provide cooling to ambient temperatures down to 0° F. Fan speed control shall be field adjustable.

6. Each unit shall have a variable speed scroll compressor on the lead refrigeration circuit. Each compressor shall be complete with gauge ports, crankcase heater, sight-glass, anti-slug protection, motor overload protection and a time delay to prevent short cycling and simultaneous starting of compressors following a power failure. Compressors shall be isolated with resilient rubber isolators to decrease noise transmission.
8. Each unit shall have two independent refrigeration circuits for redundancy. Each circuit shall be complete with a low pressure control, filter-drier, liquid moisture indicator/sight-glass, thermal expansion valve, and a manual reset high pressure safety switch. The thermal expansion valve shall be capable of modulation from 100% to 25% of its rated capacity. Sight-glasses shall be accessible for viewing without disrupting unit operation. Each circuit shall be dehydrated and factory charged with Refrigerant 410A and oil.

9. Each unit shall have at least 4 compressor stages of cooling capacity control for better part load control as required by ASHRAE 90.1-2013.

O. Roof Curb

1. A prefabricated 12-gauge galvanized steel, mounting curb, designed and manufactured by the unit manufacturer, shall be provided for field assembly on the roof decking prior to unit shipment. The roof curb shall be a full perimeter type with complete perimeter support of the air handling section and rail support of the condensing section. Supply and return opening duct frames shall be provided as part of the curb structure allowing duct connections to be made directly to the curb prior to unit arrival. The curb shall be a minimum of 20" high and include a nominal 2" x 4" wood nailing strip. Gasket shall be provided for field mounting between the unit base and roof curb.

P. Controls

1. Each unit shall be equipped with a complete MicroTech® microprocessor-based control system. The unit control system shall include all required temperature and pressure sensors, input/output boards, main microprocessor and operator interface. All boards shall be individually replaceable for ease of service. All microprocessors, boards, and sensors shall be factory mounted, wired and tested.

2. The microprocessor shall be a stand-alone DDC controller not dependent on communications with any on-site or remote PC or master control panel. The microprocessor shall maintain existing set points and operate standalone if the unit loses either direct connect or network communications. The microprocessor memory shall be protected from voltage fluctuations as well as any extended power failures. All factory and user set schedules and control points shall be maintained in nonvolatile memory. No settings shall be lost, even during extended power shutdowns.

3. The main microprocessor shall support an RS-232 direct connection to a product service tool or a modem. A communications module shall be provided for direct communication into the BAS network.

4. All digital inputs and outputs shall be protected against damage from transients or wrong voltages. Each digital input and digital output shall be equipped with an LED for ease of service. All field wiring shall be terminated at a separate, clearly marked terminal strip.

5. The microprocessor shall have a built-in time schedule. The schedule shall be programmable from the unit keypad interface. The schedule shall be maintained in nonvolatile memory to ensure that it is not lost during a power failure. There shall be one start/stop per day and a separate holiday schedule. The controller shall accept up to sixteen holidays each with up to a 5-day duration. Each unit shall also have the ability to accept a time schedule via BAS network communications.

Q. Warranty
1. The manufacturer shall provide 12-month parts only warranty. Defective parts will be repaired or replaced during the warranty period at no charge. The warranty period shall commence at start up, or 6 months after shipment, whichever occurs first.

2.2 HEAT GENERATION

A. Hydronic Hot Water Boiler:

1. The boiler shall bear the ASME "H" stamp for 80 psi working pressure and shall be National Board listed. The boiler shall have a fully welded, stainless steel, fire tube heat exchanger. There shall be no banding material, bolts, gaskets or "O" rings in the pressure vessel construction. The heat exchanger shall be designed for a single-pass water flow to limit the water side pressure drop. The condensate collection basin shall be constructed of welded stainless steel. The complete heat exchanger assembly shall carry a fifteen (15) year limited warranty.

2. The boiler shall be certified and listed by C.S.A. International under the latest edition of the harmonized ANSI Z21.13 test standard. The boiler shall operate at a minimum of 95% AFUE Efficiency and as registered with AHRI. The boiler shall be certified for indoor installation.

3. The boiler shall be constructed with a heavy gauge steel jacket assembly, primed and pre-painted on both sides. The combustion chamber shall be sealed and completely enclosed, independent of the outer jacket assembly, so that integrity of the outer jacket does not affect a proper seal. A burner/flame observation port shall be provided for observing the burner flame and combustion chamber. The burner shall be a premix design constructed of high temperature stainless steel with a woven Fecralloy outer covering to provide smooth operation at all modulating firing rates. The boiler shall be supplied with a negative pressure regulation gas valve and be equipped with a pulse width modulation blower system to precisely control the fuel/air mixture to the burner. The boiler shall operate in a safe condition with gas supply pressures as low as 4 inches of water column. The burner flame shall be ignited by direct spark ignition with flame monitoring via a flame sensor.

4. The boiler shall utilize a 24 VAC control circuit and components. The control system shall have a factory installed display for boiler set-up, boiler status, and boiler diagnostics. All components shall be easily accessed and serviceable from the front and top of the jacket. The boiler shall be equipped with a temperature/pressure gauge; high limit temperature control with manual reset; ASME certified pressure relief valve set for 30 psi (standard); outlet water temperature sensor with a dual thermistor to verify accuracy; system supply water temperature sensor; outdoor air sensor, flue temperature sensor with dual thermistor to verify accuracy; low water cut off with manual reset, blocked drain switch and a condensate trap for the heat exchanger condensate drain.

5. The boiler shall include standard and factory controls with installed with 128 x 128 resolution display, password security, outdoor air reset, pump delay with freeze protection, pump exercise, ramp delay featuring six steps, domestic hot water prioritization with limiting capabilities, USB drive for simple uploading of parameters and a PC port connection for connection to a local computer for programming and trending. A secondary operating control that is field mounted outside or inside the appliance is not acceptable. The boiler shall have alarm contacts for any failure, runtime contacts and data logging of runtime at given modulation rates, ignition attempts and ignition failures. The boiler shall have a built-in "Cascade" with leader redundancy to sequence and rotate while maintaining modulation of up to eight boilers of different Btu inputs without utilization of an external controller. The internal "Cascade" function shall be capable of lead-lag, efficiency
optimization, front-end loading, and rotation of lead boiler every 24 hours. The control must have optional capability to communicate via Modbus protocol with a minimum of 46 readable points. The boiler shall have an optional gateway device which will allow integration with BACnet protocols.

6. The control shall increase fan speed to boost flame signal when a weak flame signal is detected during normal operation. A 0-10 VDC output signal shall control a variable speed boiler pump (pump shall be supplied by manufacturer) to keep a fixed Delta T across the boiler regardless of the modulation rate. The boiler shall have the capability to receive a 0-10 VDC input signal from a variable speed system pump to anticipate changes in system heat load in order to prevent flow related issues such as erratic temperature cycling.

7. The boiler shall be equipped with two terminal strips for electrical connection. A low voltage connection board with 46 connection points for safety and operating controls, i.e., Alarm Contacts, Runtime Contacts, Low Water Cut Off, Louver Proving Switch, Tank Thermostat, Domestic Hot Water Building Recirculation Pump Contacts, Domestic Hot Water Building Recirculation Temperature Sensor Contacts, Remote Enable/Disable, System Supply Temperature Sensor, Outdoor Temperature Sensor, Tank Temperature Sensor, Modbus Building Management System Signal and Cascade Control Circuit. A high voltage terminal strip shall be provided for Supply voltage. Supply voltage shall be 120 volt / 60 hertz / single phase on all models. The high voltage terminal strip plus integral relays are provided for independent pump control of the System pump, the Boiler pump and the Domestic Hot Water pump.

8. Direct Vent system with vertical roof top termination of both the exhaust vent and combustion air. The flue shall be Category IV approved material constructed of PVC, CPVC, Polypropylene or Stainless Steel. A separate pipe shall supply combustion air directly to the boiler from the outside. The boiler’s total combined air intake length shall not exceed 100 equivalent feet. The boiler’s total combined exhaust venting length shall not exceed 100 equivalent feet. The air inlet must terminate on the rooftop with the exhaust.

9. The boiler shall operate at altitudes up to 4,500 feet above sea level without additional parts or adjustments. The boiler shall be certified for operation at elevations of 4,500 feet, and above, by a 3rd party organization.

B. 90% Efficient Gas Furnace:

1. General:

   a. Furnace shall be a 4-way multipoise, fixed capacity, gas-fired direct vent unit of the vertical or horizontal type and consist of a heating section, blower, and all necessary wiring, all of which are to be contained in an internally insulated cabinet. Unit shall be rated in accordance with ARI Standards 210 and 270 and shall be UL labeled.

2. Casing:

   a. Casing shall be of .03 in. thickness minimum, pre-painted galvanized steel. Casing shall be insulated and contain access panels to all internal components which require servicing. Air handler shall be designed for vertical or horizontal installation as shown on the plans.

3. Gas Heating Section:
a. Furnace shall be of the condensing type with a minimum AFUE rating of 90% and shall contain a pressure switch, redundant main gas control, 24 volt gas valve, electric ignition system, pressure regulator, manual shut-off valve, and drain tubing along with installed condensate drain trap. The primary heat exchanger shall be a 3-Pass, 20 gage corrosion resistant aluminized steel of fold-and-crimp sectional design, which operates under negative pressure. The secondary heat exchanger shall be of a flow-through, fold-and-crimp design, which operates under negative pressure. Flues and combustion air shall be directly piped into the furnace, using schedule 40 CPVC pipe. A flame rollout switch shall be factory installed into the burner box to reduce the possibility of a blocked or restricted exhaust or combustion air intake pipe. Furnace heat exchanger shall be warranted for 20 years.

4. Blower:

a. Furnace shall contain a direct drive supply fan and motor. Galvanized blower wheel shall be centrifugal type, statically and dynamically balanced. Blower motor of PSC type shall be permanently lubricated with sealed bearings, rated at the horsepower listed on plans, and shall be multiple-speed direct drive. Blower motor shall be soft mounted to the blower scroll to reduce vibration transmission and shall be provided with overload protection.

5. Filters:

a. Filters shall be 1” replaceable pleated media type with a minimum MERV rating of 6. Provide four (4) extra sets of filters with furnace. See drawings for filter rack location and details.

6. Controls:

a. Controls shall consist of an integrated electronic control board, motor starters, disconnect switches, overload protection, terminal strips for connection of remote controls, a replaceable automotive-type circuit protection fuse, and a 40 va transformer.

7. Manufacturer, Capacity & Accessories:

a. See drawings.

C. Ductless Split System - Wall-Mounted Units

1. ¾ to 3 ton nominal cooling only or heat pump outdoor unit

2. General:

a. Indoor, direct-expansion, wall-mounted fan coil. Unit shall be complete with cooling/heating coil, fan, fan motor, piping connectors, electrical controls, microprocessor control system, and integral temperature sensing. Unit shall be furnished with integral wall mounting bracket and mounting hardware. Unit shall be rated per ARI Standards 210/240 and UL labeled.

3. Unit Cabinet:

a. Cabinet discharge and inlet grilles shall be attractively styled, high-impact polystyrene. Cabinet shall be fully insulated for improved thermal and acoustic performance.

4. Fans:
a. Fan shall be tangential direct-drive blower type with air intake at the top of the unit and discharge at the bottom front. Automatic, motor-driven vertical air sweep shall be provided standard.
b. Air sweep operation shall be user selectable. The vertical sweep may be adjusted (using the remote control) and the horizontal air direction may be set manually.

5. Coil:

a. Coil shall be copper tube with aluminum fins and galvanized steel tube sheets. Fins shall be bonded to the tubes by mechanical expansion. A drip pan under the coil shall have a drain connection for hose attachment to remove condensate. Condensate pan shall have internal trap.

6. Motors:

a. Motors shall be open drip-proof, permanently lubricated ball bearing with inherent overload protection. Fan motors shall be 3-speed.

7. Controls:

a. Controls shall consist of a microprocessor-based control system which shall control space temperature, determine optimum fan speed, and run self diagnostics. The temperature control range shall be from 62° F to 84° F.
b. The unit shall have the following functions as a minimum:
   1) An automatic restart after power failure at the same operating conditions as at failure.
   2) A timer function, to provide a minimum 24-hour timer cycle for system Auto Start/Stop.
   3) Temperature-sensing controls shall sense return air temperature.
   4) Indoor coil freeze protection.
   5) Wireless infrared remote control to enter set points and operating conditions.
   6) Automatic air sweep control to provide on or off activation of air sweep louvers.
   7) Dehumidification mode shall provide increased latent removal capability by modulating system operation and set point temperature.
   8) Fan-only operation to provide room air circulation when no cooling is required.
   9) Diagnostics shall provide continuous checks of unit operation and warn of possible malfunctions. Error messages shall be displayed at the unit.
   10) Fan speed control shall be user-selectable: high, medium, low, or microprocessor controlled automatic operation during all operating modes.
   11) Automatic heating-to-cooling changeover in heat pump mode. Control shall include deadband to prevent rapid mode cycling between heating and cooling.
   12) Indoor coil high temperature protection shall be provided to detect excessive indoor discharge temperature when unit is in heat pump mode.

8. Filters:

a. Unit shall have filter track with factory-supplied cleanable filters.

9. Electrical Requirements:

a. Power is supplied from outdoor unit.

10. Special Features (Field Installed, if necessary):

a. Condensate Pump: The condensate pump shall remove condensate from the drain pan when gravity drainage cannot be used. Pump shall be designed for quiet operation. Pump shall consist of two parts; an internal reservoir/sensor assembly, and a remote sound-shielded pump assembly. A liquid level sensor in the reservoir shall stop cooling operation if the liquid level in the reservoir is unacceptable.
11. Warranty:
   a. Minimum 1 year parts limited warranty.

12. Outdoor Units:
   a. ¾ to 3 Ton Nominal Cooling Capacity / ¾ to 3 Ton Nominal Heating Capacity
   b. General:
      1) Factory assembled, single piece, air-cooled outdoor unit. Contained within the unit enclosure shall be all factory wiring, piping, controls, and the compressor.
      2) Units shall consist of a rotary compressor, an air-cooled coil, propeller-type draw-through outdoor fan, reversing valve (HP), accumulator (HP units), metering device(s), and control box. Units shall discharge air horizontally as shown on the contract drawings. Units shall function as the outdoor component of an air-to-air cooling only, or heat pump system.
      3) Units shall be used in a refrigeration circuit matched to duct-free cooling only or heat pump fan coil units.

13. Unit Cabinet:
   a. Unit cabinet shall be constructed of galvanized steel, bonderized and coated with a baked-enamel finish on inside and outside.
   b. Unit access panels shall be removable with minimal screws and shall provide full access to the compressor, fan, and control components.
   c. Outdoor compartment shall be isolated and have an acoustic lining to assure quiet operation.

14. Fans:
   a. Outdoor fans shall be direct-drive propeller type, and shall discharge air horizontally. Fans shall draw air through the outdoor coil.
   b. Outdoor fan motors shall be totally-enclosed, single phase motors with class B insulation and permanently-lubricated ball bearings. Motor shall be protected by internal thermal overload protection.
   c. Shaft shall have inherent corrosion resistance.
   d. Fan blades shall be non metallic and shall be statically and dynamically balanced.
   e. Outdoor fan openings shall be equipped with PVC metal/mesh coated protection grille over fan.
   f. Compressor:
   g. Compressor shall be fully hermetic rotary type.
   h. Compressor shall be equipped with oil system, operating oil charge, and motor. Internal overloads shall protect the compressor from over-temperature and over-current.
   i. Motor shall be NEMA rated class F, suitable for operation in a refrigerant atmosphere.
   j. Compressor assembly shall be installed on rubber vibration isolators.

15. Outdoor Coil:
   a. Coil shall be constructed of aluminum fins mechanically bonded to seamless copper tubes, which are cleaned, dehydrated, and sealed.

16. Refrigeration Components:
   a. Refrigerant circuit components shall include brass external liquid line service valve with service gage port connections, suction line service valve with service gage connection port, service gage port connections on compressor suction and
discharge lines with Schrader type fittings with brass caps, accumulator, reversing valve. Provide tamper proof port caps.

17. Controls and Safeties:

a. Operating controls and safeties shall be factory selected, assembled, and tested.
   The minimum control functions shall include the following:
   1) A time delay control sequence is provided standard through the fan coil board.
   2) Automatic outdoor-fan motor protection.
   3) System diagnostics.
   4) Compressor motor current and temperature overload protection.
   5) Outdoor fan failure protection.

18. Electrical Requirements:

a. Unit electrical power shall be a single point connection.
b. Unit control voltage to the indoor-fan coil shall be 24 VDC.
c. All power and control wiring must be installed per NEC and all local electrical codes.
d. Unit shall have high-and low-voltage terminal block connections.

19. Special Features (Field Installed):

a. Low-Ambient Kit: Control shall regulate fan-motor cycles in response to saturated condensing temperature of the unit. The control shall be capable of maintaining a condensing temperature of 100°F ± 10°F, with outdoor temperatures to 20°F. Installation of kit shall not require changing the outdoor fan motor.

b. Crankcase Heater.

20. Warranty:

a. 1-Year parts and 5-Year compressor warranty

2.3 EXHAUST FANS

A. Laboratory Exhaust Fan

1. General
2. Base fan performance at standard conditions (density 0.075 Lb/ft3). Fasteners to be 304 stainless steel. Each fan shall be belt driven in AMCA arrangement 1, 9 or 10 according to drawings. Fans to be equipped with lifting lugs. Corrosion Resistant Coating
3. Note that fan housings that have 8-10 mil thick liquid coating are more subject to running or sagging, manually applied have a non-uniform coverage over the surface, final finish is less durable and is environmentally unfriendly due to the emission of volatile organic compounds (solvents). Fan stand and impellers shall be corrosion resistant coated with a two part electrostatically applied, baked, corrosion resistant, Plastifier™ Polyester powder coating system. Standard finish color to be M.K. Plastics light gray. All steel surfaces shall be cleaned and prepared using a multi-stage process that includes phosphate washing to increase corrosion resistance, surface area and improve paint adhesion. Coatings shall consist of a 70% zinc rich polyester primer and a polyester powder resin top coat that shall be electrostatically applied and cured. Final coating thickness shall be a minimum 4-6 mil for superior corrosion resistance, and shall include UV inhibitors to prevent chalking from sunlight. Fan Housing and Outlet

a. M. K. Plastics will supply a Vacuum Hub Seal to avoid any contaminated air from escaping (patent pending), if noted on the equipment schedule. Fan housing to be
aerodynamically designed with high-efficiency inlet, engineered to reduce incoming air turbulence. Casings to be smooth exterior and resin rich interior. Fan housing shall be manufactured in specifically formulated resins, for maximum corrosion resistance, and reinforced with fiberglass for structural strength. Fastening bolts holding the casing to the support plate are to be encapsulated in FRP. No uncoated metal fan parts in the corrosive air stream will be tolerated. A bifurcated fiberglass reinforced plastic (FRP) discharge nozzle shall be supplied by the fan manufacturer and be designed to efficiently handle an outlet velocity of up to 7,000 FPM. The discharge shall include a venturi and fiberglass wind band to induce ambient air. All fiberglass parts shall include UV inhibitors in the resins to prevent chalking from the sunlight. Flame retardancy of 25 or less, is standard. A graphite liner and grounding strap shall be included to remove any possible build up of static electricity, if noted on the equipment schedule. An integral fan housing drain shall be used to drain rainwater when the fan is de-energized. A bolted housing access door shall be supplied for impeller inspection. Standard finish color to be light gray. Hub seal to be neoprene or Teflon, if noted on the equipment schedule. Fan Impeller Fan impeller shall be coated with a minimum of 4-6 mil electrostatically applied baked polyester powder coating. Refer to specification section 2.02 for corrosion resistant coating. Impellers shall have die-formed airfoil, backward curved steel blades with the option of extruded aluminum blades. All hollow blade wheels shall be continuously welded around all edges. All wheels shall be statically and dynamically balanced on precision electronic balancers to a Balance Quality Grade G6.3 per ANSI/AMCA 204 or better. Fan Inlet Elbow/Plenum All dampers shall have an extended control shaft for electronic, pneumatic or manual control actuation.

b. For variable volume systems, an inlet elbow/plenum shall be provided as shown on drawings. The elbow/plenum shall be equipped with a bypass air damper(s) and fiberglass reinforced plastic (FRP) weather cowl and birdscreen, for introducing outside air at roof level upstream of the fan. As standard the plenum shall be constructed of corrosion resistant fiberglass, double wall, with 1" thick K-Kore™ thermal and acoustical insulated fiberglass panels, bonded, reinforced and sealed together to prevent noise and air leakage. As an option, the plenum shall be constructed of single wall, continuously welded galvaneal steel, and comply with specification section 2.02 for corrosion resistant coating. All plenums shall be mounted on an insulated curb. An optional combination integral fan platform plenum curb shall be provided by the fan manufacturer, if shown on the project drawings. Inlet elbow/plenum to be attached to the fan inlet by a flexible FPVC connector, provided by the fan manufacturer. Bypass air damper(s) shall be opposed-blade, airfoil design, extruded aluminum with a clear anodized finish (salt water resistance), with linkage hardware installed in the side frame. All aluminum linkage hardware parts shall be clear anodized and all non-aluminum linkage hardware parts shall be type 316 stainless steel. Dampers shall be suitable for applications up to 10 inches wg. in extruded aluminum. For higher pressures up to 20” wg., the damper blades and frame shall be heavy duty H.R. steel and polyester coated. Each bypass damper shall be housed inside a fiberglass reinforced plastic (FRP) weather cowl and birdscreen, to prevent the possibility of rainwater entrainment. Fan isolation damper(s) shall be parallel-blade, airfoil design, extruded aluminum with a clear anodized finish (salt water resistance), with linkage hardware installed in the side frame. All aluminum linkage hardware parts shall be clear anodized and all non-aluminum linkage hardware parts shall be type 316 stainless steel. Dampers shall be suitable for applications up to 10 inches wg. in extruded aluminum. For higher pressures up to 20” wg., the damper blades and frame shall be heavy duty H.R. steel and polyester coated. Each isolation damper shall be housed inside a fiberglass reinforced plastic (FRP) damper enclosure.
bolted to the bypass air plenum with a round slip connection at one end for fan inlet attachment. Fan Motors and Drives: Motors to be premium efficiency, standard NEMA frame, 1800 RPM, TEFC with a 1.15 service factor. A factory mounted NEMA 3R or 4X disconnect switch shall be provided for each fan. Motor maintenance shall be accomplished without fan impeller removal or requiring maintenance personnel to access the contaminated exhaust components.

c. Fans submitted that use 900 RPM, 1200 RPM, or C-Face motors, shall include one spare motor per fan system, in accordance with ANSI Z9.5, section 4.14.7.4, CRITICAL SERVICE SPARES.

d. Drive belts and sheaves shall be sized for 150% of the fan operating brake horsepower, and shall be readily and easily accessible for service, if required.

e. Motor sheaves shall be cast iron, variable pitch on applications 5 HP and smaller, and fixed pitch on 7.5 HP and larger.

f. Shaft to be ANSI C-1045 steel, and shall be coated with TECTYL protectant.

g. Bearings shall be heavy duty, grease lubricated, spherical roller or adapter mounted anti-friction ball, self-aligning, pillow block type and selected for a minimum average bearing life (AFBMA L-10) in excess of 200,000 hours at the maximum fan RPM.

h. All shaft bearings on sizes 2450 and above and non-permanently lubricated motors shall have extended lube lines with zerk fittings, if noted on the equipment schedule.

B. Ceiling Cabinet Exhaust Fan (Standard):

1. Description:

   a. Fan shall be ceiling, wall, or inline mounted, direct driven, centrifugal exhaust fan.

2. Certifications:

   a. Fan shall be listed by Underwriters Laboratories (UL 705) and UL listed for Canada (cUL 705). Fan shall bear the AMCA certified ratings seal for sound and air performance.

3. Construction:

   a. The fan housing shall be minimum 20 gauge galvanized steel and acoustically insulated housing above 200 cfm. Blower and motor assembly shall be mounted to a minimum 14 gauge reinforcing channel and shall be easily removable from the housing. Motor shall be mounted on vibration isolators. Unit shall be supplied with integral wiring box and disconnect receptacle shall be standard. Discharge position shall be convertible from right angle to straight through by moving interchangeable panels. The outlet duct collar shall include a reinforced aluminum damper with continuous aluminum hinge rod and brass bushings. To accommodate different ceiling thickness, an adjustable prepunched mounting bracket shall be provided. A powder painted white steel grille shall be provided as standard.

4. Wheel:

   a. Wheel shall be centrifugal forward curved type, constructed of galvanized steel. Wheel shall be balanced in accordance with AMCA Standard.

5. Motor:

   a. Motor shall be open drip proof type with permanently lubricated sealed bearings, built-in thermal overload protection and disconnect plug. Motor shall be furnished at the specified voltage.
C. Upblast Exhaust Fan

1. **Description:**
   - Fan shall be a single width, single inlet, backward inclined flat blade, belt driven centrifugal vent set.

2. **Certifications:**
   - Fan shall be manufactured at an ISO 9001 certified facility. Fan shall be listed by Underwriters Laboratories (UL/cUL 705) for US and Canada. For restaurant applications, fan shall be listed by Underwriters Laboratories (UL/cUL 762) for US and Canada. For smoke control applications, fan shall be listed by Underwriters Laboratories (Power Ventilator for Smoke Control Systems) for US and Canada. Fan shall bear the AMCA certified ratings seal for air performance.

3. **Construction:**
   - The fan shall be of bolted and welded construction utilizing corrosion resistant fasteners. The scroll wrapper shall be a minimum 14-gauge steel and the scroll side panels shall be a minimum 12-gauge steel. The entire fan housing shall have continuously welded seams for leakproof operation. A performance cut-off shall be furnished to prevent the recirculation of air in the fan housing. The fan housing shall be field rotatable to any one of eight discharge positions and shall have a minimum 1-1/2-inch outlet discharge flange. Bearing support shall be minimum 10-gauge welded steel. Side access inspection ports shall be provided with quick release latches for access to the motor compartment without removing the weather cover. Lifting lugs shall be provided for ease of installation. Unit shall bear an engraved aluminum nameplate. Nameplate shall indicate design CFM, static pressure, and maximum fan RPM. Unit shall be shipped in ISTA certified transit tested packaging.

5. **Coating:**
   - Steel fan components shall be Lorenized™ with an electrostatically applied, baked polyester powder coating. Each component shall be subject to a five stage environmentally friendly wash system, followed by a minimum 2 mil thick baked powder finish. Paint must exceed 1,000-hour salt spray under ASTM B117 test method.

6. **Wheel:**
   - Wheel shall be steel centrifugal backward inclined, non-overloading flat blade type. Blades shall be continuously welded to the backplate and deep spun inlet shroud. Wheel hub shall be keyed and securely attached to the fan shaft. Wheel inlet shall overlap an aerodynamic aluminum inlet cone to provide maximum performance and efficiency. Wheel shall be balanced in accordance with AMCA Standard 204-05, Balance Quality and Vibration Levels for Fans.

7. **Motor:**
   - Motor shall be Nema design B with class B insulation rated for continuous duty and furnished at the specified voltage, phase and enclosure.

a. **Bearings:**
   - Bearings shall be designed and tested specifically for use in air handling applications. Construction shall be heavy duty regreasable ball or roller type in a cast iron pillow block housing selected for a minimum L50 life in excess of 200,000 hours at maximum cataloged operating speed.

B. **Blower Shaft:**
   - Blower shaft shall be AISI C-1045 hot rolled and accurately turned, ground and polished. Shafting shall be sized for a critical speed of at least 125% of maximum RPM.

C. **Belts and Drives:**
   - Belts shall be oil and heat resistant, static conducting. Drives shall be precision machined cast iron type, keyed and securely attached to the wheel and motor shafts. Drives shall be sized for 150% of the installed motor horsepower. The variable pitch motor drive must be factory set to the specified fan RPM.

### 2.4 HUMIDIFIER
A. General

1. Description:
   Air humidification apparatus for the production of aseptic steam, with gas burner technology, supplied with mains drinking water. System commissioning performed by [manufacturer’s technical personnel].

2. Product:
   Stand-alone isothermal humidifier with gas burner for the production of steam at atmospheric pressure using city drinking water. The water is heated via a heat exchanger containing the burner combustion head, producing sterile steam. The apparatus shall be able to operate with natural gas (G20 or G25) or LPG (G31); the initial configuration shall be performed in the field by setting software parameters and without replacing any mechanical parts. The humidifier shall be able to operate within the following temperature range: -40°C to +45°C. Steam production, water drain and refill shall be managed by the control program completely automatically according to actual feedwater conductivity, without the need for prior analysis or settings.

3. Features:
   Painted steel supporting structure with separate sections for the water circuit and the electrical parts, front and side panels that can be removed for maintenance. Electrical section with electrical panel including electrical components and electronic control. The steam production boiler shall be built using AISI 304 stainless steel. The heat exchanger immersed in the water shall be thin AISI316L stainless steel with a minimum heat exchange efficiency of 94%. The quantity of steam produced shall be modulated continuously, with a minimum flow-rate not exceeding 25%. The water level shall be controlled by a suitable three-level sensor. Any excess foam on the surface of the water shall be detected and managed by a suitable device inside the boiler. SOLUTIONS WITHOUT PROTECTION AGAINST EMISSION OF BOILING WATER ARE NOT PERMITTED. The same device shall also act as an additional safety level sensor. In the event of inactivity, the water shall be automatically drained after 72 h (parameter that can be set by the user). At least two frost protection safety checks shall be provided in the event of a fall in temperature, before completely emptying the boiler automatically due to inactivity. In the event of temperatures below 3°C, the automatic boiler drain shall be controlled by a system that is independent of the unit’s power supply (a mechanical NO valve independent of the electrical circuit and functioning even if the unit is switched off). The unit installed indoors shall have two sides accessible for maintenance and be able to be positioned close to two walls. The unit installed outdoors shall be able to be positioned on a raised support base, with the water, power supply and drain connections at the bottom of the unit.

5. Controls:
   The apparatus shall be managed completely automatically by an electronic microprocessor controller. Steam production shall be modulated continuously according to the input signal. Input signal from probe or external controller: 0-1V, 0-10V, 0-20mA, 4-20mA, ON/OFF contact, NTC. An external enabling input and at least 4 programmable relays are required for remote signaling of alarm status, production status, activation of the steam blower. An input for a second “limit” humidity probe is required to CONTINUOUSLY MODULATE PRODUCTION based on the humidity downstream in the duct, in order to prevent condensation during temperature transients. A SIMPLE ON/OFF ENABLING INPUT BASED ON A THRESHOLD IS NOT ACCEPTABLE FOR THIS PURPOSE. The minimum required control algorithms, which can be selected during installation, are: stand-alone with room probe, stand-alone with main probe + modulating limit probe, stand-alone with two probes (average); secondary with external proportional voltage or current signal, with external signal + local limit probe, ON/OFF from voltage- free contact, with NTC temperature probe for steambaths. The user interface shall feature a colour touch screen.
graphic display for programming and monitoring unit status, the set and measured humidity level, steam production, current draw, water conductivity, parameters and alarms using text and icons. The web server function shall be available for connectivity to the local Ethernet network. It shall be connectable to other similar units in main-secondary i.e. "mirror" mode so as to extend capacity, including the "automatic backup" and "rotation" functions to distribute wear equally across several humidifiers operating in the system. It shall be connectable to multiple wireless probes to avoid wiring in critical installations; the probes can be assigned a weight for average measurements. Initial configuration shall be guided via wizard. The following shall be included: complete diagnostics, alarm log downloadable via USB port for diagnosis; messages for preventive maintenance. It shall include daily and weekly programming of operation with differentiated set points. Water pre-heating function to reduce time to reach production (programmable pre-heating set point).

Performance Data:

6. Relative humidity control accuracy shall be up to +/- 3%. Maximum flow-rate shall be settable by parameter, with continuous production control between 25% and 100% of the maximum set capacity (12.5% for models with two burners). Safety, Savings, and Hygiene:

7. The burner shall be a negative pressure premix model with double safety shutter for the gas and negative pressure sensor on the air intake. The flame control board shall comply with CE, TÜV DVGW, ETL, AGA standards. The flue gas temperature shall be monitored by means of a specific temperature sensor to detect combustion problems or the need to clean the heat exchanger. In addition, the flue gas exhaust system shall be equipped with a mechanical thermal circuit breaker with manual reset to detect overheating and interrupt operation independently of the electronic controller. The apparatus shall be equipped with a conductivity meter in the feedwater supply circuit and a suitable software algorithm to optimize water change and prevent corrosion based on actual water quality, allowing significant savings in water consumption. SOLUTIONS THAT ONLY ALLOW MANUAL SETTING OF WATER HARDNESS DURING INSTALLATION ARE NOT ACCEPTABLE, THE SYSTEM MUST BE SELF-ADAPTIVE. Automatic water draining due to inactivity shall be factory-set every 3 days by parameter, however can be modified in the field to comply with any local regulations, so as to avoid hygiene problems due to stagnant water. The device shall be equipped with an automatic frost protection feature. Interface: BACnet, Modbus, CAREL protocols for BMS and remote control via RS485 serial; BACnet and Modbus protocols over Ethernet. Without requiring external devices. USB for programming, updating, parameter duplication, diagnostic logs. Ethernet port. RS485 serial port. The humidifier shall be able to be monitored and managed remotely using a cloud service operating via Ethernet or 4G network in plug&play mode. Accessories: Steam delivery hoses, food safety certified quality, with embedded steel spiral to prevent choking, diameters 22, 30, 40 and 80 mm. Stainless steel duct steam distributors with diameters 22, 30 and 40 mm, lengths between 35 and 205 cm, flow-rates from 1 to 40 kg/h, with separate condensate drain. 10 mm drain pipes for condensate and 40/50 mm for humidifier water. Wide range of relative humidity and temperature sensors, duct and room models, ranges 10-90% rH or 0-100% rH, with current or voltage signal. Provide with 5 micron particulate filter to be placed after the manual fill valve 1 to trap solid impurities.

2.5 PUMPS

A. Close Coupled, Vertical Inline Pump

1. General:

   a. The pumps shall be of the inline, close-coupled, single stage, vertical split case design in cast iron bronze fitted construction and shall be specifically designed for
quiet operation. All pump internals shall be capable of being serviced without disturbing the piping connections.

b. The pumps shall be sized for a non-overloading condition, whether it is a single pump installation, lead-lag installation or parallel pumping installation. In a parallel installation, one pump must be able to operate in a non-overload condition while the other pump is turned off. The pump submittals must show this situation, complete with parallel pumping and system curves.

c. The dimensions of the suction and discharge connections of each pump shall not be less than those of the scheduled pumps shown on the plans.

d. The pump manufacturer shall be ISO-9001 certified.

2. Pump Casing:

a. Pump casing shall be cast iron, suitable for 175 psi (1206 kPa) working pressure at 140°F (60°C). Ductile iron pump casings are suitable for pressures to 250 psi (1724 kPa). The casing shall be hydrostatically tested to 150% maximum working pressure. The casing shall be radially split to allow removal of the rotating element without disturbing the pipe connections. The casing suction and discharge connections shall be the same size and shall be provided with drilled and tapped seal vent and pressure gauge connections.

3. Impeller:

a. Pump impeller shall be bronze, fully enclosed type. Impeller shall be dynamically balanced.

4. Seal:

a. Mechanical Seal shall be single spring inside type with carbon against Ceramic faces. EPDM elastomer with stainless steel spring and hardware shall be provided. Seal vent line shall be factory installed and shall be piped from the seal area to the pump suction connection.

5. Shaft:

a. A bronze shaft sleeve, extending the full length of the mechanical seal area, shall be provided.

6. Motor:

a. The motor shall meet the scheduled horsepower, speed, voltage, and enclosure design. The motor shall have heavy-duty grease lubricated ball bearings to offset the additional bearing loads associated with closed coupled pump design. The motor shall be non-overloading at any point on the pump curve and shall meet NEMA specification.

7. Capacity, Manufacturer, and Accessories:

a. See Drawings.

2.6 AIR DISTRIBUTION

A. Supply air ductwork = 2" W.G.
B. Return, Exhaust, Outside Air Intake ductwork = 1" W.G.

1. Low pressure ductwork located exposed in exposed ceiling areas, shall be spiral type ducts with a “paint-grip” finish, on ductwork and associated fittings that can be painted. Joints shall be sealed evenly and in a professional manner with silver silicon. Discolored or
damaged ductwork unacceptable to the Engineer shall be replaced at the Contractor's expenses.

a. Joints: 0" to 20" diameter, interior slip coupling beaded at center, fastened to duct with screws and with sealing compound applied continuously around joint before assembling and after fastening. Sealing compound shall be applied in an evenly and professional manner.

b. Joints 22" – 72" diameter, use 3-piece, gasketed, flanged joints consisting of 2 internal flanges (with integral mastic sealant) split to accommodate minor differences in duct diameter, and one external closure band designed to compress gasketing between internal flanges. The manufacturer shall be Ductmate Spiralmate or equal.

c. All takeoff or branch entrances shall be by means of factory-fabricated fittings. Field taps shall not be allowed.

d. Supply air ductwork from air handler to the terminal unit = 4" W.G.

2. All medium pressure ductwork shall be leak tested. Duct leakage test criteria shall be limited as follows:

a. All supply ductwork from air handler to terminal unit: 1% of design cfm at 4" of static pressure.

b. Duct leakage testing:
   1) Perform testing in accordance with the HVAC Air Duct Leakage Test Manual and SMACNA.
   2) Use a certified orifice tube for measuring the leakage.
   3) Define section of system to be tested and blank off.
   4) Determine the percentage of the system being tested.
   5) Using that percentage, determine the allowable leakage (cfm) for that section being tested.
   6) Pressurize to operating pressure and repair any significant or audible leaks.
   7) Re-pressurize and measure leakage.
   8) Repeat steps 6 and 7 until leakage measured is less than the allowable in step 5.

c. Fume hood and lab exhaust ductwork shall be single wall 316L stainless steel, ASTM-A312 built for structural strength. Protect finish with mill applied protective plastic/paper throughout construction. All balancing dampers and other accessories located in the fume hood exhaust duct system shall be 316 stainless steel.
   1) All lab exhaust ductwork except the individual runouts from the main to the fume exhaust hood.
   2) Duct shall be a minimum of 18 gauge.
   3) Elbows and angles shall have the same gauge as ductwork, inside radius not less than width of ductwork.
   4) The duct system shall be fitted with copper grounding straps, connected to the duct and to an effective grounding system.
   5) Provide drains at low points in ductwork.
   6) See fabrication requirements below for ductwork fabrication and assembly requirements.
   7) Note that all fittings, accessories, etc. in the fume hood and laboratory exhaust ductwork system shall be fabricated from 316 stainless steel.

d. All lab exhaust runouts from the main to fume exhaust hoods.
   1) Duct shall be a minimum of 18 gauge.
   2) Elbows and angles shall have the same gauge as ductwork, inside radius not less than width of ductwork.
3) The duct system shall be fitted with copper grounding straps, connected to the duct and to an effective grounding system.
4) Ducts shall be sloped back to their respective hood.
5) Longitudinal and transverse joints between ductwork and fittings shall be continuous purge welded with Argon gas. Use of spot welds and sealants is prohibited.
6) Note that all fittings, accessories, etc. in the fume hood and laboratory exhaust ductwork system shall be fabricated from 316 stainless steel.

3. Ductwork where humidifier grid is located shall be constructed of a minimum 304 stainless steel ductwork 18” prior to the grid and 24” after the grid. No interior liner shall be installed at the locations noted. The exterior of the duct shall be wrapped per the specifications as noted to meet energy code.

4. Smoke dampers are to be ultra-low leakage (less than 4CFM/ft2) type with factory sleeve and electric operator located exterior to duct 120 V. operator to be spring return, fail closed and UL label. Provide duct inspection door at each damper. Minimum size shall be 8” x 8”. Inspection door shall be provided with a steel frame with gasketing around periphery, and a hinged panel. Dampers located in moisture laden air conditions shall have all metal parts made of stainless steel. Belimo operators/actuators only.

5. See Drawings for requirement.

6. During ductwork being delivered from the premises of the manufacturer, care must be taken to prevent damage during transportation and off-loading.

7. Job site duct material storage areas should be clean, dry, and located away from high dust generating processes such as masonry or tile cutters, cutoff saws, drywall sanding, mortar and plaster mixers, roof pitch kettles, portable electric generators, and main walkways that will be constantly broom swept. The general contractor should designate a suitable area for temporary storage.

8. To prevent ductwork material damage from standing water, storage locations should include pallets or blocking to keep fabricated metal ductwork above the floor surface. If there is a risk of water runoff from above or dusty areas cannot be avoided, coverage should be used to protect stored materials.

9. Before the installation of individual duct sections, they are to be inspected to ensure that they are free from all debris.

10. All ductwork risers must be covered to prevent the entry of debris into the duct.

11. Access covers shall be firmly fitted in position on completion of each section of the work. Open ends on completed ductwork and overnight work-in-progress shall be sealed.

12. The working area should be clean and dry and protected from the elements.

13. The internal surfaces of the uninsulated ductwork shall be wiped to remove excess dust immediately prior to installation.

14. In addition to the provisions previously described, the following requirements should also be undertaken:

   a. All self-adhesive labels for part identification are to be applied to external surfaces only.
b. To maintain cleanliness during transportation, all ductwork shall be sealed either by blanking or capping duct ends, bagging small fittings, surface wrapping or shrink wrapping.

c. All sealed ends shall be visually examined and if damaged resealed with an appropriate material.

d. The working area shall be clean, dry and the ductwork protected from dust. Protective coverings shall only be removed immediately before installation and inspected to determine if additional wipe down is necessary.

2.7 PIPING SYSTEMS

A. Refrigerant piping shall be the manufacturer’s standard line sets, in lengths as required for proper installation. Coiling excess tubing will not be acceptable. Piping shall be continuous with no joints.

B. Provide factory wall outlet Airex Titan Outlet by Airex Manufacturing Inc. or equal. Wall outlet shall be provided with compression gasket and seal and fastened with non-corrosive screws with pre-loaded neoprene washers. Wall outlet shall be provided with an integrated over-molded flexible elastomeric sleeve for sealing, isolating, and supporting refrigerant pipes from vibration. The wall outlet must provide for expansion and contraction wall protection features with gaskets and seals. A stainless-steel clamp must be provided and installed to provide a watertight seal.

C. See Section 220100 for hanger and support requirements for piping systems. See drawings for seismic support requirements for piping systems.

D. Piping Accessories:

1. Piping Hydronic Thermometer: Thermometer shall be 3” bimetal dial thermometers with recalibrator with a 0°F to 250°F range and 2°F scale and accurate within 1% of scale range. Thermometer shall be provided with an Vari-angle Form angle stem and thermowell. Thermometers shall be installed in the hydronic system in a neat workman like manner, aligned vertically and horizontally with other thermometers in the system. The thermometers shall be installed no higher than 9'-0” above finish floor and be readable from finish floor. Weiss instrument or approved equal.

2. Piping Hydronic Pressure Gauges: Pressure gauges shall be 4½” diameter, liquid filled gauges with ranges to meet 1.5 times the pressure ratings of the system its serving. Pressure gauges shall be provided with quarter turn ball valve isolation valves on the source side and on the bleed offline. Pressure gauges shall be installed in the hydronic system in a neat workman like manner, aligned vertically and horizontally with other pressure gauges in the system. The pressure sensors shall be installed no higher than 9'-0” above finish floor and be readable from finish floor. Weiss instrument or approved equal.

3. Air Vent: Non-modulating, high capacity, automatic type designed to purge free air from the system and provide positive shutoff at pressures up to 150 psig at a maximum temperature of 250°F. Vent shall be constructed of cast iron body and bonnet with stainless steel, brass, EPDM, and silicon rubber internal components.

E. Valves:

F. Grooved Piping Requirements:

1. Grooved Pipe Valves:
2. **Grooved Pipe Specialties:**

   a. **Strainers – Grooved-End**

      1) **T-Type Strainer:** 2” through 12” sizes, 300 PSI T-Type Strainer shall consist of ductile iron (ASTM A-536, Grade 65-14-12) body, Type 304 stainless steel frame and mesh removable basket with No. 12 mesh, 2”-3” strainer sizes, or No. 6 mesh, 4”-12” strainer sizes, 57% free open area. Basis of design: Victaulic Style 730 / W730 or approved equal.

      2) **Y-Type Strainer,** 2” through 18” sizes, 300 PSI, Y-Type Strainer shall consist of ductile iron body, ASTM A-536, Grade 65-45-12, Type 304 stainless steel perforated metal removable baskets with 1/16” (1.6mm) diameter perforations 2”-3” strainer sizes, 1/8” (3.2mm) diameter perforations 4”-12” strainer sizes, and 0.156” (4mm) diameter perforations 14”-18” basis of design strainer sizes. Basis of design: Victaulic Style 732 / W732 or approved equal.

   b. **Suction Diffuser – Flanged outlet with grooved inlet connections,** rated to 300 psi. Ductile iron (ASTM A-536) body, 304 stainless steel frame and perforated sheet diffuser with 5/32” (4.0mm) diameter holes. Removable 20 mesh 304 stainless steel start-up pre-filter, outlets for pressure/temperature drain connections, and base support boss. Basis of design: Victaulic Series 731-G and W731-G or approved equal.

3. **Quality Assurance**

   a. To ensure uniformity and compatibility of piping components in grooved end piping systems, all grooved products utilized shall be supplied by one manufacturer. Grooving tools shall be supplied by the same manufacturer as the grooved components.

4. **Execution:**

   a. **Installation:**

      1) Pipe ends shall be clean and free from indentations, projections, and roll marks in the area from pipe end to groove for proper gasket sealing.
2) The gasket style and elastomeric material (grade) shall be verified as suitable for the intended service as specified.

3) Coupling installation shall be complete when visual metal-to-metal contact is reached.

b. Training:

1) A factory trained representative (direct employee) of the grooved product manufacturing company shall provide on-site training for contractor’s field personnel in the use of grooving tools, application of groove, and product installation.

c. Application:

1) A representative of the grooved system supplier shall periodically visit the job site and review installation. The contractor shall fix and/or replace any improperly installed products.

2) Grooved mechanical pipe couplings, fittings, valves and other grooved components may be used as an option to welding, threading, or flanged methods.

3) All grooved components shall conform to local code approval and/or as listed by ANSI-B-31.1, B-31.3, B-31.9, ASME, UL/ULC, FM, IAPMO or BOCA.

4) Grooved-end product manufacturer to be ISO-9001 certified.

2.8 PIPING SYSTEMS CLEANING & CHEMICAL TREATMENT

A. The Mechanical Contractor shall fill each heating piping system with clean fresh water prior to cleaning and thoroughly leak check system piping. A qualified water treatment contractor shall be utilized to furnish the cleaning material and supervise the flushing and treatment of the system. Approved water treatment contractors must show proof of similar service for not less than 3 years, and shall have full-time service personnel located within one hour from the job site. A cleaning and passivating agent supplied by the Chemical Treatment Contractor shall be added to the system at the direction of the Treatment Contractor during the leak check process to minimize initial corrosion. If the system is filled multiple times during the leak check and repair process the Mechanical Contractor shall coordinate with the Treatment Contractor to maintain this initial protection. The Treatment Contractor is responsible for providing chemical for up to two refills of the system. If additional chemical is required due to multiple re-fillings the Mechanical Contractor shall be responsible for the additional time and chemical.

B. The Mechanical Contractor shall close isolation valves at each hot water coil and open the bypass valve to prevent flow through the strainer, flow control device and coil during the initial flushing and subsequent cleaning. The side stream filter bag shall be removed during the initial flushing process.

C. Following leak check the closed system shall be flushed by the Mechanical Contractor until the leaving water runs clear. All primary runs shall be flushed at their ends to obtain maximum sweep of cutting oils and debris from the system. The inlet screens on the circulating pumps must be kept clear during this initial cleaning process and inspected following cleaning. When flushing is complete the system is to be left full. The water treatment contractor shall insure that the system not be left dry during system drain-down.

D. Prior to flushing the Mechanical Contractor shall coordinate with Treatment Contractor so that the Treatment Contractor can be available immediately following flush to add cleaning chemical within 4 hours to prevent initial corrosion.

E. Following initial flushing the Chemical Treatment Contractor shall refill all systems with cleaning and passivating agents raising the PH to a minimum of 10, circulate and flush until thoroughly clean. All primary piping runs shall be flushed at the ends during this cleaning process. The side stream filter bags shall be inspected during cleaning and changed as required. Cleaning shall
continue until these bags no longer show signs of debris.

F. Heat solution to 180° F and circulate for a minimum of 8 hours, then flush system with clean fresh water until all solids have been cleaned from the system. Clean all strainers in system. The Treatment Contractor shall provide final inspection report for inclusion in the Operation and Maintenance Manual. Additionally, the Treatment Contractor shall take loop samples approximately 12 months following completion, add or adjust chemical as required and provide a post construction report to the owner prior to warranty closeout. Chemical required is the responsibility of the Treatment Contractor.

1. Following cleaning process the Treatment Contractor shall close the bypass valves at each hot water coil and open isolation valves for normal operation and check for leaks. The bypass valve handle shall be removed and tied to the valve. A clean bag filter shall be installed in the system. The water treatment contractor shall refill system with a mixture of 100% volume of softened clean water.

### 2.9 INSULATION

A. General:

1. All insulation shall have composite fire and smoke hazard ratings, as tested by ASTM E-84, NFPA 255, and UL 723, not exceeding:
   
   a. Flame Spread 25
   b. Smoke Developed 50

B. Ductwork - External Insulation:

1. Insulation shall be fiberglass insulation with aluminum foil scrim kraft facing. All joints shall be taped with UL listed tape to provide a continuous vapor barrier. The following ducts shall be externally insulated:
   
   a. Supply ducts in unconditioned spaces (unless internally insulated)
   b. Return ducts in unconditioned spaces (unless internally insulated)
   c. Combustion air ducts
   d. Outside air intake ducts
   e. Exposed ductwork located within conditioned spaces shall not be externally insulated

2. Insulation thickness & "R" values shall be as follows:

   a. R-6 – ducts located in unconditioned spaces (such as above ceiling, but below roof insulation) and outside air intake ducts.
   b. R-12 – ducts located outside of the building's insulation envelope (such as above the attic insulation).

C. Ductwork - Internal Insulation:

1. Insulation shall be flexible fiberglass duct liner. Liner shall be attached with 100% coverage of manufacturers recommended adhesive and welded or mechanically fastened galvanized steel pins. All exposed edges of liner shall be coated with adhesive. Duct dimensions shown are net air side face-to-face of duct liner. The following ducts shall be internally insulated:
ITD D-1 Laboratory Building  
Section 23 01 00  
Coeur d’Alene, Idaho  
HVAC

a. Supply and Return ducts within 15'-0" of air handler  
b. Supply and Return ducts in mechanical rooms  
c. 15'-0" downstream of VAV terminal units.  
d. 15'-0" downstream of fan coil units.  
e. Exterior ducts (located outdoors)  
f. Buried ductwork below concrete slab  
g. Ducts as indicated on plans

2. Insulation thickness & "R" values shall be as follows:

a. R-6 – ducts located in unconditioned spaces (such as above ceiling, but below roof insulation, or buried ductwork) and outside air ducts located outside of the building envelope.  
b. R-12 – ducts located outside of the building’s insulation envelope (such as above the roof).

D. Piping Insulation - Chilled Water, Heating Water, Steam, and Condensate Return:

1. Insulation shall be pre-formed fiberglass insulation with a vapor barrier jacket. Insulation shall have a conductivity not exceeding 0.27 Btu-inch/hour-sq. ft.-°F. Lap and butt joints shall be sealed with pressure sensitive joint sealing tape of the same finish as the insulation jacket to provide a continuous vapor seal. Fittings and valves shall be insulated with PVC fitting covers and fiberglass insulation inserts, or with hydraulic setting insulating cement and four ounce canvass jacket with vapor barrier adhesive. Insulation thickness shall be as follows:

<table>
<thead>
<tr>
<th>Nominal Pipe Diameter</th>
<th>Fluid</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>½&quot; to &lt; 1½&quot;</td>
</tr>
<tr>
<td>Heating Water</td>
<td>1½&quot;</td>
</tr>
</tbody>
</table>

E. Piping Insulation - Refrigerant Piping:

1. Insulation on refrigerant suction piping shall be one-piece preformed flexible formed tubing with built-in closed cell vapor barrier. Seal laps and butt joints with moisture resistant adhesive to provide a continuous vapor seal. Cover all insulated suction lines exposed on the exterior of the building with E-Flex Guard by Airex Manufacturing, Inc. At exterior wall penetration provide Titan outlet by Airex Manufacturing, Inc. or equal with an Insulation thickness as follows:

<table>
<thead>
<tr>
<th>Nominal Pipe Diameter</th>
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<tbody>
<tr>
<td>Refrigerant line set type</td>
</tr>
<tr>
<td>Located with-in the conditioned spaces</td>
</tr>
<tr>
<td>Suction</td>
</tr>
<tr>
<td>Liquid</td>
</tr>
<tr>
<td>Discharge (hi/low pressure)</td>
</tr>
</tbody>
</table>

| Located outside the conditioned spaces |
| Suction | ½" | 1" | 1" |
| Liquid | not required |
| Discharge (hi/low pressure) | 1½" | 1½" | 2" |

F. Piping Insulation - Exterior (Outdoor) Piping:

601 E. Front Ave. Ste. 201 Coeur d’Alene, Idaho 83814 Ph: 208.664.1773 Email: kolln@millerstauffer.com
1. Piping located outdoors shall be insulated as specified above. In-addition piping shall be covered with a weather-proof aluminum alloy 3003 or 3105 jacket meeting ASTM standard B209, minimum 0.016" think, installed per the manufacturer’s installation requirements. At a minimum the following installation shall occur. The jacketing overlap shall be a minimum of 2". Horizontal piping shall have the jacket seams located at the 3 o’clock or 9 o’clock position with the seam joint openings point downward to shed moisture. Vertical piping shall have the upper jacket seams overlap the lower seam to shed moisture. Valve handles and gauges shall be positioned on the bottom to help prevent water penetration. Banding shall be used to secure the jacketing; screws, rivets, and all other fasteners capable of penetrating the underlying vapor retarder shall be prohibited. Jacketing sealant shall be applied to all longitudinal and circumferential joints and the sealant shall be located between the aluminum jacket, not at the outer lip.

G. Equipment Insulation:

1. Equipment shall be insulated with 2" thick fiberglass, minimum 6 pounds/cubic foot density. Insulation shall be finished with hydraulic setting insulating cement (1/2" thick), 6-ounce canvas, and one layer of Arabol over entire surface. Equipment to be insulated includes the following:
   a. Hot water expansion tank
   b. Air separator

2.10 VIBRATION ISOLATION

A. General:

1. All rotating equipment and appurtenances connected to rotating equipment shall be vibration isolated from the supporting structure. No metal-to-metal contact will be permitted between fixed and floating parts. All metal isolators exposed to weather shall be hot dipped galvanized after fabrication. Piping connected to rotating equipment shall be hung with spring hangers for the first 50 pipe diameters.

B. Floor Mounted Spring Isolators:

1. Isolators shall be free standing, laterally stable, and include acoustical friction pads and leveling bolts. Isolators shall have a minimum ratio of spring diameter to operating spring height of 1.0 and an additional travel to solid equal to 50% of rated deflection.

C. Floor Mounted Neoprene Pads:

1. Isolators shall be neoprene waffle or combination neoprene and cork sandwich. Pads shall be sized and selected as per manufacturers loading requirements.

D. Spring Hangers:

1. Vibration hanger shall contain a spring and double deflection neoprene element in series. Spring shall have a diameter not less than 0.8 of compressed operating spring height. Spring shall have a minimum additional spring travel of 50 percent between design height and solid height. Spring shall permit a 15-degree angular misalignment without rubbing on hanger box.

2.11 SEISMIC SUPPORTS
A. All equipment, ductwork, and piping shall be seismically supported as required by the International Building Code, latest edition. Support details shall be as indicated on the Drawings.

2.12 CONTROL SYSTEM

A. General:

1. The Control Contractor shall be responsible for a complete and operable control system, including equipment, installation, and accessories required to perform the functions specified on the drawings. The Control Contractor shall supervise the installation of all control equipment and accessories and shall submit shop drawings of the proposed system for approval.

2. The Control Contractor shall furnish and install all control conduit and wiring. All wiring shall be installed in EMT in accordance with the section Electrical. Provide plastic covered wires of not less than 18-gauge (16-gauge if longer than 50'), with at least one spare circuit at each control device. Control voltage shall not exceed 30 volts, except in starter pilot circuits.

3. The Mechanical Contractor shall be responsible for installing all control valves, water flow switches, temperature wells, control dampers, and related equipment which is furnished by the Control Contractor.

4. The control system shall be basically electric, with supplementary electronic devices as required.

5. The Control Contractor shall be ATS of Spokane, WA. The control system shall be an extension of the existing Alerton Control System using Delta controllers.

B. Control Equipment and Accessories:

1. All control dampers are to be furnished under this section, except those specified to be furnished with the air handling units. Damper blades shall be fabricated of 22-gauge galvanized sheet steel and frames shall be not less than 16-gauge galvanized steel. Blades shall be maximum 10 inches wide, 50 inches long, and shall be provided with neoprene gasketed edges and oilite bronze or nylon bearings. Dampers shall be ultra-low leakage, opposed blade type for proportional action and parallel blade type for two-position action. Leakage performance shall be a maximum of 3 cfm per sq, ft. @ a pressure differential of 1" w.g. Provide damper operators for all motorized dampers and louvers. Belimo or approved equal. Submittals shall include leakage and pressure drop data for all control dampers. All outside air dampers shall fail closed.

2. Control valves 2-1/2" and smaller shall be screwed, 3" and larger shall be grooved or flanged. Screwed valves shall be bronze or cast brass, grooved valves shall be ductile iron, and flanged valves shall be cast iron or cast steel. Three-way valves shall have contoured plugs for linear flow characteristics and constant total flow throughout the stem travel. Straight-thru valves shall be single seated and have equal percentage characteristics for water service. Flat discs shall be used for on-off control only. All valves shall be stainless steel stems, replaceable seats, and self-adjusting Teflon or rubber packing. All heating control valves shall fail open. Belimo or approved equal.

3. Smoke detectors shall be products of combustion detector and shall be UL listed. The unit shall be designed for detection of combustion gases, fire, and smoke in air ducts in
compliance with NFPA Pamphlet 90A. The sheet metal contractor shall provide a minimum 18”x18” hinged access door, in inaccessible ceilings, for each detector that is furnished. The sheet metal contractor is also responsible for providing all necessary transitions in the ductwork for mounting of the duct detector.

4. See Drawings for schematics and sequence of operations.

PART 3 - EXECUTION

3.1 WORKMANSHIP

A. Install the grooved piping and fittings in accordance with the latest recommendations as published by the manufacturer. Pipe shall be square cut, +/-0.030”, properly deburred and cleaned. Mark pipe ends at the required location using a gauge supplied by the Manufacturer to ensure full insertion into the coupling or fitting during assembly. Use a manufacturer’s tool with proper sized jaw for pressing.

B. All diffusers, grilles, and registers shall be installed tight on their respective mounting surfaces and shall be accurately centered on ceiling tile, recesses, windows, or doors.

C. All sheet metal work shall be done by qualified, experienced mechanics in accordance with the requirements of ASHRAE and the latest edition of the applicable SMACNA Manual. All ductwork shall be installed in a neat and orderly manner, and shall be adequately supported to prevent vibration or sagging. All sheet metal ductwork shall be sealed with United-Sheet Metal Duct Sealer or equal.

D. Units shall be installed approximately where shown on the plans to provide access space for filter changing, motor, drive and bearing servicing, and fan shaft and coil removal. Pipe drain pan connection through a running trap to floor drain. Unit shall not be operated until filters are installed. Isolate sheet metal ducts from all fans with flexible connectors.

END OF SECTION 230100
PART 1 - GENERAL

1.1 SCOPE:

A. General:

1. The purpose of the mechanical start-up is to provide the owner of the facility with a high level of assurance that the mechanical system has been installed and operates per the requirements of the mechanical construction plans and specifications. The Mechanical General Provisions, Section 230000, is to be included as a part of this section of the specifications.

B. Pre-start and Start-up checklist:

1. The contractor shall be responsible for the completion of pre-start and start-up checklist forms. These forms can usually be obtained from the equipment manufacturer.

2. After completion of pre-start and start-up checklists, the contractor shall provide a copy of the pre-start and start-up checklist to the engineer for review and approval prior to substantial completion.

3. Approved Mechanical Equipment Start-up forms shall be included in the operations and maintenance manual.

PART 2 - START-UP PROCESS

2.1 RESPONSIBILITIES

A. Mechanical Contractor:

1. Coordinate with other trades involved in the installation of mechanical equipment to complete the requirements of mechanical start-up specifications.

2. Complete the pre-start and start-up checklist forms obtained from the equipment manufacturer.

3. Notify the mechanical engineer of tests to be witnessed. Contractor shall give the engineer a minimum of 48 hours notice prior to test.

B. Engineer:

1. Review the completed pre-start and start-up check lists provided by the mechanical contractor.

2. At final inspection, spot check items on the pre-start and start-up checklist forms to ensure that they have been completed.

2.2 EQUIPMENT PRE-START
A. Before starting any equipment or system, complete the system pre-start checklist forms. As part of the pre-start process, the following items shall be completed as applicable:

1. Piping systems shall be pressure tested as specified, found to be tight, with reports submitted.
2. Piping systems shall be flushed and cleaned as specified, all required reports submitted, and the system shall be filled or charged per plans.
3. Air system cleaning is complete and final filters shall be installed.
4. Vibration isolation and seismic restraints shall be installed per plans and specifications.
5. Equipment drives shall be aligned.
6. Electrical services shall be installed and checked.
7. Control points checkouts shall be completed.
8. Safety controls shall be installed and operation checked.
9. Manufacturer’s representatives have carried out major equipment start-up, and all checks shall be documented on the relevant checklists as they are carried out.
10. Equipment has been thoroughly cleaned (interior and exterior of units), of construction debris.
11. Deficiencies or incomplete work shall be corrected and pre-start shall be repeated until the installation is ready for operation.

2.3 EQUIPMENT START-UP

A. After the pre-start up process described in Section 2.2, complete the system start-up checklist and document findings with forms provided. As part of the Start-up process, the following items shall be completed as applicable:

1. Air systems balanced as specified in plans and specifications.
2. Water systems balanced as specified in plans and specifications.
3. Problems revealed during balancing of air and water systems shall be corrected.
4. All automatic temperature controls devices shall be calibrated, including adjustments to control valves and damper actuators.
5. Set up or program controls for accurate response and precise sequencing to meet specified performance.
6. The controls contractor and balancing contractor shall adjust and set air flows and calibrate controls of equipment as applicable.
7. Ensure final adjustments to vibration isolation and seismic restraints are carried out per the manufacturer’s requirements.
8. Check the operation of all fire dampers; smoke dampers and combination fire/smoke dampers.

B. Deficiencies or incomplete work shall be corrected, and the startup shall be repeated until correct installation and function has been confirmed and the installation is ready for engineer verification.

2.4 TRAINING AND INSTRUCTION

A. Once the substantial completion has been approved, the mechanical contractor shall provide the Owner and engineer with a training schedule for operation of the mechanical equipment and systems and their controls as listed in the specifications and plans. Reference Section 230000 Mechanical General Provisions, “Project Closeout” of these specifications.

PART 3 - EXECUTION

A. The following systems and equipment shall be completed under the mechanical start-up plan as described above and documented with equipment pre-start and start-up forms provided.

1. Boilers
2. Pumps
3. Humidifiers
4. Air Handling Units
5. Ducted Split Systems
6. Ductless Split Systems
7. Electric Heaters
8. Direct Digital Control System
9. Air Valves
10. Snorkel Hoods
11. Canopy Hoods
12. Exhaust Fans
13. Valves
14. Louvers
15. Penthouses
16. Sound Attenuators
17. Reheat Coils

B. Pre-start and start-up forms are to be provided to the engineer for final approval before
substantial completion.
C. Approved forms shall be included in the operations and maintenance manual.

END OF SECTION 230150
SECTION 23 08 00
HVAC COMMISSIONING REQUIREMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS:
A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Specification Sections, apply to this Section.

1.2 SUMMARY:
A. This Section includes requirements for commissioning the HVAC system and its subsystems and equipment, including the Direct Digital Control system.
B. The commissioning agent is responsible to provide evidence of mechanical systems commissioning and completion in accordance to the provisions of this section.

1.3 DEFINITIONS:
A. Architect: Includes Architect identified in the Contract for Construction between Owner and Contractor, plus consultant/design professionals responsible for design of HVAC, electrical, communications, controls for HVAC systems, and other related systems.
B. RDP: Registered Design Professional
C. Systems, Subsystems, and Equipment: Where these terms are used together or separately, they shall mean "as-built" systems, subsystems, and equipment.
D. TAB: Testing, Adjusting, and Balancing.

1.4 COMMISSIONING DOCUMENTATION:
A. Commissioning Plan: A commissioning plan will be developed by a registered design professional or approved agency and shall include the following items:
   1. A narrative description of the activities that will be accomplished during each phase of commissioning, including the personnel intended to accomplish each of the activities.
   2. A listing of the specific equipment, appliances or systems to be tested and a description of the tests to be performed.
   3. Functions to be tested, including, but not limited to calibrations and economizer controls.
   4. Conditions under which the test will be performed. At a minimum, testing shall affirm winter and summer design conditions and full outside air conditions.
   5. Measurable criteria for performance
B. Test Checklists: RDP, with assistance of Architect/Engineer, shall develop test checklists for each system, subsystem, or equipment including interfaces and interlocks, and include a separate entry, with space for comments, for each item to be tested. Prepare separate checklists
for each mode of operation and provide space to indicate whether the mode under test responded as required. Provide space for testing personnel to sign off on each checklist.

1. Name and identification of tested item.
2. Test number.
3. Time and date of test.
4. Indication of whether the record is for a first test or retest following correction of a problem or issue.
5. Date of the test and name of parties involves as applicable.
6. Individuals present for test.
8. Note if re-test is necessary.

C. Test and Inspection Reports: RDP shall record test data, observations, and measurements on test checklists. Photographs, forms, and other means appropriate for the application shall be included with data. RDP shall compile test and inspection reports and tests and inspection certificates and include them in systems manual and commissioning report.

D. Corrective Action Documents: RDP shall document corrective action taken for systems and equipment that fail tests. Include required modifications to systems and equipment and revisions to test procedures, if any. Retest systems and equipment requiring corrective action and document retest results.

E. Issues Log: RDP shall prepare and maintain an issues log that describes design, installation, and performance issues that are at variance with the Contract Documents. Identify and track issues as they are encountered, documenting the status of unresolved and resolved issues.

1. Creating an Issues Log Entry:
   a. Identify the issue with unique numeric or alphanumeric identifier by which the issue may be tracked.
   b. Assign a descriptive title of the issue.
   c. Identify date and time of the issue.
   d. Identify test number of test being performed at the time of the observation, if applicable, for cross-reference.
   e. Identify system, subsystem, and equipment to which the issue applies.
   f. Identify location of system, subsystem, and equipment.
   g. Include information that may be helpful in diagnosing or evaluating the issue.
   h. Note recommended corrective action.
   i. Identify commissioning team member responsible for corrective action.
   j. Identify expected date of correction.
   k. Identify person documenting the issue.

2. Documenting Issue Resolution:
   a. Log date correction is completed or the issue is resolved.
   b. Describe corrective action or resolution taken. Include description of diagnostic
steps taken to determine root cause of the issue, if any.
c. Identify changes to the Contract Documents that may require action.
d. State that correction was completed and system, subsystem, and equipment is ready for retest, if applicable.
e. Identify person(s) who corrected or resolved the issue.
f. Identify person(s) documenting the issue resolution.

3. Issues Log Report: On a periodic basis, but not less than for each commissioning team meeting, RDP shall prepare a written narrative for review of outstanding issues and a status update of the issues log. As a minimum, RDP shall include the following information in the issues log and expand it in the narrative:

a. Issue number and title.
b. Date of the identification of the issue.
c. Name of the commissioning team member assigned responsibility for resolution.
d. Expected date of correction.

F. Commissioning Report: RDP shall document results of the commissioning process including unresolved issues and performance of systems, subsystems, and equipment. The commissioning report shall indicate whether systems, subsystems, and equipment have been completed and are performing according to the Contract Documents. The commissioning report shall include, but is not limited to, the following:

1. Lists and explanations of substitutions; compromises; variances in the Contract Documents; record of conditions; and, if appropriate, recommendations for resolution. This report shall be used to evaluate systems, subsystems, and equipment and shall serve as a future reference document during Owner occupancy and operation. It shall describe components and performance that exceed requirements of the Contract Documents. It may also include a recommendation for accepting or rejecting systems, subsystems, and equipment.
2. Commissioning plan.
4. Testing plans and reports.
5. Corrective modification documentation.
6. Issues log.
7. Completed test checklists.
8. Listing of off-season tests not performed and a schedule for their completion.

G. Systems Manual: RDP shall gather required information and compile systems manual. Systems manual shall include, but is not limited to, the following:
1. Submittal Data stating equipment size and selected options for each piece of equipment requiring maintenance.
2. Operation and maintenance data on each piece of equipment requiring maintenance. Required routine maintenance actions shall be clearly identified.
3. Name and address of at least one service agency.
4. HVAC controls system maintenance and calibration information.
5. A narrative of how each system is intended to operate, including recommended setpoints.

PART 2 - PRODUCTS – NOT USED

PART 3 - EXECUTION

3.1 BALANCING:

A. Scope:

1. Prior to final acceptance by the Owners, all air systems shall be balanced to deliver the quantities as specified or directed. The air balance shall be performed by an independent agency specializing in balancing and is certified by the National Environmental Balancing Bureau.

2. The Mechanical Contractor shall provide assistance to the Balancing Contractor by identifying all installed mechanical systems and assisting access to all installed mechanical systems. All mechanical systems shall be completely operational and functional prior to the Balancing Contractor performing his specified work.

B. Air balancing:

1. Balancing of the air system shall consist of:

   a. Adjust all air volumes to the quantities shown, with allowable variation of plus 10, minus 10 percent.
   b. Record all system, zone, diffuser, grille, and register C.F.M. Use volume control devices to regulate air quantities only to the extent that adjustments do not create objectionable air motion or sound levels. Balancing Engineer shall work with the Contractor to set minimum & maximum CFM quantities for zone dampers, or zone dampers/heaters.
   c. Test and record all system static pressures, inlet and discharge, on all packaged units, fans, and terminal units. Vary total system air quantities by adjustment of fan speeds. Provide drive changes as necessary. Vary branch air quantities by damper regulation.
   d. Test and record motor full load amps and nameplate amps.
   e. Test and record entering and leaving temperatures at all coils.
   f. Adjust all automatically operated dampers, in cooperation with the Control Contractor, to the required settings. Adjust outside air automatic dampers, outside air, return air, and exhaust dampers for design conditions within specified tolerances. Where modulating dampers or economizers are provided, take measurements at full return air, minimum outside air, and 100 percent outside air mode of operation.
g. Adjust diffusers and grilles for proper deflection, throw, and coverage. Eliminate drafts and excessive noise where possible.

h. Mark final positions of all balance dampers with a red felt pen.

i. Air systems shall be balanced in accordance with standard procedures and recognized practices of the Associated Air Balance Council, and the Testing Adjusting, and Balancing Bureau.

C. Quality Assurance:

1. The Balancing Contractor shall demonstrate to the Engineer of record, flow verification for at least 10% of the balanced devices as selected by the Engineer. If more than 25% of the tested devices do not meet the designed or balance report, then the entire system balance must be rebalanced.

D. Balance Reports:

1. Four copies of the air system balance report to the Architect/Engineer for evaluation and approval. Reports shall be on TABB/SMACNA forms that indicate information addressing each of the testing methods, readings, and adjustments.

3.2 TESTING:

A. Test systems and intersystem performance after test checklists for systems, subsystems, and equipment have been approved.

B. Perform tests using design conditions whenever possible.

1. Simulate conditions by imposing an artificial load when it is not practical to test under design conditions and when written approval for simulated conditions is received from RDP. Before simulating conditions, calibrate testing instruments. Set and document simulated conditions and methods of simulation. After tests, return settings to normal operating conditions

2. Alter set points when simulating conditions is not practical and when written approval is received from RDP.

3. Alter sensor values with a signal generator when design or simulating conditions and altering set points are not practical. Do not use sensor to act as signal generator to simulate conditions or override values.

C. Scope of HVAC Subcontractor Testing.

1. Testing scope shall include entire HVAC installation, from central equipment for heat generation and refrigeration through distribution systems to each conditioned space. It shall include measuring capacities and effectiveness of operational and control functions.

2. Test all operating modes, interlocks, control responses, responses to abnormal or emergency conditions, and verify proper response of building automation system controllers and sensors.

D. Detailed Testing Procedures: RDP, with HVAC Subcontractor, TAB Subcontractor, and HVAC Instrumentation and Control Subcontractor, shall prepare detailed testing plans, procedures, and checklists for HVAC systems, subsystems, and equipment.
E. HVAC Instrumentation and Control System Testing.

1. Field testing plans and testing requirements are specified in Division 23 Sections “HVAC Instrumentation and Controls” and “Sequence of Operation.” The CxA, HVAC Subcontractor, and the HVAC Instrumentation and Control Subcontractor shall collaborate to prepare testing plans.

2. CxA shall convene a meeting of appropriate entities to review test report of HVAC instrumentation and control systems.

F. Energy Supply System Testing: HVAC Subcontractor shall prepare a testing plan to verify performance of refrigerant systems and equipment. Plan shall include the following:

1. Sequence of testing and testing procedures for each equipment item and pipe section to be tested, identified by pipe zone or sector identification marker. Markers shall be keyed to Drawings for each pipe sector showing the physical location of each designated pipe test section. Drawings keyed to pipe zones or sectors shall be formatted to allow each section of piping to be physically located and identified when referred to in system testing plan.

2. Tracking checklist for managing and ensuring that all pipe sections have been tested.

G. Heat-Generation System Testing: HVAC Subcontractor shall prepare a testing plan to verify performance of auxiliary heating equipment. Plan shall include the following:

1. Sequence of testing and testing procedures for each item of equipment and section of piping to be tested, identified by identification marker. Markers shall be keyed to Drawings for each heating sector showing the physical location of each item of equipment and test section. Drawings shall be formatted to allow each item of equipment and section of heating to be physically located and identified when referred to in the system testing plan.

2. Tracking checklist for managing and ensuring that all heating sections have been tested.

H. Refrigeration System Testing: HVAC Subcontractor shall prepare a testing plan to verify performance of all condensing units, refrigerant compressors and condensers, heat pumps, and other refrigeration systems. Plan shall include the following:

1. Sequence of testing and testing procedures for each item of equipment and section of pipe to be tested, identified by identification marker. Markers shall be keyed to Drawings showing the physical location of each item of equipment and pipe test section. Drawings shall be formatted to allow each item of equipment and section of piping to be physically located and identified when referred to in the system testing plan.

2. Tracking checklist for managing and ensuring that all pipe sections have been tested.

I. HVAC Distribution System Testing: HVAC Subcontractor shall prepare a testing plan to verify performance of air, and refrigerant distribution systems; special exhaust; and other distribution systems. Include HVAC terminal equipment and unitary equipment. Plan shall include the following:

1. Sequence of testing and testing procedures for each item of equipment and section of pipe to be tested, identified by identification marker. Markers shall be keyed to Drawings showing the physical location of each item of equipment and pipe test section. Drawings shall be formatted to allow each item of equipment and section of piping to be physically located and identified when referred to in the system testing plan.
shall be formatted to allow each item of equipment and section of piping to be physically located and identified when referred to in the system testing plan.

2. Tracking checklist for managing and ensuring that all pipe sections have been tested.

J. Deferred Testing:

1. If tests cannot be completed because of a deficiency outside the scope of the HVAC system, the deficiency shall be documented and reported to Owner. Deficiencies shall be resolved and corrected by appropriate parties and test rescheduled.

2. If the testing plan indicates specific seasonal testing, appropriate initial performance tests shall be completed and documented and additional tests scheduled.

END OF SECTION 230800
PART 1: GENERAL

1.01 WORK INCLUDED:

A. Furnish a totally native BACnet-based system, including a Microsoft Windows 10 compatible operator’s workstation. The operator’s workstation, all building controllers, application controllers, and all input/output devices shall communicate using the protocols and network standards as defined by ANSI/ASHRAE Standard 135–2016, BACnet. In other words, all workstations and controllers, including unitary controllers, shall be native BACnet devices. No gateways shall be used for communication to controllers installed under this section. Gateways may be used for communication to existing systems or to systems installed under other sections.

B. Provide all necessary BACnet-compliant hardware and software to meet the system’s functional specifications. Provide Protocol Implementation Conformance Statement (PICS) for Windows-based control software and every controller in system, including unitary controllers.

C. Prepare individual hardware layouts, interconnection drawings, and software configuration from project design data.

D. Implement the detailed design for all analog and binary objects, system databases, graphic displays, logs, and management reports based on control descriptions, logic drawings, configuration data, and bid documents.

E. Design, provide, and install all equipment cabinets, panels, data communication network cables needed, and all associated hardware.

F. Provide and install all interconnecting cables between supplied cabinets, application controllers, and input/output devices.

G. Provide and install all interconnecting cables between all operator’s terminals and peripheral devices (such as printers, etc.) supplied under this section.

H. Provide complete manufacturer’s specifications for all items that are supplied. Include vendor name of every item supplied.

I. Provide supervisory specialists and technicians at the job site to assist in all phases of system installation, startup, and commissioning.

J. Provide a comprehensive operator and technician training program as described herein.

K. Provide as-built documentation, operator’s terminal software, diagrams, and all other associated project operational documentation (such as technical manuals) on approved media, the sum total of which accurately represents the final system.

L. Provide new sensors, dampers, valves, and install only new electronic actuators. No used components shall be used as any part or piece of installed system.
1.02 SYSTEM DESCRIPTION:

A. A distributed logic control system complete with all software and hardware functions shall be provided and installed. System shall be completely based on ANSI/ASHRAE Standard 135-2016. This system is to control all mechanical equipment, including all unitary equipment such as VAV boxes, heat pumps, fan-coils, AC units, etc., and all air handlers, boilers, chillers, and any other listed equipment using native BACnet-compliant components. Non-BACnet-compliant or proprietary equipment or systems (including gateways) shall not be acceptable and are specifically prohibited.

B. Operator's workstation software shall use Microsoft Windows 10 as the computer operating system. The Energy Management and Control System (EMCS) application program shall be written to communicate specifically utilizing BACnet protocols. Software functions delivered on this project shall include password protection, scheduling (including optimum start), alarming, logging of historical data, full graphics including animation, after-hours billing program, demand limiting, and a full suite of field engineering tools including graphical programming and applications. Systems using operating systems other than that described above are strictly prohibited. All software required to program application specific controllers and all field level devices and controllers will be left with the owner. All software passwords required to program and make future changes to the system will also become the property of the owner. All software required to make any program changes anywhere in the system, along with scheduling and trending applications, will be left with the owner. All software passwords required to program and make future changes to schedules, trends and related program changes will also become the property of the owner. All software required for all field engineering tools including graphical programming and applications will be left with the owner. All software passwords required to program and make future changes to field engineering tools, including graphical programming and applications will be left with the owner.

C. Building controllers shall include complete energy management software, including scheduling building control strategies with optimum start and logging routines. All energy management software and firmware shall be resident in field hardware and shall not be dependent on the operator's terminal. Operator's terminal software is to be used for access to field-based energy management functions only. Provide zone-by-zone direct digital logic control of space temperature, scheduling, runtime accumulation, equipment alarm reporting, and override timers for after-hours usage.

D. Room sensors shall be provided with digital readout that allow the user to view room temperature, view outside air temperature, adjust the room setpoint within preset limits and set desired override time. User shall also be able to start and stop unit from the digital sensor. Include all necessary wiring and firmware such that room sensor includes field service mode. Field service mode shall allow a technician to balance VAV zones and access any parameter in zone controller directly from the room sensor. Field service mode shall have the ability to be locked out.

E. All application controllers for every terminal unit (VAV, HP, UV, etc.) air handler, all central plant equipment, and any other piece of controlled equipment shall be fully programmable. Application controllers shall be mounted next to controlled equipment and communicate with building controller through BACnet LAN.

1.03 APPROVED MANUFACTURERS:

A. Approved Control Manufacturers and Installers

1. Delta by ATS Inland NW

1.04 QUALITY ASSURANCE:

A. The Building Automation System (BAS) system shall be designed, installed, commissioned, and serviced by manufacturer authorized and trained personnel. System provider shall have an in-place support facility within 4 hours response time of the site with technical staff, spare parts inventory, and necessary test and diagnostic equipment.

The contractor shall provide an experienced project manager for this work, responsible for direct supervision of the design, installation, start-up and commissioning of the BAS system.
B. Materials and equipment shall be manufacturer's latest standard design that complies with the specification requirements.

C. All BAS peer-to-peer network controllers, central system controllers and local user displays shall be UL Listed under Standard UL 916, category PAZX.

D. All electronic equipment shall conform to the requirements of FCC Regulation, Part 15, Governing Radio Frequency Electromagnetic Interference and be so labeled.

1.05 REFERENCE STANDARDS:

A. The latest edition of the following standards and codes in effect and amended as of supplier's proposal date, and any applicable subsections thereof, shall govern design and selection of equipment and material supplied:

1. American Society of Heating, Refrigerating and Air Conditioning Engineers (ASHRAE).
4. UL 916 Underwriters Laboratories Standard for Energy Management Equipment. Canada and the US.
6. FCC Part 15, Subpart J, Class A.
8. UL-864 UUKL listing for Smoke Controls for any equipment used in smoke control sequences.

B. City, county, state, and federal regulations and codes in effect as of contract date.

C. Except as otherwise indicated, the system supplier shall secure and pay for all permits, inspections, and certifications required for his work, and arrange for necessary approvals by the governing authorities.

1.06 SUBMITTALS:

A. Drawings

1. The system supplier shall submit engineered drawings, control sequence, and bill of materials for approval.
2. Drawings shall be submitted in the following standard sizes: 11” x 17” (ANSI B).
3. Eight complete sets (copies) of submittal drawings shall be provided.
4. Drawings shall be available on thumb drive if desired.

B. System Documentation

Include the following in submittal package:

1. System configuration diagrams in simplified block format.
2. All input/output object listings and an alarm point summary listing.
3. Electrical drawings that show all system internal and external connection points, terminal block layouts, and terminal identification.
5. Manufacturer's instructions and drawings for installation, maintenance, and operation of all purchased items.
6. Overall system operation and maintenance instructions—including preventive maintenance and troubleshooting instructions.
7. For all system elements—operator's workstation(s), building controller(s), application controllers, routers, and repeaters—provide BACnet Protocol Implementation Conformance Statements (PICS) as per ANSI/ASHRAE Standard 135-2001.
8. Provide complete description and documentation of any proprietary (non-BACnet) services and/or objects used in the system.
9. A list of all functions available and a sample of system programming that shall be part of delivered system.

C. Project Management

1. The vendor shall provide a detailed project design and installation schedule with time markings and details for hardware items and software development phases. Schedule shall show all the target dates for transmission of project information and documents, and shall indicate timing and dates for system installation, debugging, and commissioning.

1.07 WARRANTY:

A. Warranty shall cover all costs for parts, labor, associated travel, and expenses for a period of one year from completion of system acceptance.
B. Hardware and software personnel supporting this warranty agreement shall provide on-site or off-site service in a timely manner after failure notification to the vendor. The maximum acceptable response time to provide this service at the site shall be 24 hours, Monday through Friday and 48 hours on Saturday and Sunday.
C. This warranty shall apply equally to both hardware and software.

1.08 RELATED WORK IN OTHER SECTIONS:

A. Refer to Division 0 and Division 1 for related contractual requirements.
B. Refer to Section 23 00 00 for General Mechanical Provisions.
C. Refer to Section 26 00 00 for General Electrical Provisions.

PART 2: PRODUCTS

2.01 Advanced Workstation (AWS):

A. General structure of workstation interaction shall be a standard client/server relationship with web server embedded in the server for browser only access. Server shall be used to archive data and store system database. The AWS shall support operation in a virtualized server environment. Thick and web clients shall access server for all archived data.

1. The system shall be an extension of the existing Delta Control System used at District 2 in Lewiston, Idaho.
2. A single server license shall:
   a. Allow a minimum of 50 thick client seats/installations.
b. Allow a minimum of 200 web client users.
c. Not restrict system size based on point count (BACnet or Integration).

B. Data Displays

1. Project graphics development shall start with a Graphics Orientation Meeting between the end-user/owner and the graphics design team from ATS Inland NW. During this meeting floor plan presentations shall be determined along with animation details for equipment specified. Custom graphics that outline the as-built system central plants and equipment layouts such as AHU’s, and MUA units are only accepted. Canned graphics that do not match installed equipment is not allowed. Data displays shall render all data associated with project as called out on drawings and/or object type list supplied. Graphic files shall be created using digital, full color photographs of system installation, AutoCAD or Visio drawing files of field installation drawings, and wiring diagrams from as-built drawings.

2. Data displays shall render data using iconic graphic representations of all mechanical equipment. System shall be capable of displaying graphic file, text, trend log, and dynamic object data together on each display and shall include animation. Information shall be labeled with descriptors and shall be shown with the appropriate engineering units. All information on any display shall be dynamically updated without any action by the user.

3. Data display frame shall allow user to change all field-resident AWS functions associated with the project, such as setpoints, weekly schedules, exception schedules, etc., from any screen, no matter if that screen shows all text or a complete graphic display. This shall be done without any reference to object addresses or other numeric/mnemonic indications.

4. Analog objects shall be displayed with operator modifiable units. Analog input objects may also be displayed as individual graphic items on the display screen as an overlay to the system graphic.

5. All displays and programming shall be generated and customized by the local use energy management and control system (EMCS) supplier and installer. Systems requiring factory development of graphics or programming of DDC logic are specifically prohibited.

6. AWS shall be supplied with a library of standard graphics, which may be used unaltered or modified by the operator. AWS shall include a library of equipment graphic components to assemble custom graphics. Systems that do not allow customization or creation of new graphic objects by the operator (or with third-party software) shall not be allowed.

7. A navigation tree for building, equipment and system diagnostic centric display organization shall be available from data display view. The tree navigation contents shall be customizable on a per-user and per-group basis.

8. Each display may be protected from viewing unless operator credentials have the appropriate access level. An access level may be assigned to each display and system object. The menu label shall not appear on the graphic if the operator does not have the appropriate security level.

9. Data displays shall have the ability to link to content outside of the EMCS system. Such content shall include but is not limited to launching external files in their native applications (for example, a Microsoft Word document).

11. Data displays shall support:

   a. Graphic items with custom geometry that offer both color gradient shading and variable opacity in scale to system variables, both analog and digital, and color range settings. For example, rooms on a floor plan graphic can be made to indicate the space temperature by varying the color of that room.

   b. Clear and custom geometry navigation buttons to provide intuitive navigation to system display or...
external URLs.
c. Graphic files in JPG, PNG, and GIF file types.
d. Viewing of up to 1,024 system data points (Analog, Binary, and/or multi-state) in a single screen.
e. Customizable mouse-over tooltip information of graphic items or data points can be displayed.
The tooltips can be turned on and off. The default setting is off.
f. Right click capability to directly access system functionality, such as Schedule, Trendlogs, and
Alarms associated with a display object selected.
g. Automatic zooming to the screen size detected to maximize the size of the display to match
screen display area available. The zoom capability can be enabled or disabled; default is
enabled. The background color, if solid, will be used to flood fill the remaining screen background.
h. Supports user configurable embedded Data Viewer for a persistent trend log data view to
accompany system data and graphic information on a single display.

C. Password Protection

1. Provide security system that prevents unauthorized use unless operator is logged on. Access shall be
limited to operator’s assigned functions when user is logged on. This includes displays as outlined above.
2. AWS shall provide security for a minimum of 200 users. Each user shall have an individual User ID,
Username, and Password. Entries are alphanumeric characters only and are case sensitive (except for
User ID). User ID, Username, and Password shall be shall support a minimum of 40 characters. All user
information and passwords shall be stored in an encrypted form.
3. Each user shall be allowed individual assignment of only those control functions, menu items, navigation
tree, and user-specific system start display, as well as restricted access to discrete BACnet devices
to which that user requires access.
4. All passwords, usernames, and access assignments shall be adjustable via Server and Thick client.
Password shall be adjustable via the web client.
5. Users shall also have a set access level, which defines access to displays and individual objects the user
may control. System shall include 10 separate and distinct access levels for assignment to users.
6. The AWS and Thick Client shall include an Auto Logout feature that shall automatically logout user when
there has been no keyboard or mouse activity for a set period. Time period shall be adjustable by system
administrator. Auto Logout may be enabled and disabled by system administrator. Operator terminal shall
display message on screen that user is logged out after Auto Logout occurs.
7. The system shall permit the assignment of an effective date range, as well as an effective time of day,
that the User IDs are permitted to authenticate.
8. Security. Each operator shall be required to log on to the system with a username and password in order
to view, edit, add, or delete data. System security shall be selectable for each operator. The system
supervisor shall have the ability to set passwords and security levels for all other operators. Each
operator password shall be able to restrict the functions accessible to viewing and/or changing each
system application. System shall support LDAP to allow central control over user security status,
restriction and/ or deletion of users.
9. System Diagnostics. The system shall automatically monitor the operation of all workstations, printers,
modems, network connections, building management panels, and controllers.

D. Operator Activity Log
1. An Operator Activity Log that tracks all operator changes and activities shall be included with AWS. System shall track what is changed in the system, who performed this change, date and time of system activity, and value of the change before and after operator activity. Operator shall be able to display all activity, sort the changes by user and also by operation. Operator shall be able to print the Operator Activity Log display.

2. Log shall be gathered and archived to a hard drive on AWS as needed. Operator shall be able to export data for display and sorting in a spreadsheet.

3. System shall have the option to require user comment recording in the Operator Activity Log upon any system point change.

4. Operator Activity log shall be accessible via the Web Client for viewing, sorting, filtering, and Printing.

E. Scheduling

1. AWS, Thick Client and Web Client shall show all information in easy-to-read daily format including calendar of this month and next. All schedules shall show actual ON/OFF times for day based on scheduling priority. Priority for scheduling shall be events, holidays and daily, with events being the highest.

2. Holiday and special event schedules shall display data in calendar format. Operator shall be able to schedule holidays and special events directly from these calendars.

3. Operator shall be able to change all information for a given weekly or exception schedule if logged on with the appropriate access privileges.

4. AWS and Thick Client shall include a Schedule Wizard for set up of schedules. Wizard shall walk user through all steps necessary for schedule generation. Wizard shall have its own pull-down selection for startup or may be started by right-clicking on value displayed on graphic and then selecting Schedule.

5. Scheduling shall include optimum start based on outside air temperature, current heating/cooling setpoints, indoor temperature and history of previous starts. Each and every individual zone shall have optimum start time independently calculated based on all parameters listed. User shall input schedules to set time that occupied setpoint is to be attained. Optimum start feature shall calculate the startup time needed to match zone temperature to setpoint. User shall be able to set a limit for the maximum startup time allowed.

6. Schedule list shall show all schedules currently defined. This list shall include all standard, holiday, and event schedules. In addition, user shall be able to select a list that shows all scheduled points and zones.

7. Display of all three schedules must show all ON times for standard, holiday and event schedules in different colors on a given day. In addition, OFF times for each must also be shown in additional colors. User shall be able to select from standard calendar what days are to be scheduled and same display shall show all points and zones affected. User shall be able to set time for one day and select all days of the week that shall be affected as a recurrence of that same schedule for that given day.

8. Any displayed data that is changeable by the operator may be selected using the right mouse button and the schedule shall then be selectable on the screen. Selection of the schedule using this method shall allow the viewing of the assigned schedule allow the point to be scheduled.

9. Schedule editor shall support drag-n-drop events and holidays onto the schedule calendar.

10. Schedule editor shall support drag-n-drop events default to a two-hour period, which can then be adjusted by the user.

11. Schedule editor shall support drag-n-drop holidays default for OFF all day and can be edited for multiple-day holidays.
12. Schedule editor shall support the view of affected zones when adding or editing timed events of a schedule.
13. The web client shall have the ability to search a list of all scheduled points and zones to access the schedule calendar.
14. Schedule time blocks shall present schedule detail via mouse-over information.

F. Alarm Indication and Handling

1. AWS shall provide visual, printed, and email means of alarm indication. Printout of alarms shall be sent to the assigned terminal and port. Alarm notification can be filtered based on the User ID's authorization level.

2. Web client shall display a persistent alarm state for the system regardless of the data view including points in alarm but not acknowledged, and points that have gone into alarm and returned to normal without being acknowledged.

3. Alarm History shall provide log of alarm messages. Alarm log shall be archived to the hard disk of the AWS. Each entry shall include a description of the event-initiating object generating the alarm. Description shall be an alarm message of at least 256 characters in length. Entry shall include time and date of alarm occurrence, time and date of object state return to normal, time and date of alarm acknowledgment, and identification of operator acknowledging alarm.

4. Alarm messages shall be in user-definable text (English or other specified language) and shall be delivered either to the operator's terminal, client or through remote communication using email (Authenticated SMTP supported).

5. AWS, Thick Client, and Web Client shall allow for set up of alarms. UI shall walk user through all steps necessary for alarm generation. Alarm creation may be started by right-clicking on value displayed on graphic and then selecting Alarm setup.

6. Web client shall support color-coded indication of current alarms as follows:
   i. Red indicator shows number of active alarms that have not been acknowledged.
   j. Yellow indicator shows number of alarms that are still active but have been acknowledged.
   k. Blue indicator shows number of alarms that have returned to normal but have not been acknowledged.
   l. Color-coded indicators, when selected by the user, navigate to a pre-filtered view of alarm history.
   m. Alarm history can be filtered by color-coded indicator states.

7. Alarm annunciation includes navigation link to a user-selected display or URL.

8. Any displayed data that is changeable by the operator may be selected using the right mouse button and the alarm shall then be selectable on the screen. Selection of the alarm using this method shall allow the viewing of the alarm history or allow the creation of a new alarm.

G. Trendlog Information

1. AWS shall periodically gather historically recorded data stored in the building controllers and store the information in the system database. Stored records shall be appended with new sample data, allowing records to be accumulated. Systems that write over stored records shall not be allowed unless limited file size is specified. Samples may be viewed at the web client. All trendlog records shall be displayed in standard engineering units.
2. AWS shall be capable of trending on an interval determined by a polling rate, or change-of-value.
3. AWS, Thick client, or Web Client shall be able to add and edit trendlogs and the setup information. This includes the information to be logged as well as the interval at which it is to be logged. All operations shall be password protected. Viewing may be accessed directly from any and all graphics on which a trended object is displayed.
4. AWS and Thick Client shall include a Trend log Wizard for setup of multiple trend logs simultaneously. Wizard shall walk user through all necessary steps. Wizard shall have its own pull-down selection for startup or may be started by right-clicking on value displayed on graphic, and then selecting Trendlogs from the displayed menu.
6. Any displayed data that is changeable by the operator may be selected using the right mouse button and the trend log shall then be selectable from a menu on the screen. Selection of the trend log using this method shall allow the viewing of the trend log data in the Data Viewer.
7. Data Viewer shall provide:
   a. Software that can graph the trend-logged object data shall be included.
   b. Access and ability to create, edit and view are restricted to users by user account credentials
   c. Specific and repeatable URL defines the trend log(s) views for browser bookmarking and email compatibility.
   d. Call out of trend log value at intersection of trend line and mouse-over vertical axis.
   e. Trend log or Energy log and companion logs can be configured to display on one of two independent vertical scales embedded in the display.
   f. Click zoom for control of data set viewed along either graph axis.
   g. User-specifiable start and end dates as well as a fast scroll features that supports click zoom of macro scale view of the data for quickly finding data set based on visual signature.
   h. User export of the viewed data set to MS Excel.
   i. Web browser-based help.
   j. Optional min/max ranges (Upper Control Limits, Lower Control Limits) for each value.

H. Energy Log Information

1. AWS shall be capable of periodically gathering energy log data stored in the field equipment and archive the information. Archive files shall be appended with new data, allowing data to be accumulated. Systems that write over archived data shall not be allowed unless limited file size is specified. Display all energy log information in standard engineering units.
2. All data shall be stored in database file format for direct use by third-party programs. Operation of system shall stay completely online during all graphing operations.
3. AWS operator shall be able to change the energy log setup information as well. This includes the meters to be logged, meter pulse value, and the type of energy units to be logged. All meters monitored by the system may be logged. System shall support using flow and temperature sensors for BTU monitoring.
4. AWS shall display data in tabular format form for both consumption and peak values. Data shall be shown in hourly, daily, weekly, monthly, and yearly formats. In each format, the user shall be able to select a specific period of data to view.
5. Web client shall display data in tabular format and graphical format. Data shall be shown in hourly, daily, weekly, monthly, and yearly formats. In each format, the user shall be able to select a specific period of data to view.

I. Demand Limiting

1. AWS shall include demand limiting program that includes two types of load shedding. One type of load shedding shall shed/restore equipment in binary fashion based on energy usage when compared to shed and restore settings. The other type of shedding shall adjust operator-selected control setpoints in an analog fashion based on energy usage when compared to shed and restore settings. Shedding may be implemented independently on each zone or piece of equipment connected to system.

2. Binary shedding shall include minimum of five (5) priority levels of equipment shedding. All loads in each priority level shall be shed before any loads in a higher priority level are shed. Load shedding within a given priority level shall include two methods. In one, the loads shall be shed/restored in a “first off-first on” mode, and in the other the loads are just shed/restored in a “first off-last on” (linear) fashion.

3. Analog shed program shall generate a ramp that is independently used by each individual zone or individual control algorithm to raise the appropriate cooling setting and lower appropriate heating setting to reduce energy usage.

4. AWS shall be able to display the status of each load shed program. Status of each load assigned to an individual shed program shall be displayed along with English description of each load.

J. Tenant Activity

1. AWS shall include program that monitors after-hours overrides by tenants, logs that data, and generates a bill based on usage and rate charged for each tenant space. Tenant Activity program shall be able to assign multiple zones, from a list of every zone connected to system, to a particular tenant. Every zone is monitored for after-hours override usage and that data logged in AWS. Operator may then generate a bill based on the usage for each tenant and the rate charged for any overtime use.

2. Configuration shall include entry of the following information for use in logging and billing:
   a. Tenant’s contact name and address
   b. One or multiple tenant zones that make up a total tenant space, including a separate billing rate for each separate zone
   c. Minimum and maximum values an event duration and event limit
   d. Property management information
   e. Overall billing rate
   f. Seasonal adjustments or surcharge to billing rate
   g. Billing notification type including, but not limited to printer, file and email
   h. Billing form template

3. Logging shall include recording the following information for each and every tenant event:
   a. Zone description
   b. Time the event begins
c. Total override time  
d. Limits shall be applied to override time

4. A tenant bill shall be generated for a specific period using all the entered configuration data and the logged data. User with appropriate security level shall be able to view and override billing information. User shall be able to select a billing period to view and be able to delete events from billing and edit a selected tenant activity event’s override time.

K. Reports

1. AWS shall be capable of periodically producing reports of trendlogs, alarm history, tenant activities, device summary, energy logs, and override points. The frequency, content, and delivery are to be user adjustable.
2. All reports shall be capable of being delivered in multiple formats including text- and comma-separated value (CSV) files. The files can be printed, emailed, or saved to a folder, either on the server hard drive or on any network drive location.

L. Configuration/Setup

1. Provide means for operator to display and change system configuration. This shall include, but not be limited to system time, day of the week, date of daylight savings set forward/set back, printer termination, port addresses, modem port and speed, etc. Items shall be modified using understandable terminology with simple mouse/cursor key movements.
2. The building management system (BMS) shall operate the user interface in any region and support varying languages and locale settings, without the addition of special software. Localization tools shall be commonly available open sourced or purchased products, No BMS manufacturer specific software will be acceptable.
3. The following localization capabilities shall be supported:
   1. Locale settings related to date, time and number formats
   2. On the fly locale change using browser language settings (multiple language and locale setting change)
   3. Default character encoding shall be UTF-8
   4. Each localized BMS element can be localized independently and operate autonomously.

M. Field Engineering Tools

1. AWS shall include field engineering tools for programming all controllers supplied. All controllers shall be programmed using graphical tools or line code that allow the user to connect function blocks or line code on screen that provide sequencing of all control logic. Function blocks shall be represented by graphical displays that are easily identified and distinct from other types of blocks.
2. User shall be able to select a graphical function block or line code block from menu and place on screen. Provide zoom in and zoom out capabilities. Function blocks shall be downloaded to controller without any reentry of data.
3. Programming tools shall include a real-time operation mode. Function blocks or line code shall display real-time data and be animated to show status of data inputs and outputs when in real-time operation. Animation shall show change of status on logic devices and countdown of timer devices in graphical format.
4. Field engineering tools shall also include a database manager of applications that include logic files for controllers and associated graphics. Operator shall be able to select unit type, input/output
configuration and other items that define unit to be controlled. Supply minimum of 250 applications as part of workstation software.

5. Field engineering tool shall include Device Manager for detection of devices connected anywhere on the BACnet network by scanning the entire network. This function shall display device instance, network identification, model number, and description of connected devices. It shall record and display software file loaded into each controller. A copy of each file shall be stored on the computer’s hard drive. If needed, this file shall be downloaded to the appropriate controller using the mouse.

6. AWS shall automatically notify the user when a device that is not in the database is added to the network.

7. AWS shall include backup/restore function that will back up entire system to selected medium and then restore system from that medium. The system shall be capable of creating a backup for the purpose of instantiating a new client PC.

8. The system shall provide a means to scan, detect, interrogate, and edit third-party BACnet devices and BACnet objects within those devices.

N. Workstation Hardware

1. Provide operator’s workstation(s) at location(s) noted on the plans.

2. AWS Server Minimum Requirements

   f. 64-bit OS
   g. Windows 10, Windows 10 Professional Enterprise and Windows 2019 Server
   h. 2 GHz (or better), quad-core processors
   i. 8 GB RAM or higher
   j. 128 GB SSD hard drive
   k. Network interface card (1000 Mbps)

O. Software

1. At the conclusion of the project, contractor shall leave with owner an electronic copy that includes the complete software operation system and project graphics, setpoints, system parameters, etc. This backup shall allow the owner to completely restore the system in the case of a computer malfunction.

P. Web Client

1. EMCS supplier shall provide an HTML5-based browser access to the AWS as part of standard installation. User must be able to access all displays of real-time data that are part of the AWS using a standard web browser. Web browser shall tie into the network through owner-supplied Ethernet network connection. The web client shall support a minimum of 200 users with a single license.

2. For improved security, browser shall be the latest version of Microsoft Internet Explorer, Firefox, Chrome, or Safari. No special vendor-supplied software shall be needed on computers running browser. Data shall be displayed in real-time and update automatically without user interaction.

3. Web pages shall be automatically generated using HTML5 from the data display files that reside on the AWS. Any system that requires use of an HTML editor for generation of web pages shall not be considered.

4. Access through web client or thick client shall utilize the same hierarchical security scheme as the AWS. User shall be asked to log on once the client makes connection to the AWS. Once the user
logs on, all changes that are made shall be tracked by the AWS. The user shall be able to change only those items he or she has authority to change. A user activity report shall show all activity of the users who have logged on to the system, regardless of whether those changes were made using a web client, thick client or through the AWS.

5. Shall provide User Session Management including the ability to view all connected user sessions to the web client, see how long they have been active/inactive for each unique session, and force log-out for any or all sessions.

6. Shall provide menu-style navigation access to primary features, i.e. alarm history, Data Viewer, Search scheduled points and Zones, System Activity, User Session Management, and Top Display

7. Web client shall, at a minimum, support the following tablets:
   a. Android platform:
      1. Google Nexus
      2. Samsung Galaxy Note

2.02 BUILDING CONTROLLER:
   A. General Requirements

   1. BACnet Conformance
      a. Building Controller shall be approved by the BTL as meeting the BACnet Building Controller requirements.
      b. Please refer to section 22.2, BACnet Functional Groups, in the BACnet standard, for a complete list of the services that must be directly supported to provide each of the functional groups listed above. All proprietary services, if used in the system, shall be thoroughly documented, and provided as part of the submittal data. All necessary tools shall be supplied for working with proprietary information.
      c. Note: In lieu of a Building Controller, System Controllers can also be employed, if the system is designed to use distributed System Controllers.

   2. Building controller shall be of scalable design such that the number of trunks and protocols may be selected to fit the specific requirements of a given project.
   3. The controller shall be capable of panel-mounted on DIN rail and/or mounting screws.
   4. The controller shall be capable of providing global control strategies for the system based on information from any objects in the system, regardless of if the object is directly monitored by the building controller module or by another controller.
   6. The software program implementing the DDC strategies shall be completely flexible and user definable. All software tools necessary for programming shall be provided as part of project software.
   7. Programming shall be text programmed or object-oriented using control function blocks and support DDC functions. Programming tool shall be supplied and be resident on workstation. The same tool shall be used for all controllers.
   8. The programming tool shall provide means to graphically view inputs and outputs to each program block in real-time as program is executing. This function may be performed using the operator's workstation or field computer.
   9. Global controller (if required) shall have 6,000 Analog Values and 6,000 Binary Values.
10. Controller IP configuration can be done via with an operator’s workstation or field computer.
11. Controller shall have at a minimum a Quad Core 996Ghz processor to ensure fast processing speeds.
12. Global control algorithms and automated control functions shall execute using a 64-bit processor.
13. Controller shall have a minimum of 1 GB of DDR3 SDRAM on a 533Mhz bus to ensure high speed data recording, large data storage capacity and reliability.
14. Controller shall support two (2) on-board EIA-485 ports capable of supporting various EIA-485 protocols including, but not limited to BACnet MS/TP and Modbus.
   a. Ports can support various EIA-485 protocols including, but not limited to BACnet MS/TP and Modbus.
15. Controller shall support two (2) ports—each of gigabit speed—Ethernet (10/100/1000) ports.
   a. Ports can support various Ethernet protocols including, but not limited to BACnet IP, FOX, and Modbus.
16. All ports shall be capable of having protocol(s) assigned to utilize the port’s physical connection.
17. The controller shall have at a minimum four (4) onboard inputs, two (2) universal inputs and two (2) binary inputs.
18. Schedules
   a. Building controller modules shall provide normal seven-day scheduling, holiday scheduling and event scheduling.
   b. Each building controller shall support a minimum of 380 BACnet Schedule Objects and 380 BACnet Calendar Objects.
19. Logging Capabilities
   a. Each building controller shall log as minimum 2,000 objects at 15-minute intervals. Any object in the system (real or calculated) may be logged. Sample time interval shall be adjustable at the operator’s workstation.
   b. Logs may be viewed both on-site or off-site using WAN or remote communication.
   c. Building controller shall periodically upload trended data to networked operator’s workstation for long-term archiving if desired.
   d. Archived data stored in database format shall be available for use in third-party spreadsheet or database programs.
20. Alarm Generation
   a. Alarms may be generated within the system for any object change of value or state (either real or calculated). This includes things such as analog object value changes, binary object state changes, and various controller communication failures.
   b. Each alarm may be dialed out as noted elsewhere.
   c. Alarm log shall be provided for alarm viewing. Log may be viewed on-site at the operator’s terminal or off-site using remote communications.
   d. Controller must be able to handle up to 2,000 alarm setups stored as BACnet event enrollment.
objects, with system destination and actions individually configurable.

21. Demand Limiting

a. Demand limiting of energy shall be a built-in, user-configurable function. Each controller module shall support shedding of up to 1,200 loads using a minimum of two types of shed programs.
b. Load shedding programs in building controller modules shall operate as defined in section 2.1.J of this specification.

22. Tenant Activity Logging

a. Tenant Activity logging shall be supported by a building controller module. Each independent module shall support a minimum of 380 zones.
b. Tenant Activity logging shall function as defined in section 2.1.K of this specification.

B. BACnet MS/TP

1. BACnet MS/TP LAN must be software-configurable from 9.6 to 115.4Kbps

a. Each BACnet MS/TP LAN shall support 64 BACnet devices at a minimum.
b. All proprietary object types, if used in the system, shall be thoroughly documented, and provided as part of the submittal data. All necessary tools shall be supplied for working with proprietary information.

C. BACnet IP

1. The building controller shall comply with Annex J of the BACnet specification for IP connections. This device shall use Ethernet to connect to the IP internetwork, while using the same Ethernet LAN for non-IP communications to other BACnet devices on the local area network (LAN).
2. Must support interoperability on WANs and campus area networks (CANS), and function as a BACnet Broadcast Management Device (BBMD).
3. Each controller shall support at a minimum 128 BBMD entries.
4. BBMD management architecture shall support 3,000 subnets at a minimum.
5. Shall support BACnet Network Address Translation.
6. All proprietary object types, if used in the system, shall be thoroughly documented and provided as part of the submittal data. All necessary tools shall be supplied for working with proprietary information.

D. Expansion Ports

1. Controller shall support two (2) expansion ports.
   a. Combining the two on-board EIA-458 ports with fully loaded expansion ports, the controller shall support six (6) EIA-485 trunks simultaneously.

2. Expansion cards that mate to the expansion ports shall include:
   a. Dual port EIA-485 card.
   b. LON network card.

E. Niagara Framework
1. Controller shall utilize the Tridium Niagara Framework.
   a. Niagara Framework shall be version 3.8 or newer.
   b. All Niagara licensing shall be stored on a removable MicroSD card for fast in-field replacement of controller.

2. The Niagara License for the controllers shall be an open license.
   a. The controller shall be programmable via Niagara Workplace programming tool.
   b. The controller shall be programmable via an Niagara embedded Workplace programming tool.

F. Power Supply
   1. Input for power shall accept between 17 and 30VAC, 47 and 63Hz.
   2. Optional rechargeable battery for shutdown of controller including storage of all data in flash memory.
   3. On-board capacitor will ensure continuous operation of real-time clocks for minimum of 14 days.

G. Controller shall comply with the following:
   1. UL 916 for open energy management
   2. FCC Class B
   3. ROHS
   4. IEC 60703
   5. C-Tick Listed

H. Controller shall operate in the following environmental conditions:
   1. -4 to 149 °F (-20 to 65 °C) without optional battery, or 32 to 122 °F (0 to 50 °C) with optional battery.
   2. 0 to 95% relative humidity (RH), non-condensing.

2.03 CENTRAL PLANT AND AIR HANDLER APPLICATION CONTROLLERS:

A. Provide one or more native BACnet application controllers for each air handler and provide native BACnet application controllers as needed for central plant control that adequately cover all objects listed in object list. All controllers shall interface to building controller through either MS/TP LAN using BACnet protocol, or Ethernet LAN using BACnet over Ethernet or BACnet TCP/IP. No gateways shall be used. Controllers shall include input, output and self-contained logic program as needed for complete control of units. Controllers shall be fully programmable using graphical programming blocks. Programming tool shall be resident on operator workstation and be the same tool as used for the building controller. No auxiliary or non-BACnet controllers shall be used.

B. BACnet Conformance
   1. Application controllers shall be approved by the BTL as meeting the BACnet Advanced Application Controller requirements.
   2. Please refer to section 22.2, BACnet Functional Groups, in the BACnet standard, for a complete list of the services that must be directly supported to provide each of the functional groups listed above. All proprietary services, if used in the system, shall be thoroughly documented and provided as part of the submittal data. All necessary tools shall be supplied for working with proprietary information.
3. Standard BACnet object types supported shall include, as a minimum, Analog Input, Analog Output, Analog Value, Binary Input, Binary Output, Binary Value, Multi-state Values, Device, File, and Program object types. All proprietary object types, if used in the system, shall be thoroughly documented, and provided as part of the submittal data. All necessary tools shall be supplied for working with proprietary information.

C. Application controllers shall include universal inputs with 12-bit resolution that accept 10K thermistors, 0–10V DC, Platinum 1000-ohm RTD, 0–5V DC, 4–20mA and dry contact signals. Any input on a controller may be either analog or digital with a minimum of three inputs that accept pulses. Controller shall also include support and modifiable programming for interface to intelligent room sensor with digital display. Controller shall include binary and analog outputs on board. Analog outputs with 12-bit resolution shall support either 0–10VDC or 0–20mA. Binary outputs shall have LED indication of status. Software shall include scaling features for analog outputs. Application controller shall include 20VDC voltage supply for use as power supply to external sensors.

1. All outputs must have onboard Hand-Off-Auto (HOA) switches and a status indicator light. HOA switch position shall be monitored. Each analog output shall include a potentiometer for manually adjusting the output when the HOA switch is in the Hand position.
2. The position of each HOA switch shall be available system wide as a BACnet object property.

D. All program sequences shall be stored on board application controller in EEPROM. No batteries shall be needed to retain logic program. All program sequences shall be executed by controller up to 20 times per second (minimum of 10 times per second) and capable of multiple PID loops for control of multiple devices. All calculations shall be completed using floating-point math and system shall support display of all information in floating-point nomenclature at operator’s terminal.

1. The following control blocks shall be supported:
   a. Natural Log
   b. Exponential
   c. Log base 10
   d. X to the power of Y
   e. Nth square root of X
   f. 5th Order Polynomial Equations
   g. Astronomical Clock (sunrise/sunset calculation)
   h. Time based schedules

E. Programming of application controller shall be completely modifiable in the field over installed BACnet LANs or remotely using modem interface. Operator shall program logic sequences by graphically moving function blocks on screen and tying blocks together on screen. Application controller shall be programmed using programming tools as described in operator’s terminal section.

F. Application controller shall include support for intelligent room sensor (see Section 2.10.B.) Display on intelligent room sensor shall be programmable at application controller and include an operating mode and a field service mode. All button functions and display data shall be programmable to show specific controller data in each mode, based on which button is pressed on the sensor. See sequence of operation for specific display requirements at intelligent room sensor.

G. Schedules

1. The controller shall support a minimum of 3 BACnet Schedule Objects and have a real time clock on
board with battery backup to maintain time through a power loss.

H. Logging Capabilities

1. Controller shall support a minimum of 50 trendlogs. Any object in the controller (real or calculated) may be logged. Sample time interval shall be adjustable at the operator’s workstation.
2. Controller shall periodically upload trended data to system server for long-term archiving if desired. Archived data stored in (MS Jet Database or SQL) database form and shall be available for use in third-party spreadsheet or database programs.

I. Alarm Generation

1. Alarms may be generated within the controller for any object change of value or state (either real or calculated). This includes things such as analog object value changes, and binary object state changes.
2. Alarm log shall be provided for alarm viewing. Log may be viewed on-site at the operator’s terminal or off-site using remote communications.
3. Controller must be able to handle up to 25 alarm setups stored as BACnet event enrollment objects, with system destination and actions individually configurable.

J. The controller processor shall be a 32-bit processor.

2.04 TERMINAL UNIT APPLICATION CONTROLLERS (Small Air Handlers, Heat Pumps, AC Units, Fan-Coils):

A. Provide one native BACnet application controller for each piece of unitary mechanical equipment that adequately covers all objects listed in object list for unit. All controllers shall interface to building controller through MS/TP LAN using BACnet protocol. No gateways shall be used. Controllers shall include input, output and self-contained logic program as needed for complete control of unit.

B. BACnet Conformance

1. Application controllers shall, as a minimum, support MS/TP BACnet LAN types. They shall communicate directly using this BACnet LAN at 9.6, 19.2, 38.4 and 76.8 Kbps, as a native BACnet device. Application controllers shall be approved by the BTL as meeting the BACnet Application Specific Controller requirements and support all BACnet services necessary to provide the following BACnet functional groups:
   a. Files Functional Group
   b. Reinitialize Functional Group
   c. Device Communications Functional Group

2. Please refer to Section 22.2, BACnet Functional Groups in the BACnet standard, for a complete list of the services that must be directly supported to provide each of the functional groups listed above. All proprietary services, if used in the system, shall be thoroughly documented and provided as part of the submittal data. All necessary tools shall be supplied for working with proprietary information.
3. Standard BACnet object types supported shall include, as a minimum, Analog Input, Analog Output, Analog Value, Binary Input, Binary Output, Binary Value, Device, File, and Program Object Types. All proprietary object types, if used in the system, shall be thoroughly documented and provided as part of the submittal data. All necessary tools shall be supplied for working with proprietary information.

C. Application controllers shall include universal inputs with 10-bit resolution that can accept 10K thermistors, 0–5VDC, 4–20mA, dry contact signals and a minimum of 3 pulse inputs. Any input on controller may be either
analog or digital. Controller shall also include support and modifiable programming for interface to intelligent room sensor. Controller shall include binary outputs on board with analog outputs as needed.

D. All program sequences shall be stored on board controller in EEPROM. No batteries shall be needed to retain logic program. All program sequences shall be executed by controller 10 times per second and shall be capable of multiple PID loops for control of multiple devices. Programming of application controller shall be completely modifiable in the field over installed BACnet LANs or remotely through modem interface. Operator shall program logic sequences by graphically moving function blocks on screen and tying blocks together on screen. Application controller shall be programmed using same programming tools as building controller and as described in operator workstation section. All programming tools shall be provided and installed as part of system.

E. Application controller shall include support for intelligent room sensor (see Section 2.10.B.) Display on room sensor shall be programmable at controller and include an operating mode and a field service mode. All button functions and display data shall be programmable to show specific controller data in each mode based on which button is pressed on the sensor. See sequence of operation for specific display requirements at intelligent room sensor.

2.05 VAV BOX CONTROLLERS—SINGLE DUCT:

A. Provide one native BACnet application controller for each VAV box that adequately covers all objects listed in object list for unit. All controllers shall interface to building controller through MS/TP LAN using BACnet protocol. No gateways shall be used. Controllers shall include on board CFM flow sensor, inputs, outputs and programmable, self-contained logic program as needed for control of units. BACnet Conformance

1. Application controllers shall, at a minimum, support MS/TP BACnet LAN types. They shall communicate directly through this BACnet LAN at 9.6, 19.2, 38.4 and 76.8 Kbps, as a native BACnet device. Application controllers shall be approved by the BTL as meeting the BACnet Application Specific Controller requirements.

2. Please refer to Section 22.2, BACnet Functional Groups, in the BACnet standard, for a complete list of the services that must be directly supported to provide each of the functional groups listed above. All proprietary services, if used in the system, shall be thoroughly documented and provided as part of the submittal data. All necessary tools shall be supplied for working with proprietary information.

3. Standard BACnet object types supported shall include, as a minimum, Analog Input, Analog Output, Analog Value, Binary Input, Binary Output, Binary Value, Device, File, and Program Object Types. All proprietary object types, if used in the system, shall be thoroughly documented and provided as part of the submittal data. All necessary tools shall be supplied for working with proprietary information.

C. Application controllers shall include universal inputs with 10-bit resolution that can accept 10K thermistors, 0–5 VDC, and dry contact signals. Inputs on controller may be either analog or digital. Controller shall also include support and modifiable programming for interface to intelligent room sensor with digital display. Controller shall also include binary outputs on board. For applications using variable speed parallel fans, provide a single analog output selectable for 0-10 V or 0-20 mA control signals. Application controller shall include microprocessor driven flow sensor for use in pressure independent control logic. All boxes shall be controlled using pressure-independent control algorithms and all flow readings shall be in CFM (LPS if metric).

D. All program sequences shall be stored on board application controller in EEPROM. No batteries shall be needed to retain logic program. All program sequences shall be executed by controller 10 times per second and shall be capable of multiple PID loops for control of multiple devices. Programming of application controller shall be completely modifiable in the field over installed BACnet LANs or remotely using modem interface. Operator shall program logic sequences by graphically moving function blocks on screen and tying blocks together on screen. Application controller shall be programmed using the same programming tool as Building Controller and as described in operator’s workstation section. All programming tools shall be provided as part of system.
E. Application controller shall include support for intelligent room sensor (see Section 2.10.B.) Display on room sensor shall be programmable at application controller and include an operating mode and a field service mode. All button functions and display data shall be programmable to show specific controller data in each mode based on which button is pressed on the sensor. See sequence of operations for specific display requirements for intelligent room sensor.

F. On board flow sensor shall be microprocessor-driven and pre-calibrated at the factory. Pre-calibration shall be at 16 flow points as a minimum. All factory calibration data shall be stored in non-volatile memory. Calibration data shall be field adjustable to compensate for variations in VAV box type and installation. All calibration parameters shall be adjustable through intelligent room sensor. Operator’s workstation, portable computers, and special hand-held field tools shall not be needed for field calibration.

G. Provide duct temperature sensor at discharge of each VAV box that is connected to controller for reporting back to operator’s workstation.

2.06 AUXILIARY CONTROL DEVICES:

A. Temperature Sensors

1. All temperature sensors to be solid-state electronic, interchangeable with housing appropriate for application. Wall sensors to be installed as indicated on drawings. Mount 48 inches above finished floor. Duct sensors to be installed such that the sensing element is in the main air stream. Immersion sensors to be installed in wells provided by control contractor but installed by mechanical contractor. Immersion wells shall be filled with thermal compound before installation of immersion sensors. Outside air sensors shall be installed away from exhaust or relief vents, not in an outside air intake, and in a location that is in the shade most of the day.

B. Intelligent Room Sensor with Touchscreen

1. Hardware

   1. Room sensor shall include:

      i. Backlit touchscreen LCD digital display
      ii. Temperature sensor
      iii. Humidity sensor
      iv. Programmable Status Light indicator

   b. Temperature sensor shall be a have an accuracy of +/- 0.36 °F (0.3 °C) at calibration point over the range of 32 to 158 °F or better.
   c. Humidity sensor shall have an accuracy of +/-3% from 10 to 90% relative humidity (RH) or better, non-condensing.
   d. The intelligent room sensor’s Status Light indicator shall have a minimum of four (4) colors (blue, red, amber, and green) that will be used as visual indicator to the occupants of the condition of the system. The color and on/off state of the Status Light indicator shall be fully programmable.
   e. CO2 sensor shall have an accuracy of +/- 30 ppm over the range of 0–5000 ppm or better if the CO2 sensor is used.
   f. CO2 sensor shall utilize Automatic Baseline Correction to maintain sensor calibration without the need for manual calibration if the CO2 sensor is used.
   g. The user shall interact with the smart sensor using a touchscreen, with no buttons allowed.
   h. The intelligent room sensor shall have provisions for a tamper proof installation requiring tools to be
removed from the wall.

j. Controller shall function as room control unit, and allow occupant to raise and lower setpoint, and activate terminal unit for override use—all within limits as programmed by building operator.

2. Display Content

a. The intelligent room sensor shall simultaneously display room setpoint, room temperature, and outside temperature at each controller.

b. The intelligent room sensor shall have the ability to add or remove from the display time-of-day, room humidity, and indoor air temperature to customize the view for the customer.

c. The intelligent room sensor must have the capability to show temperatures in degrees Fahrenheit or degrees Celsius.

g. The intelligent room sensor shall have the ability to display the status of a lighting zone and control the on/off state of the zone from the touchscreen using a tenant-accessible display page.

h. The intelligent room sensor shall have the ability to display the status of a window zone (e.g., blinds) and control the on/off state of the zone from the touchscreen using a tenant-accessible display page.

i. After Hours Override shall:

   v. Override time may be set and viewed in 30-minute increments.

   vi. Override time countdown shall be automatic, but may be reset to zero by occupant from the sensor.

   vii. Time remaining shall be displayed.

   viii. Display shall show the word "OFF" in unoccupied mode unless a function button is pressed.

3. Other Modes

a. The intelligent room sensor shall also allow service technician access to hidden functions for advanced system configuration. This functionality shall be accessed-protected with a configurable PIN number.

b. Field Service Mode shall allow access to common parameters as dictated by the application’s sequence of operations. The parameters shall be viewed and set from the intelligent room sensor with no computer or other field service tool needed.

c. If the intelligent room sensor is connected to VAV controller, Balance Mode shall allow a VAV box to be balanced and all air flow parameters viewed. The balancing parameters shall be viewed and set from the intelligent room sensor with no computer or other field service tool needed.

4. Intelligent Room Sensor shall be in compliance of the following:

a. UL Standard for Safety 916

b. FCC Part 15.107 & 109, Class B, CFR47-15

c. EMC Directive 89/336/EEC (European CE Mark)

C. Humidity Wall Transmitter

1. Transmitters shall be accurate to +/- [1] [2] % at full scale.

2. Transmitter shall have replaceable sensing element.

3. Sensor type shall be thin-film capacitive.
5. Sensor element shall contain multipoint calibration on-board in nonvolatile memory
6. Operating range shall be 0 - 100% RH noncondensing, 50 to 95 F
7. Output shall be field selectable 4-20 mA or 0-5/0-10 VDC.
8. Transmitter shall accept 12-30 VDC or 24 VAC supply power.
9. Transmitter shall be available in an [off white] [black] enclosure made of high impact ABS plastic for mounting on a standard electrical box.
10. Transmitter shall have LCD display
11. Transmitter shall be available with a certification of NIST calibration
12. [Transmitter shall have integrated temperature sensor]

D. Humidity Duct Transmitter
1. Transmitters shall be accurate to +/- [1] [2] % at full scale.
2. Transmitter shall be fully encapsulated in potting material within a stainless steel probe.
3. Transmitter shall have replaceable sensing element.
4. Sensor type shall be thin-film capacitive.
5. Sensor element shall contain multipoint calibration on-board in nonvolatile memory
6. Operating range shall be 0 - 100% RH noncondensing, -40 to 122 F
7. Output shall be 4-20 mA or 0-5/0-10 VDC.
8. Transmitter shall accept 12-30 VDC or 24 VAC supply power.
9. Transmitter shall be available with a certification of NIST calibration
10. [Transmitter shall have integrated temperature sensor]
11. Basis of Design: Senva HT1 Series

E. Humidity Outdoor Transmitter
1. Transmitters shall be accurate to +/- 2% at full scale.
2. Transmitter shall be fully encapsulated in potting material within a stainless steel probe. Probe shall be encased in PVC solar radiation shield and mounted in a weatherproof enclosure.
3. Transmitter shall have replaceable sensing element.
4. Sensor type shall be thin-film capacitive.
5. Sensor element shall contain multipoint calibration on-board in nonvolatile memory
6. Operating range shall be 0 - 100% RH noncondensing, -40 to 122 F
7. Output shall be 4-20 mA or 0-5/0-10 VDC.
8. Transmitter shall accept 12-30 VDC or 24 VAC supply power.
9. Transmitter shall be available with a certification of NIST calibration
10. [Transmitter shall have integrated temperature sensor]

F. Carbon Dioxide Wall Transmitter:
1. Sensor type shall be Non-dispersive infrared (NDIR).
2. Accuracy shall be ±30 ppm ±2% of measured value with annual drift of ±10 ppm. Minimum five year recommended calibration interval.
3. Repeatability shall be ±20 ppm ±1% of measured value
4. Response Time shall be <60 seconds for 90% step change
5. Outputs shall be field selectable [Analog: 4-20mA or 0-5/0-10VDC] [Protocol: Modbus or BACnet] with [SPDT Relay 1A@30VDC] [temperature setpoint slider]
6. Transmitter shall accept 12-30 VDC or 24 VAC supply power.
7. Temperature Range: [32° to 122°F (CO2 only)] [50° to 95°F (with humidity option)]
8. Output range shall be programmable 0-2000 or 0-5000 ppm
9. Transmitter shall be available in an [off white] [black] enclosure for mounting on a standard electrical box.
10. Transmitter shall have LCD display for commissioning and provide additional faceplate to conceal LCD display where occupants may misinterpret CO2 readings.
11. [Transmitter shall have integrated [humidity sensor] [temperature sensor]]

G. Carbon Dioxide Duct Transmitter:
1. Sensor type shall be Non-dispersive infrared (NDIR).
2. Accuracy shall be ±30 ppm ±2% of measured value with annual drift of ±10 ppm.
   Minimum five year recommended calibration interval.
3. Repeatability shall be ±20 ppm ±1% of measured value
4. Response Time shall be <60 seconds for 90% step change
5. Outputs shall be field selectable Analog: 4-20mA or 0-5/0-10VDC with SPDT
   Relay 1A@30VDC
6. Transmitter shall accept 12-30 VDC or 24 VAC supply power.
7. Temperature Range: 32° to 122°F
8. Output range shall be programmable 0-2000 or 0-5000 ppm
9. Enclosure shall not require remote pickup tubes and make use of integrated
   H-beam probe to channel air flow to sensor.
10. Enclosure lid shall require no screws and make use of snap on features for
    attachment
11. Enclosure shall be made of high impact ABS plastic
12. Transmitter shall have LCD display
13. [Transmitter shall have integrated [humidity sensor] [temperature sensor]]
14. Basis of Design: Senva CT1D

H. Air Pressure Transmitters.
1. Sensor shall be microprocessor profiled ceramic capacitive sensing element
2. Transmitter shall have 14 selectable ranges from 0.1 – 10” WC
3. Transmitter shall be +/- 1% accurate in each selected range including linearity,
   repeatability, hysteresis, stability, and temperature compensation.
4. Transmitter shall be field configurable to mount on wall or duct with static probe
5. Transmitter shall be field selectable for Unidirectional or Bidirectional
6. Maximum operating pressure shall be 200% of design pressure.
7. Output shall be field selectable 4-20 mA or 0-5/0-10 VDC linear.
8. Transmitter shall accept 12-30 VDC or 24 VAC supply power
9. Response time shall be field selectable T95 in 20 sec or T95 in 2 sec
10. Transmitter shall have an LCD display (where required)
11. Units shall be field selectable for WC or PA
12. Transmitter shall have provision for zeroing by pushbutton or digital input.
13. Transmitter shall be available with a certification of NIST calibration (where required)

I. Liquid Differential Pressure Transmitters:
1. Transmitter shall be microprocessor based
2. Transmitter shall use two independent gauge pressure sensors to measure and
   calculate differential pressure
3. Transmitter shall have 4 switch selectable ranges
4. Transmitter shall have test mode to produce full-scale output automatically.
5. Transmitter shall have provision for zeroing by pushbutton or digital input.
6. Transmitter shall have field selectable outputs of 0-5V, 0-10V, and 4-20mA.
7. Transmitter shall have field selectable electronic surge damping
8. Transmitter shall have an electronic port swap feature to correct plumbing errors.
9. Transmitter shall accept 12-30 VDC or 24 VAC supply power
10. Sensor shall be 17-4 PH stainless steel where it contacts the working fluid.
11. Performance:
12. Accuracy shall be ±1% F.S. and ±2% F.S. for lowest selectable range
13. Long term stability shall be ±0.25%
14. Sensor temperature operating range shall be -4° to 185°F
15. Operating environment shall be 14° to 131°F; 10-90% RH noncondensing
16. Proof pressure shall be 2x max. F.S. range
17. Burst pressure shall be 5x max. F.S. range
18. Transmitter shall be encased in a NEMA 4 enclosure.
19. Transmitter shall be provided with armored plug-in sensor cables with no exposed wire.
20. Transmitter shall be available with a certification of NIST calibration
21. No bypass manifold will be required. Unit will be provided with internal zero button.
22. Basis of Design: Veris CW2 Series (New Style Line)

J. Current Sensors (Go-No Go)

1. Current-status switches shall be used to monitor fans, pumps, motors and electrical loads. Current switches shall be provided in split core model, and offer either a digital signal to the automation system.

2. Basis of Design: Senva C-2300

K. Current Status Switches for Constant Load Devices (Pre-Set Knob Adjustable)

1. General: Knob preset current sensor with adjustable visual scale to detect motor undercurrent situations such as belt or coupling loss on constant loads.
2. Visual LED indicator for status.
3. Split core sensor, induced powered from monitored load and isolated to 600 VAC rms. Sensor shall indicate status from 0.5 A to 175 A.
4. Normally open current sensor output. 0.1A at 30 VAC/DC.
5. Basis of Design: Senva Model C-2320

L. Current Status Switches for Constant and Variable Load Devices (VFD/Auto Calibration)

1. General: Microprocessor controlled, self-learning, self-calibrating current sensor to detect motor undercurrent and overcurrent situations such as belt loss, coupling shear, and mechanical failure on variable loads. Sensor shall store motor current as operating parameter in non-volatile memory. Push-button to clear memory and relearn.
2. Visual LED indicator for status.
3. Alarm Limits: ±20% of learned current in every 5 Hz freq. band
4. Split core sensor, induced powered from monitored load and isolated to 600 VAC rms. Sensor shall indicate status from 1.5 A to 135 A.
5. Normally open current sensor output. 0.1A at 30 VAC/DC.
6. Basis of Design: Senva C-2350-VFD

M. Current Status Switches for Constant and Variable Load Devices (VFD/Auto Calibration)

1. General: Microprocessor controlled, self-learning, self-calibrating current sensor to detect motor undercurrent and overcurrent situations such as belt loss, coupling shear, and mechanical failure on variable loads. Sensor shall store motor current as operating parameter in non-volatile memory. Push-button to clear memory and relearn.
2. Visual LED indicator for status.
3. Alarm Limits: ±20% of learned current in every 5 Hz freq. band
4. Split core sensor, induced powered from monitored load and isolated to 600 VAC rms. Sensor shall indicate status from 1.5 A to 135 A.
5. Normally open current sensor output. 0.1A at 30 VAC/DC.
6. Basis of Design: Senva C-2350-VFD

N. Piezo Airflow Measuring Stations Transducer (for manufacturer mounted Piezo Stations – provided with equipment by others – typically used on Fan Walls).
2. Sensor shall be microprocessor profiled ceramic capacitive sensing element
3. Transmitter shall have single range as required for Airflow Measuring Station
4. Transmitter shall be +/- 0.25% accurate including linearity, repeatability, hysteresis, stability, and temperature compensation.
5. Maximum operating pressure shall be 200% of design pressure.
6. Output shall be field selectable 4-20 mA or 0-5/0-10 VDC linear.
7. Transmitter shall accept 12-30 VDC or 24 VAC supply power
8. Response time shall be field selectable T95 in 20 sec or T95 in 2 sec
9. Transmitter shall have an LCD display (where required)
10. Units shall be field selectable for WC or PA
11. Transmitter shall have provision for zeroing by pushbutton or digital input.
12. Transmitter shall be available with a certification of NIST calibration (where required)

2.07 ELECTRICAL POWER MEASUREMENT:

A. Electrical Power Monitors, Single Point (High Accuracy/Revenue Grade):
1. General: Revenue grade meter. Measures voltage, amperage, real power (kW), consumption (kWh), reactive power (kVAR), apparent power (kVA) and power factor (PF) per phase and total load for a single load. Available with data logging, Bi-directional (4-quadrant) metering, and pulse contact accumulator inputs.
2. Voltage Input: 90-600 VAC, 50/60 Hz
4. Performance:
   a. Accuracy: +/- 0.2% revenue grade or 1% non-revenue grade. (Select)
   b. Operating Temperature Range: -22-158°F
   1) Output: Pulse, BACnet, Modbus RTU
   2) Display: Backlit LCD
   3) Enclosure: NEMA 1
   4) Agency Rating: UL508, ANSI C12.20
   5) Basis of Design: Dent PowerScout 3 Series with NEMA 1 Enclosure 0.2% CT

B. Electrical Power Monitors, Multiple Point (12-48 loads, High Accuracy):
1. General: Revenue grade meter. Measures volts, amps, power and energy for each circuit. 1/4 amp to 4000-amp monitoring.
2. Voltage Input: 90-480 VAC, 60 Hz
3. Current Input: 5A – 4000A, 1/3V CT inputs
4. Performance:
   a. Accuracy: +/- 0.2% meter (split core), or +/- 1% meter (split core) (as specified)
   b. Operating Temperature Range: 32-140°F
   1) Output: Modbus RTU, BACnet MS/TP or BACnet I/P
   2) Agency Rating: UL508, ANSI C12.10, IEC Class 1
   3) Basis of Design: Dent PowerScout 12/24/48 Series with NEMA 1 Enclosure 0.2% CT

2.08 ELECTRONIC ACTUATORS AND VALVES:
A. Quality Assurance for Actuators and Valves
1. UL Listed Standard 873 and C.S.A. Class 4813 02 certified.
2. NEMA 2 rated enclosures for inside mounting, provide with weather shield for outside mounting.
3. Five-year manufacturer’s warranty. Two-year unconditional and three-year product defect from date of
B. Execution Details for Actuators and Valves

1. Furnish a Freeze-stat and install “Hard Wire” interlock to disconnect the mechanical spring return actuator power circuit for fail-safe operation. Use of the control signal to
2. VAV box damper actuation shall be floating type or analog (2–10VDC, 4–20mA).
3. Booster-heat, VAV, FC, RH valve actuation shall be floating type or analog (2-10vdc, 4-20ma).
4. Primary valve control for central plant and AHU’s types shall be analog (2–10VDC, 4–20mA).

C. Actuators for damper and control valves 0.5–6 inches shall be electric unless otherwise specified, provide actuators as follows:

1. UL Listed Standard 873 and Canadian Standards association Class 481302 shall certify actuators.
2. NEMA 2 rated actuator enclosures for inside mounting. Use additional weather shield to protect actuator when mounted outside.
3. Five-year manufacturer’s warranty.
4. Mechanical spring shall be provided when specified. Capacitors or other non-mechanical forms of fail-safe are not acceptable.
5. Position indicator device shall be installed and made visible to the exposed side of the actuator. For damper short shaft mounting, a separate indicator shall be provided to the exposed side of the actuator.
6. Overload Protection: Actuators shall provide protection against actuator burnout by using an internal current limiting circuit or digital motor rotation sensing circuit. Circuit shall insure that actuators cannot burn out due to stalled damper or mechanical and electrical paralleling. End switches to deactivate the actuator at the end of rotation are acceptable only for butterfly valve actuators.
7. A Pushbutton gearbox release shall be provided for all non-spring actuators.
8. Modulating actuators shall be 24VAC and consume 10VA power or less.
9. Conduit connectors are required when specified and when code requires it.

D. Damper Actuators:

1. Outside air and exhaust air damper actuators shall be mechanical spring return. Capacitors or other non-mechanical forms of fail-safe are not acceptable. The actuator mounting arrangement and spring return feature shall permit normally open or normally closed positions of the damper as required.
2. Economizer actuators shall utilize analog control 2–10VDC, floating control is not acceptable.
3. Electric damper actuators (including VAV box actuators) shall be direct shaft-mounted and use a V-bolt and toothed V-clamp causing a cold weld effect for positive gripping. Single bolt or set-screw type fasteners are not acceptable.
4. One electronic actuator shall be direct shaft-mounted per damper section. No connecting rods or jackshafts shall be needed. Small outside air and return air economizer dampers may be mechanically linked together if one actuator has sufficient torque to drive both and damper drive shafts are both horizontal installed.
5. Multi-section dampers with electric actuators shall be arranged so that each damper section operates individually. One electronic actuator shall be direct shaft-mounted per damper section. (See below execution section for more installation details.)
E. Valve Actuators 0.5–6 inches

1. Mechanical spring shall be provided on all actuators for pre-heat coil and actuators for AHU heating or cooling coil when units are mounted outside. See plans for fail-safe flow function: Normal Open or Normal Closed.
2. All zone service actuators shall be non-spring return unless otherwise specified.
3. The valve actuator shall be capable of providing the minimum torque required for proper valve close-off for the required application.
4. All control valves actuators shall have an attached 3-foot cable for easy installation to a junction box. Note: No splices are allowed outside a junction box.
5. Override handle and gearbox release shall be provided for all non-spring return valve actuators.

F. Control Dampers.

1. The sheet metal contractor shall furnish and size all automatic control dampers unless provided with packaged equipment. The sheet metal contractor shall install all dampers unless provided with packaged equipment.
2. All dampers used for modulating service shall be opposed blade type and arranged for normally open or normally closed operation as required. The damper is to be sized so that, when wide open, the pressure drop is a sufficient amount of its close-off pressure drop for effective throttling.
3. All dampers used for two-position or open-close control shall be parallel blade type arranged for normally open or closed operation as required.
4. Damper linkage hardware shall be constructed of aluminum or corrosion-resistant zinc and nickel-plated steel and furnished as follows:
   a. Bearing support bracket and drive blade pin extension shall be provided for each damper section. Sheet metal contractor shall install bearing support bracket and drive blade pin extension. Sheet metal contractor shall provide permanent indication of blade position by scratching or marking the visible end of the drive blade pin extension.
   b. Drive pin may be round only if V-bolt and toothed V-clamp is used to cause a cold weld effect for positive gripping. For single bolt or set-screw type actuator fasteners, round damper pin shafts must be milled with at least one side flat to avoid slippage.
   c. Damper manufacturer shall supply alignment plates for all multi-section dampers.

G. Control Valves 0.5–6 inches

1. The BAS contractor shall furnish all specified motorized control valves and actuators. BAS contractor shall furnish all control wiring to actuators. The plumbing contractor shall install all valves. Equal percentage control characteristic shall be provided for all water coil control valves. Linear valve characteristic is acceptable for 3-way valves that are 2.5 inches and above.
2. Characterized control valves shall be used for hydronic heating or cooling applications and small to medium AHU water-coil applications to 100GPM. Actuators are non-spring return for terminal unit coil control unless otherwise noted. If the coil is exposed to the outside air stream, see plans for spring return requirement.
   a. Leakage is aero percent, close-off is 200psi, maximum differential is 30psi; rangeability is 500:1.
   b. Valves 0.5–2 inches shall be nickel-plated forged brass body, NPT screw type connections.
c. Valves 0.5–1.25 inches shall be rated for ANSI Class 600 working pressure. Valves 1.5 and 2 inches shall be rated for ANSI Class 400 working pressure.
d. The operating temperature range shall be 0–250 degrees F.
e. Stainless steel ball and stem shall be furnished on all modulating valves.
f. Seats shall be fiberglass reinforced Teflon.
g. Two-way and three-way valves shall have an equal percentage control port. Full stem rotation is required for maximum flow to insure stable BTU control of the coil.
h. Three-way valve shall be applicable for both mixing and diverting.
i. The characterizing disc is made of TEFZEL and shall be keyed and held secure by a retaining ring.
j. The valves shall have a blow-out proof stem design.
k. The stem packing shall consist of 2 lubricated O-rings designed for on-off or modulating service and require no maintenance.
l. The valves shall have an ISO type, 4-bolt flange for mounting actuator in any orientation parallel or perpendicular to the pipe.
m. A non-metallic thermal isolation adapter shall separate valve flange from actuator.
n. One fastening screw shall secure the direct coupling of the thermal isolation adapter between the actuator and the valve. This will prevent all lateral or rotational forces from affecting the stem and its packing O-rings.

3. Globe valves 0.5–2 inches shall be used for steam control or water flow applications.
   a. Valves shall be bronze body, NPT screw type, and shall be rated for ANSI Class 250 working pressure.
   b. Valves 0.5 inches (DN15) through 2 inches (DN50) with spring return actuators shall close off against 50 psi pressure differential with Class III leakage (0.1%).
   c. The operating temperature range shall be 20–280 degrees F.
   d. Spring loaded TFE packing shall protect against leakage at the stem.
   e. Two-way valves shall have an equal percentage control port.
   f. Three-way valves shall have a linear control and bypass port.
   g. Mixing and diverting valves must be installed specific to the valve design.

4. Globe Valve 2.5–6 inches
   a. Valves 2.5 inches (DN65) through 6 inches (DN50) shall be iron body, 125 lb. flanged with Class III (0.1%) close-off leakage at 50 psi differential.
   b. Valves with spring return actuators shall close off against 50 psi pressure differential with Class III leakage (0.1%).
   c. Flow type for two-way valves shall be equal percentage. Flow type for three-way valves shall be linear.
   d. Mixing and diverting valves must be installed specific to the valve design.
H. Butterfly valves

1. Butterfly valves shall be sized for modulating service at 60–70 degree stem rotation. Isolation valves shall be line-size. Design velocity shall be less than 12 feet per second when used with standard EPDM seats.
   
   a. Body is cast iron.
   b. Disc is aluminum bronze standard.
   c. Seat is EPDM standard.
   d. Body Pressure is 200 psi, -30–275 degrees F.
   e. Flange is ANSI 125/250.
   f. Media Temperature Range is -22–240-degrees F.
   g. Maximum Differential Pressure is 200 psi for 2- to 6- inch size.

I. Butterfly Valve Industrial Actuators

a. Actuators shall be approved under Canadian Standards Association or other Nationally Recognized Testing Laboratory to UL standards. CSA Class 4813 02 or equal. Enclosure shall be NEMA 4 (weatherproof) enclosure and will have an industrial quality coating.

   a. Actuator shall have a motor rated for continuous duty. The motor shall be fractional horsepower; permanent split capacitor type designed to operate on a 120VAC, 1pH, 60Hz supply. Two adjustable cam-actuated end travel limit switches shall be provided to control direction of travel. A self-resetting thermal switch shall be imbedded in the motor for overload protection.
   b. Reduction gearing shall be designed to withstand the actual motor stall torque. Gears shall be hardened alloy steel, permanently lubricated. A self-locking gear assembly or a brake shall be supplied.
   c. Actuator shall have a 6 ft wiring harness provided for ease in field wiring (above 1500 in-lbs). Two adjustable SPDT cam-actuated auxiliary switches, rated at 250VAC shall be provided for indication of open and closed position. Actuator shall have heater and thermostat to minimize condensation within the actuator housing.
   d. Actuator shall be equipped with a hand wheel for manual override to permit operation of the valve in the event of electrical power failure or system malfunction. Hand wheel must be permanently attached to the actuator and when in manual operation electrical power to the actuator will be permanently interrupted. The hand wheel will not rotate while the actuator is electrically driven.
   e. The actuator shall be analog, floating, or two position as called out in the control sequence of operation. All Analog valves shall be positive positioning, and respond to a 2–10VDC, 4-20mA, or adjustable signal as required.

b. Performance Verification Test

   a. Control loops shall cause productive actuation with each movement of the actuator and actuators shall modulate at a rate that is stable and responsive. Actuator movement shall not occur before the effects of previous movement have affected the sensor.
   b. Actuator shall have capability of signaling a trouble alarm when the actuator Stop-Go Ratio exceeds 30%.

   c. Actuator mounting for damper and valve arrangements shall comply to the following:

      a. Damper actuators: Shall not be installed in the air stream
b. A weather shield shall be used if actuators are located outside. For damper actuators, use clear plastic enclosure.

c. Damper or valve actuator ambient temperature shall not exceed 122 degrees F through any combination of medium temperature or surrounding air. Appropriate air gaps, thermal isolation washers or spacers, standoff legs, or insulation shall be provided as necessary.

d. Actuator cords or conduit shall incorporate a drip leg if condensation is possible. Water shall not be allowed to contact actuator or internal parts. Location of conduits in temperatures dropping below dew point shall be avoided to prevent water from condensing in conduit and running into actuator.

e. Damper mounting arrangements shall comply to the following:

   ix. The ventilation subcontractor shall furnish and install damper channel supports and sheet metal collars.
   x. No jack shafting of damper sections shall be allowed.
   xi. Multi-section dampers shall be arranged so that each damper section operates individually. One electronic actuator shall be direct shaft mounted per section.

f. Size damper sections based on actuator manufacturer’s specific recommendations for face velocity, differential pressure and damper type. In general:

   i. Damper section shall not exceed 24 ft-sq. with face velocity >1500 FPM.
   ii. Damper section shall not exceed 18 ft-sq. with face velocity > 2500 FPM.
   iii. Damper section shall not exceed 13 ft-sq. with face velocity > 3000 FPM.

g. Multiple section dampers of two or more shall be arranged to allow actuators to be direct shaft mounted on the outside of the duct.

h. Multiple section dampers of three or more sections wide shall be arranged with a 3-sided vertical channel (8 inches wide by 6 inches deep) within the duct or fan housing and between adjacent damper sections. Vertical channel shall be anchored at the top and bottom to the fan housing or building structure for support. The sides of each damper frame shall be connected to the channels. Holes in the channel shall allow damper drive blade shafts to pass through channel for direct shaft-mounting of actuators. Open side of channel shall be faced downstream of the airflow, except for exhaust air dampers.

   i. Multiple section dampers to be mounted flush within a wall or housing opening shall receive either vertical channel supports as described above or sheet metal standout collars. Sheet metal collars (12-inch minimum) shall bring each damper section out of the wall to allow direct shaft-mounting of the actuator on the side of the collar.

d. Valve Sizing for Water Coil

   a. On/Off control valves shall be line size.
   b. Modulating control valve body size may be reduced, at most, two pipe sizes from the line size or not less than half the pipe size. The BAS contractor shall size all water coil control valves for the application as follows:

      i. Booster-heat valves shall be sized not to exceed 4–9psi differential pressure. Size valve for 50% valve authority. Valve design pressure drop is equal to the sum of coil drop plus the balance valve drop.
ii. Primary valves shall be sized not to exceed 5–15psi differential pressure. Size valve for 50% valve authority. Valve design pressure drop is equal to the sum of coil drop plus the balance valve drop.

iii. Butterfly valves shall be sized for modulating service at 60–70 degree rotation. Design velocity shall be 12 feet per second or less when used with standard EPDM seats.

c. Valve mounting arrangements shall comply to the following:

i. Unions shall be provided on all ports of two-way and three-way valves.

ii. Install three-way equal percentage characterized control valves in a mixing configuration with the “A” port piped to the coil.

iii. Install 2.5 inches and above, three-way globe valves, as manufactured for mixing or diverting service to the coil.

2.09 ENCLOSURES:

A. All controllers, power supplies and relays shall be mounted in enclosures.

B. Enclosures may be NEMA 1 when located in a clean, dry, indoor environment. Indoor enclosures shall be NEMA 12 when installed in other than a clean environment.

C. Enclosures shall have hinged, locking doors.

D. Provide laminated plastic nameplates for all enclosures in any mechanical room or electrical room. Include location and unit served on nameplate. Laminated plastic shall be 0.125 inches thick and appropriately sized to make label easy to read.

PART 3: EXECUTION

3.01 EXAMINATION:

A. Prior to starting work, carefully inspect installed work of other trades and verify that such work is complete to the point where work of this Section may properly commence.

B. Notify the owner’s representative in writing of conditions detrimental to the proper and timely completion of the work.

C. Do not begin work until all unsatisfactory conditions are resolved.

3.02 INSTALLATION (GENERAL):

A. Install in accordance with manufacturer’s instructions.

B. Provide all miscellaneous devices, hardware, software, interconnections, installation, and programming required to ensure a complete operating system in accordance with the sequences of operation and point schedules.

3.03 LOCATION AND INSTALLATION OF COMPONENTS:

A. Locate and install components for easy accessibility; in general, mount 48 inches above floor with minimum 3 feet of clear access space in front of units. Obtain approval on locations from owner’s representative prior to installation.
B. All instruments, switches, transmitters, etc., shall be suitably wired and mounted to protect them from vibration, moisture, and high or low temperatures.
C. Identify all equipment and panels. Provide permanently mounted tags for all panels.
D. Provide stainless steel or brass thermowells suitable for respective application and for installation under other sections, and sized to suit pipe diameter without restricting flow.

3.04 INTERLOCKING AND CONTROL WIRING:
A. Provide all interlock and control wiring. All wiring shall be installed neatly and professionally, in accordance with Specification Division 16 and all national, state and local electrical codes.
B. Provide wiring as required by functions as specified and as recommended by equipment manufacturers, to serve specified control functions. Provide shielded low capacitance wire for all communications trunks.
C. Control wiring shall not be installed in power circuit raceways. Magnetic starters and disconnect switches shall not be used as junction boxes. Provide auxiliary junction boxes as required. Coordinate location and arrangement of all control equipment with the owner’s representative prior to rough-in.
D. Provide auxiliary pilot duty relays on motor starters as required for control function.
E. Provide power for all control components from nearest electrical control panel or as indicated on the electrical drawings; coordinate with electrical contractor.
F. All control wiring in the mechanical, electrical, telephone and boiler rooms to be installed in raceways. All other wiring to be installed neatly and inconspicuously per local code requirements. If local code allows, control wiring above accessible ceiling spaces may be run with plenum-rated cable (without conduit).

3.05 DDC OBJECT TYPE SUMMARY:
A. Provide all database generation.
B. Displays
   1. System displays shall show all analog and binary object types within the system. They shall be logically laid out for easy use by the owner. Provide outside air temperature indication on all system displays associated with economizer cycles.
C. Run Time Totalization
   1. At a minimum, run time totalization shall be incorporated for each monitored supply fan, return fan, exhaust fan, hot water and chilled water pumps. Warning limits for each point shall be entered for alarm and or maintenance purposes.
D. Trendlog
   1. All binary and analog object types (including zones) shall have the capability to be automatically trended.
E. Alarm
   1. All analog inputs (High/Low Limits) and selected binary input alarm points shall be prioritized and routed (locally or remotely) with alarm message per owner’s requirements.
F. Database Save
   1. Provide backup database for all standalone application controllers on disk.
3.06 FIELD SERVICES:

A. Prepare and start logic control system under provisions of this section.
B. Start up and commission systems. Allow sufficient time for startup and commissioning prior to placing control systems in permanent operation.
C. Provide the capability for off-site monitoring at control contractor's local or main office. At a minimum, off-site facility shall be capable of system diagnostics and software download. Owner shall provide phone line for this service for one year or as specified.
D. Provide owner's representative with spare parts list. Identify equipment critical to maintaining the integrity of the operating system.

3.07 AS-BUILT DOCUMENTATION REQUIRED:

A. Provide all system as build documentation including all redline and field modification completions.

3.08 TRAINING:

A. DDC Control Contractor shall employ a full time Systems Training Instructor and be Factory Certified to Provide Factory Certifications on Alerton and System products. System Training Instructor shall instruct owner in operation of systems and equipment as follows.

B. Provide system operator's training to include (but not be limited to) such items as the following:
   - System 100 Class to include: Recall commonly used terms in DDC systems. Understand HVAC control components and their applications. Identify installed control equipment on site and explain their purpose/role. Explain capabilities and limitations of installed control equipment. Discuss Alerton Ascent Compass system architecture and functionality.
   - System 200 Class to include: Power up the computer, log into Compass Web UI. Understand and access / utilize available features. Maneuver through Web UI display screens and features. Explain User and Group account setup and operation. Describe appropriate security levels and privileges assignment. Create / Modify system alarms, alarm messages and alarm handlers. Use the Alarm Manager feature effectively. Create / Modify data Trendlogs. Use the Data Viewer feature effectively. Understand when to contact ATS service when required.

D. Provide certification documentation for each person that attends the training for every course attended. The instructor must be factory certified to issue class certification.

3.09 DEMONSTRATION:

A. Demonstrate complete operating system to owner's representative.
B. Provide certificate stating that control system has been tested and adjusted for proper operation.

END OF SECTION 23 09 00
SECTION 26 05 00
ELECTRICAL GENERAL PROVISIONS

PART 1 - GENERAL

1.1 CONDITIONS AND REQUIREMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary
   Conditions and Division 1 Specification Sections, apply to this Section.
B. Provisions of this Section shall apply to all Sections of Division 26, 27, and 28.

1.2 SCOPE OF WORK

A. Furnish and install all materials and equipment and provide all labor required and necessary to
   complete the work shown on the drawings and/or specified in all Sections of Division 26 and all
   other work and miscellaneous items, not specifically mentioned, but reasonably inferred for a
   complete installation, including all accessories required for testing the system. It is the intent of
   the drawings and specifications that all systems be complete and ready for operation.

1.3 CODE COMPLIANCE

A. All work and materials shall comply with the latest rules, codes and regulations, including, but not
   limited to, the following:

   1. Occupational Safety and Health Act Standards (OSHA)
   2. NFPA #70 – National Electric Code (NEC)
   3. ADA Standards – Americans with Disabilities Act
   5. NECA – Standard of Installation
   7. International Fire Code
   9. NFPA #72 – Fire Code
   11. All other applicable Federal, State and local laws and regulations.

B. Work to be executed and inspected in accordance with local codes and ordinances. Permits,
   fees or charges for inspection or other services shall be paid for by the contractor. Local codes
   and ordinances are to be considered as minimum requirements and must be properly executed
   without expense to the owner; but do not relieve the contractor from work shown that exceeds
   minimum requirements.
1.4 CONDITIONS AT SITE

A. Visit to site is recommended of all bidders prior to submission of bid. All will be held to have familiarized themselves with all discernible conditions and no extra payment will be allowed for work required because of these conditions, whether specifically mentioned or not.

B. Lines of other service that are damaged as a result of this work shall be promptly repaired at no expense to the owner to the complete satisfaction of the owner.

1.5 DRAWINGS AND SPECIFICATIONS

A. All drawings and all specifications shall be considered as a whole and work of this Division shown anywhere therein shall be furnished under this Division.

B. Drawings are diagrammatic and indicate the general arrangement of equipment and wiring. Most direct routing of conduits and wiring is not assured. Exact requirements shall be governed by architectural, structural and mechanical conditions of the job. Consult all other drawings in preparation of the bid. Extra lengths of wiring or addition of pull or junction boxes, etc., necessitated by such conditions shall be included in the bid. Check all information and report any apparent discrepancies before submitting bid.

C. Change to location, type, function, brand name, finish, etc., shall not be made without permission of engineer.

D. Some equipment is specifically designated on the drawings. It is not the intent to sole source any item unless explicitly stated. Items have been specified based upon design requirements. All bidders are encouraged to submit products for approval. Prior approval must be obtained as required by these contract documents. Bids submitted with non-approved items will be considered invalid and bidders will be held to provide approved materials at no additional cost to the owner. Submittals received by the engineer after award of contract on non-approved equipment will not be reviewed nor will they be returned.

E. Where conflicting direction is given within the specifications and drawings, the contractor shall include the most expensive option in the bid.

1.6 SAFETY AND INDEMNITY

A. Safety: The contractor shall be solely and completely responsible for conditions of the job site, including safety of all persons and property during performance of the work. This requirement will apply continuously and not be limited to normal working hours.

B. No act, service, drawing review or construction review by the owner is intended to include review of the adequacy of the contractor's safety measures in, on, or near the construction site.

1.7 CONSTRUCTION OBSERVATION BY THE ENGINEER

A. Prior to covering: any major portion of the materials installed under this section, notify the engineer so that an observation can be made. Notification shall be made at least three (3) working days in advance of the date the items will be covered.

1.8 INSTRUCTION OF OWNER’S PERSONNEL
A. The contractor shall conduct an on-site instructional tour of the entire project. The personnel designated by the owner shall be instructed in: operation of all electrical systems, troubleshooting procedures, preventative maintenance procedures, uses of Operation and Maintenance manuals, maintenance and cleaning of lighting fixtures and operation of all special systems.

B. Contractor will include in his bid 8 hours of instruction time to be held at the project location after substantial completion for instruction of owner’s personnel. Coordinate time and number of owner personnel to be present and provide schedule to engineer.

1.9 PROJECT COMPLETION

A. Upon completion of all work and operational checks on all systems, the contractor shall request that a final construction observation be performed.

B. The engineer shall compile a punch list of items to be completed or corrected. The contractor shall notify the engineer upon completion of the items.

1.10 GUARANTEE

A. All work under this section shall be guaranteed in writing to be free of defective work, materials, or parts for a period of one (1) year after final acceptance of the work under this contract or the period indicated under the Division 1 specifications whichever is longer.

B. Repair, revision or replacement of any and all defects, failure or inoperativeness shall be done by the contractor at no cost to the owner.

PART 2 - PRODUCTS

2.1 MATERIAL APPROVAL

A. The design, manufacturer and testing of electrical equipment and materials shall conform to or exceed latest applicable NEMA, IEEE or ANSI standards.

B. All materials must be new, unless noted otherwise, and UL listed. Materials that are not covered by UL testing standards shall be tested and approved by an independent testing laboratory or a governmental agency, which laboratory shall be acceptable to the owner and code enforcing agency.

2.2 SHOP DRAWINGS AND MATERIALS LIST

A. Submit an electronic copy, unless noted otherwise under Division 1, of the Division 26, 27 and 28 shop drawings and material lists proposed for this project to the architect/engineer for review.

2.3 OPERATION AND MAINTENANCE MANUALS

A. Submit an electronic copy, unless noted otherwise under Division 1, of the Operation and Maintenance Manuals for all Division 26, 27 and 28 equipment to the architect/engineer.

2.4 RECORD DRAWINGS

A. Submit record drawings to owner.
2.5 PRODUCT DELIVERY, STORAGE AND HANDLING

A. Deliver, store, and handle materials in a manner to prevent damage.
B. Protect equipment from weather and dampness.

PART 3 - EXECUTION

3.1 WORKMANSHIP AND CONTRACTOR’S QUALIFICATIONS

A. Only quality workmanship will be accepted. Haphazard or poor installation practice will be cause for rejection of work.
B. Provide experienced foreman with a minimum of three years experience working on this type of building placed in charge of this work at all times.

3.2 COORDINATION

A. Coordinate work with other trades to avoid conflict and to provide correct rough-in and connection for equipment furnished under trades that require electrical connections. Inform contractors of other trades of the required access to and clearances around electrical equipment to maintain serviceability and code compliance.
B. Verify equipment dimensions and requirements with provisions specified under this Section. Check actual job conditions before fabricating work. Report necessary changes in time to prevent needless work. Changes or additions subject to additional compensation, which are made without the authorization of the owner, shall be at contractor's risk and expense.

3.3 MANUFACTURER’S INSTRUCTIONS

A. All installations are to be made in accordance with manufacturer’s recommendations. A copy of such recommendations shall at all times be kept in the job superintendent's office and shall be available to the engineer.
B. Follow manufacturer’s instructions where they cover points not specifically indicated on drawings and specifications. If they are in conflict with the drawings and specifications obtain clarification from the engineer before starting work.

3.4 QUALITY ASSURANCE

A. The contractor shall insure that all workmanship, all materials employed, all required equipment and the manner and method of installation conforms to accepted construction and engineering practices, and that each piece of equipment is in satisfactory working condition to satisfactorily perform its functional operation.
B. Provide quality assurance tests and operational check on all components of the electrical distribution system, all lighting fixtures, and special systems.

3.5 CUTTING AND PATCHING

A. Perform all cutting and fittings required for work of this section in rough construction of the building.
B. All patching of finished construction of building shall be performed under the sections of specifications covering these materials.

C. No joists, beams, girders or columns shall be cut by any contractor without obtaining written permission from the architect/engineer.

END OF SECTION 260500
SECTION 26 05 19
CONDUCTORS AND CABLES

PART 1 - GENERAL

1.1 SUMMARY
A. This Section includes building wires and cables and associated connectors, splices, and terminations for wiring systems rated 600 V and less.

1.2 SUBMITTALS
A. Submit product data.

1.3 COORDINATION
A. Coordinate layout and installation of cables with other installations.
B. Revise locations and elevations from those indicated, as required to suit field conditions and as approved by the owner.

PART 2 - PRODUCTS

2.1 BUILDING WIRES AND CABLES
A. Conductors: Stranded, copper, 600 volt insulation, type THHN/THWN, THHN/THWN-2, XHHN/XHHW.
B. Conductors:
   1. Solid or stranded for No. 10 and smaller, stranded for No. 8 and larger, copper, 600 volt insulation, type THHN/THWN. Aluminum conductors not allowed unless noted otherwise.
   2. Insulation Types: THWN-2 for underground, THWN for wet locations, THHN for dry locations; XHHN/XHHW for GFI branch circuits and feeders fed from GFCI breakers.
C. Color-code 208/120-V system secondary service, feeder, and branch-circuit conductors throughout the secondary electrical system as follows:
1. Phase A: Black.
2. Phase B: Red.
3. Phase C: Blue.
5. Ground: Green.
6. Isolated ground: Green with yellow tracer.

D. Wire connectors and splices: units of size, ampacity rating, material, type and class suitable for service indicated.
E. Signal and communication circuits:
   1. Special cables as indicated on the drawings.
   2. Conductors for general use: stranded copper conductor, #16 AWG minimum, with THWN-2 insulation for underground, THWN for wet locations and THHN insulation for dry locations.

PART 3 - EXECUTION

3.1 GENERAL WIRING METHODS

A. Examine raceways and building finishes to receive wires and cables for compliance with requirements for installation tolerances and other conditions affecting performance of wires and cables. Do not proceed with installation until unsatisfactory conditions have been corrected.
B. Use no wire smaller than #12 AWG for power and lighting circuits and no smaller than #18 AWG for control wiring.
C. The contractor is responsible for upsizing conductor sizes to ensure the maximum voltage drop of any branch circuit does not exceed 3%. For reference, use No. 10 AWG conductor for 20 Amp, 120 volt branch circuits longer than 75 feet, and for 20 Amp, 277 volt branch circuits longer than 200 feet.
D. Place an equal number of conductors for each phase of a circuit in the same raceway or conduit.
E. Splice only in junction or outlet boxes.
F. Neatly train or lace wiring inside boxes, equipment, and panelboards.
G. Make conductor lengths for parallel circuits equal.
H. Provide a separate neutral conductor for each ungrounded conductor. Ungrounded conductors may share a neutral when all of the following conditions are met:
1. The ungrounded conductors are connected to a multi-pole breaker or breakers that are clipped together with a UL listed means that provide a common trip.
2. The ungrounded conductors contained in the same conduit or raceway.
3. The ungrounded conductors all originate from a separate and unique phase bus in the panel.

3.2 INSTALLATION

A. Install wires and cables as indicated, according to manufacturer's written instructions, and the "National Electrical Installation Standards" by NECA.
B. Pull Conductors: Use manufacturer-approved pulling compound or lubricant where necessary; compound used must not deteriorate conductor or insulation. Do not exceed manufacturer's recommended maximum pulling tensions and sidewall pressure values.
C. Use pulling means; including fish tape, cable, rope, and basket weave wire/cable grips that will not damage cables or raceway.
D. Install exposed cables parallel and perpendicular to surfaces of exposed structural members, and follow surface contours where possible.
E. Support cables above accessible ceilings; do not rest on ceiling tiles. Do not fasten cables to ceiling support wires. Use cable ties to support cables from structure.

3.3 CONNECTIONS

A. Conductor Splices: Keep to minimum.
B. Install splices and tapes that possess equivalent or better mechanical strength and insulation ratings than conductors being spliced.
C. Use splice and tap connectors compatible with conductor material.
D. Wiring at Outlets: Install conductor at each outlet, with at least 12 inches of slack.
E. Connect outlets and components to wiring and to ground as indicated and instructed by manufacturer.
F. Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values.
G. Terminate spare conductors with electrical tape.

3.4 LABELING

A. Provide Brady wire markers or equivalent on all conductors. All wire shall be labeled in each box and panel with the circuit number and panel identification.

3.5 FIELD QUALITY CONTROL
A. Inspect wire and cable for physical damage.
B. Perform continuity testing on all power and equipment branch circuit conductors. Verify proper phasing connections.

END OF SECTION 260519
PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including Fixed Price Construction Contract and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes grounding of electrical systems and equipment. Grounding requirements specified in this Section may be supplemented by special requirements of systems described in other Sections.

1.3 SYSTEM DESCRIPTION

A. Ground the electrical service system neutral at service entrance equipment to concrete encased electrode, metal underground water pipe, and effectively grounded metal frame of building.
B. Ground each separately-derived system neutral to nearest effectively grounded metal structural frame of building or point of service entrance ground.
C. Provide communications system grounding conductor to point of service entrance ground.
D. Bond together system neutrals, service equipment enclosures, exposed non-current carrying metal parts of electrical equipment, metal raceway systems, grounding conductors in raceways and cables, receptacle ground connectors, and plumbing systems.

1.4 QUALITY ASSURANCE

A. Testing: Refer to Section 26 05 01 – Field Test and Operational Check.

PART 2 - PRODUCTS

2.1 GROUNDING CONDUCTORS

A. For insulated conductors, comply with Section 260519 - Conductors and Cables.
B. If only copper conductors are permitted in Division 16 Section "Conductors and Cables," delete paragraph below.
C. Material: Copper.
D. Equipment Grounding Conductors: Insulated with green-colored insulation. Where green insulation is not available, on larger sizes, black insulation shall be used and suitably identified with green tape at each junction box or device enclosure.
E. Isolated Ground Conductors: Insulated with green-colored insulation with yellow tracer. Where not available, green and yellow tape at each junction box or device enclosure.
F. Underground Conductors: Bare, tinned, stranded, unless otherwise indicated.

G. Bare Copper Conductors: Medium hard drawn copper conductor, stranded, sized as shown on the drawings.

H. Hardware: Bolts, nuts and washers shall be bronze; cadmium plated steel or other non-corrosive material, approved for the purpose.

I. Grounding Bus: Bare, annealed copper bars of rectangular cross section, with insulators.

2.2 CONNECTOR PRODUCTS

A. Comply with IEEE 837 and UL 467; listed for use for specific types, sizes, and combinations of conductors and connected items.

B. Bolted Connectors: Bolted-pressure-type connectors, or compression type.

C. Welded Connectors: Exothermic-welded type, in kit form, and selected per manufacturer's written instructions.

D. Below grade compression fittings: Thomas & Betts, Series 52000, 53000, and 54000 or equivalent.

E. Use connector and sealant approved for purpose on all below grade clamp or compression type connections.

2.3 GROUNDING ELECTRODES

A. Ground Rods: Copper-clad steel, 5/8 inch diameter, minimum length 8 feet.

PART 3 - EXECUTION

3.1 APPLICATION

A. Use only copper conductors for both insulated and bare grounding conductors in direct contact with earth, concrete, masonry, crushed stone, and similar materials.

B. In raceways, use insulated equipment grounding conductors.

C. Exothermic-Welded Connections: Use for connections to structural steel and for underground connections.

D. Equipment Grounding Conductor Terminations: Use bolted pressure clamps.

E. Delete paragraph and subparagraphs below if grounding bus is not required, or edit to suit Project.

F. Grounding Bus: Install in electrical and telephone equipment rooms, in rooms housing service equipment, and elsewhere as indicated.
1. Use insulated spacer; space 1 inch from wall and support from wall 6 inches above finished floor, unless otherwise indicated.

G. Underground Grounding Conductors: Use copper conductor, No. 2/0 AWG minimum. Bury at least 24 inches below grade.

3.2 EQUIPMENT GROUNDING CONDUCTORS

A. Comply with NEC Article 250, for types, sizes, and quantities of equipment grounding conductors, unless specific types, larger sizes, or more conductors than required by NEC are indicated.

B. Install equipment grounding conductors in all feeders and circuits.

C. Select paragraph above or paragraph and subparagraphs below.

D. Install insulated equipment grounding conductor with circuit conductors for the following items, in addition to those required by NEC:

1. Feeders and branch circuits.
2. Lighting circuits.
3. Receptacle circuits.
5. Three-phase motor and appliance branch circuits.
6. Flexible raceway runs.

E. Computer Outlet Circuits: Install insulated equipment grounding conductor in branch-circuit runs from computer-area power panels or power-distribution units.

F. Isolated Grounding Receptacle Circuits: Install an insulated equipment grounding conductor connected to the receptacle grounding terminal. Isolate grounding conductor from raceway and from panelboard grounding terminals. Terminate at equipment grounding conductor terminal of the applicable derived system or service, unless otherwise indicated.

G. Nonmetallic Raceways: Install an equipment grounding conductor in nonmetallic raceways bonded to outlet or equipment, sized per Section 250 of the NEC.

H. Coordinate paragraph and subparagraphs below with Drawings and Specification Sections for systems referenced. Edit to suit Project.

I. Signal and Communication Systems: For telephone, alarm, voice and data, and other communication systems, provide No. 4 AWG minimum insulated grounding conductor in raceway from grounding electrode system to each service location, terminal cabinet, wiring closet, and central equipment location.
2. Terminal Cabinets: Terminate grounding conductor on cabinet grounding terminal.

J. Provide green insulated ground conductor to exterior post light standards.
K. Provide grounding and bonding at pad-mounted transformer in accordance with Section 26 12 00.

3.3 INSTALLATION

A. Ground Rods: Where indicated, install at least three rods spaced at least one-rod length from each other and located at least the same distance from other grounding electrodes.

1. Drive ground rods until tops are 2 inches below finished floor or final grade, unless otherwise indicated.
2. Interconnect ground rods with grounding electrode conductors. Use exothermic welds, unless otherwise indicated. Make connections without exposing steel or damaging copper coating.

B. Grounding Conductors: Route along shortest and straightest paths possible, unless otherwise indicated. Avoid obstructing access or placing conductors where they may be subjected to strain, impact, or damage.

C. Bonding Straps and Jumpers: Install so vibration by equipment mounted on vibration isolation hangers and supports is not transmitted to rigidly mounted equipment. Use exothermic-welded connectors for outdoor locations, unless a disconnect-type connection is required; then, use a bolted clamp. Bond straps directly to the basic structure taking care not to penetrate any adjacent parts. Install straps only in locations accessible for maintenance.

D. Metal Water Service Pipe: Provide insulated copper grounding conductors, in conduit, from building's main service equipment, or grounding bus, to main metal water service entrances to building. Connect grounding conductors to main metal water service pipes by grounding clamp connectors. Where a dielectric main water fitting is installed, connect grounding conductor to street side of fitting. Bond metal grounding conductor conduit or sleeve to conductor at each end.

E. Delete below if not applicable. See Evaluations.
F. UFER Ground (Concrete-Encased Grounding Electrode): Fabricate according to NEC 250, using a minimum of 20 feet of bare copper conductor not smaller than No. 4 AWG. Bond grounding conductor to reinforcing steel in at least four locations and to anchor bolts. Extend grounding conductor below grade and connect to building grounding grid or to a grounding electrode external to concrete.

3.4 CONNECTIONS

A. General: Make connections so galvanic action or electrolysis possibility is minimized. Select connectors, connection hardware, conductors, and connection methods so metals in direct contact will be galvanically compatible.
1. Use electroplated or hot-tin-coated materials to ensure high conductivity and to make contact points closer to order of galvanic series.
2. Make connections with clean, bare metal at points of contact.
5. Coat and seal connections having dissimilar metals with inert material to prevent future penetration of moisture to contact surfaces.

B. Exothermic-Welded Connections: Comply with manufacturer's written instructions. Welds that are puffed up or that show convex surfaces indicating improper cleaning are not acceptable.

C. Equipment Grounding Conductor Terminations: For No. 8 AWG and larger, use pressure-type grounding lugs. No. 10 AWG and smaller grounding conductors may be terminated with winged pressure-type connectors.

D. Noncontact Metal Raceway Terminations: If metallic raceways terminate at metal housings without mechanical and electrical connection to housing, terminate each conduit with a grounding bushing. Connect grounding bushings with a bare grounding conductor to grounding bus or terminal in housing. Bond electrically non-continuous conduits at entrances and exits with grounding bushings and bare grounding conductors, unless otherwise indicated.

E. Delete reference to UL 486B in paragraph below if aluminum conductors are not used.

F. Tighten screws and bolts for grounding and bonding connectors and terminals according to manufacturer's published torque-tightening values.

G. Compression-Type Connections: Use hydraulic compression tools to provide correct circumferential pressure for compression connectors. Use tools and dies recommended by connector manufacturer. Provide embossing die code or other standard method to make a visible indication that a connector has been adequately compressed on grounding conductor.

H. Moisture Protection: If insulated grounding conductors are connected to ground rods or grounding buses, insulate entire area of connection and seal against moisture penetration of insulation and cable.

3.5 SYSTEM NEUTRAL GROUND

A. Ground the neutral conductor of each transformer or generator to limit the maximum potential above ground due to normal operating voltage and limit the voltage level due to abnormal conditions.

B. Ground generators or transformers with secondary voltage 600 volt or less as follows:
   1. 3 phase, 4 wire Wye connected: ground neutral point

C. For transformers 75 kVA or smaller with primary voltage 480 volt or less the primary equipment ground conductor may be used for grounding the secondary neutral provided it is adequately sized in accordance with NEC system ground conductor size.
3.6 EQUIPMENT GROUND

A. Ground non-current carrying metal parts of electrical equipment enclosures, frames, conductor raceways or cable trays to provide a low impedance path for line-to-ground fault current and to bond all non-current carrying metal parts together. Install a grounding conductor in each raceway system. Equipment grounding conductor shall be electrically and mechanically continuous from the electrical circuit source to the equipment to be grounded. Size grounding conductors per NEC 250 unless otherwise shown on the drawings.

B. Install metal raceway couplings, fittings, and terminations secure and tight to ensure good grounding continuity. Provide grounding conductor sized per NEC through all raceway and conduit systems.

C. Lighting fixtures shall be securely connected to equipment grounding conductors. Outdoor lighting standards shall have a factory installed ground lug for terminating the grounding conductor.

D. Motors shall be connected to equipment ground conductors with a bolted solderless lug connection on the metal frame.

3.7 FIELD QUALITY CONTROL

A. Inspect grounding and bonding system conductors and connections for tightness and proper installation.

B. Test ground system per Section 26 05 01.

END OF SECTION 260526
SECTION 26 05 29
SUPPORTING DEVICES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 Specification sections, apply to work of this section.

1.2 WORK INCLUDED

A. Conduit and equipment supports.
B. Fastening hardware.

1.3 RELATED WORK

A. Division 3 - Concrete Work. Concrete equipment pads.

1.4 COORDINATION

A. Coordinate size, shape and location of concrete pads with Division 3.

1.5 QUALITY ASSURANCE

A. Support systems shall be adequate for weight of equipment and conduit, including wiring, which they carry.

PART 2 - PRODUCTS

2.1 MATERIAL

A. Support Channel: Galvanized or painted steel.
B. Hardware: Corrosion resistant.

PART 3 - EXECUTION

3.1 INSTALLATION
A. Fasten hanger rods, conduit clamps, and outlet and junction boxes to building structure using expansion anchors or beam clamps. Do not use spring steel clips and clamps.

B. Use toggle bolts or hollow wall fasteners in hollow masonry, plaster, or gypsum board partitions and walls; expansion anchors or preset inserts in solid masonry walls; self-drilling anchors or expansion anchor on concrete surfaces; sheet metal screws in sheet metal studs; and wood screws in wood construction.

C. Do not fasten supports to piping, ductwork, mechanical equipment, or conduit.

D. Do not use powder-actuated anchors.

E. Do not drill structural steel members.

F. Fabricate supports from structural steel or steel channel, rigidly welded or bolted to present a neat appearance. Use hexagon head bolts with spring lock washers under all nuts.

G. In wet locations install free-standing electrical equipment on concrete pads.

H. Install surface-mounted cabinets and panelboards with minimum of four anchors.

I. Bridge studs top and bottom with channels to support flush-mounted cabinets and panelboards in stud walls.

J. All supports and attachments shall meet project seismic zone requirements.

END OF SECTION 260529
SECTION 26 05 33
RACEWAYS AND BOXES

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 raceways, fittings, boxes, enclosures, and cabinets for electrical wiring.

1.3 DEFINITIONS
   A. EMT: Electrical metallic tubing.
   B. FMC: Flexible metal conduit.
   C. IMC: Intermediate metal conduit.
   D. LFMC: Liquidtight flexible metal conduit.
   E. RMC: Rigid metal conduit.
   F. RNC: Rigid Polyvinyl Chloride conduit.
   G. PVC: Rigid Polyvinyl Chloride conduit
   H. HDPE: High Density Polyethylene Conduit

1.4 SUBMITTALS
   A. Product Data: For surface raceways, wireways and fittings, floor boxes, hinged-cover enclosures,
      and cabinets.

1.5 COORDINATION
   A. Coordinate layout and installation of raceways and boxes with other construction elements to
      ensure adequate headroom, working clearance, and access.

PART 2 - PRODUCTS

2.1 METAL CONDUIT AND TUBING
   A. Rigid Steel Conduit: ANSI C80.1.
   B. IMC: ANSI C80.6.
   C. PVC coated Steel Conduit and Fittings: NEMA RN 1; rigid steel conduit with external 40 mil PVC
coating and internal two mil urethane coating.
D. EMT and Fittings: ANSI C80.3. Fittings: Set-screw type.
E. FMC: Zinc-coated steel.
F. LFMC: Flexible steel conduit with PVC jacket. Fittings: NEMA FB 1; compatible with conduit/tubing materials.

2.2 NONMETALLIC CONDUIT AND TUBING
A. RNC: NEMA TC 2, Schedule 40 PVC. Fittings: NEMA TC 3; match to conduit and material.

2.3 METAL WIREWAYS
A. Material: Sheet metal sized and shaped as indicated.
B. Fittings and Accessories: Include covers, couplings, offsets, elbows, expansion joints, adapters, hold-down straps, end caps, and other fittings to match and mate with wireways as required for complete system.
C. Finish: Manufacturer's standard enamel finish.

2.4 OUTLET AND DEVICE BOXES
A. Sheet Metal Boxes: NEMA OS 1, galvanized steel.
B. Cast-Metal Boxes: NEMA FB 1, Type FD, cast box with gasketed cover.

2.5 FLOOR BOXES
A. Floor Boxes: Cast metal, fully adjustable, rectangular, unless otherwise specified.

2.6 PULL AND JUNCTION BOXES
A. Small Sheet Metal Boxes: NEMA OS 1, galvanized steel.
B. Cast-Metal Boxes: NEMA FB 1, cast aluminum with gasketed cover.

2.7 ENCLOSURES AND CABINETS
A. Hinged-Cover Enclosures: NEMA 250, Type 1, 3R, or 4, with continuous hinge cover and flush latch, key operable.
   1. Metal Enclosures: Steel, finished inside and out with manufacturer's standard enamel.
B. Cabinets: NEMA 250, Type 1, galvanized steel box with removable interior panel and removable front, finished inside and out with manufacturer's standard enamel. Hinged door in front cover with flush latch and concealed hinge. Key latch to match panelboards. Include metal barriers to separate wiring of different systems and voltage, and include accessory feet where required for freestanding equipment.
2.8 J-HOOKS

A. J-hooks: Steel, rated for indoor use in non-corrosive environments. J-hooks shall be rated to support Category 5e cable.
B. Fittings and Support Bodies: Manufacturer’s recommended fittings including side mount flange clips, bottom mount flange clips, beam clamp, rod and flange clip, C & Z purlin clip, and all other components and assemblies to make the system work.
C. Acceptable Product: Caddy CableCat Hanging System, 1-5/16” and 2” hooks, or approved equal
D. Acceptable Manufacturer: Erico Fastening Products or approved equal.
E. J-hook Supports: Manufacturer’s recommended fastening devices.

2.9 INNERDUCT

A. Innerduct: NEMA TC 5. UL Listed, corrugated, specifically designed for optical fiber cable pathways.
B. Acceptable Manufactures: Arnco, Carlon, Dura-line, and Pyramid.
C. Composition:
   1. Non-plenum rated: Polyethylene (PE), or High Density Polyethylene (HDPE).
   2. Plenum rated: per manufacturer.
D. Nominal Size: 1” (inside diameter), minimum.
E. Pulling Strength: minimum of 600 pounds.
F. Color: Orange, solid.
G. Fittings and Innerduct Bodies: Manufacturer’s recommended fittings including couplings, adapters, end caps, end bells, expansion couplings, plugs, sleeves, a full compliment of connective devices, and all other components to make the system work.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine surfaces to receive raceways, boxes, enclosures, and cabinets for compliance with installation tolerances and other conditions affecting performance of raceway installation. Do not proceed with installation until unsatisfactory conditions have been corrected.

3.2 WIRING METHODS

A. Outdoors: Use the following wiring methods:
1. Exposed: Rigid steel or IMC.
2. Concealed: Rigid steel or IMC.
3. Underground, Single Run: RNC or PVC Externally Coated Rigid Steel Conduit where required by NEC 517.13.
4. Underground, Grouped: RNC or PVC Externally Coated Rigid Steel Conduit where required by NEC 517.13.
5. Connection to Vibrating Equipment (Including Transformers and Hydraulic, Pneumatic, Electric Solenoid, or Motor-Driven Equipment): LFMC.
6. Boxes and Enclosures: NEMA 250, Type 3R or Type 4.

B. Indoors: Use the following wiring methods:

1. Exposed: EMT or “Wiremold” metallic raceways or equal.
2. Exposed in public areas: “Wiremold” metallic raceways or equal. Use of exposed raceways in public areas must be approved by the architect prior to installation for each location. Use of exposed EMT in areas visible to the public is not allowed unless specifically approved by the architect prior to installation. Replacement of unapproved installations of exposed raceways will be at the expense of the contractor if deemed necessary by the architect or engineer.
3. Concealed: EMT or MC-Cable. Note: MC-Cable is not approved for “homeruns”
4. Concealed in Patient Care Areas: EMT or Hospital Grade MC-Cable where allowed by code. Note: Hospital Grade MC-Cable is not approved for “homeruns”
5. Connection to Vibrating Equipment (Including Transformers and Hydraulic, Pneumatic, Electric Solenoid, or Motor-Driven Equipment): FMC; except in wet or damp locations, use LFMC.
6. Damp or Wet Locations: Rigid steel conduit.
7. Boxes and Enclosures: NEMA 250, Type 1, except as follows:
   a. Damp or Wet Locations: NEMA 250, Type 4, stainless steel.

3.3 INSTALLATION

A. Install raceways, boxes, enclosures, and cabinets as indicated, according to manufacturer's written instructions.
B. Minimum Raceway Size: 1/2-inch trade size. 3/4-inch minimum for “homeruns”.
C. Conceal conduit and EMT, unless otherwise indicated, within finished walls, ceilings, and floors.
D. Keep raceways at least 6 inches away from parallel runs of flues and steam or hot-water pipes. Install horizontal raceway runs above water and steam piping.
E. Install raceways level and square and at proper elevations. Provide adequate headroom.
F. Complete raceway installation before starting conductor installation.
G. Route exposed conduit and conduit above accessible ceilings parallel and perpendicular to walls and adjacent piping.
H. Use temporary closures to prevent foreign matter from entering raceways.
I. Protect stub-ups from damage where conduits rise through floor slabs. Arrange so curved portion of bends is not visible above the finished slab.
J. Make bends and offsets so ID is not reduced. Keep legs of bends in the same plane and straight legs of offsets parallel, unless otherwise indicated.
K. Use raceway fittings compatible with raceways and suitable for use and location. For intermediate steel conduit, use threaded rigid steel conduit fittings, unless otherwise indicated.
L. Run concealed raceways, with a minimum of bends, in the shortest practical distance considering the type of building construction and obstructions, unless otherwise indicated.
M. Raceways Embedded in Slabs: Install in middle third of slab thickness where practical, and leave at least 1-inch concrete cover.
   1. Secure raceways to reinforcing rods to prevent sagging or shifting during concrete placement.
   2. Space raceways laterally to prevent voids in concrete.
   3. Run conduit larger than 1-inch trade size parallel to or at right angles to main reinforcement. Where at right angles to reinforcement, place conduit close to slab support.
   4. Transition from nonmetallic tubing to rigid steel conduit or IMC before rising above floor.
N. Install exposed raceways parallel to or at right angles to nearby surfaces or structural members, and follow the surface contours as much as practical.
   1. Run parallel or banked raceways together, on common supports where practical.
   2. Make bends in parallel or banked runs from same centerline to make bends parallel. Use factory elbows only where elbows can be installed parallel; otherwise, provide field bends for parallel raceways.
O. Join raceways with fittings designed and approved for the purpose and make joints tight.
   1. Make raceway terminations tight. Use bonding bushings or wedges at connections subject to vibration. Use bonding jumpers where joints cannot be made tight.
   2. Use insulating bushings to protect conductors.
P. Tighten set screws of threadless fittings with suitable tools.
Q. Terminations: Where raceways are terminated with locknuts and bushings, align raceways to enter squarely and install locknuts with dished part against the box. Where terminations are not secure with 1 locknut, use 2 locknuts: 1 inside and 1 outside the box.
R. Where raceways are terminated with threaded hubs, screw raceways or fittings tightly into the hub so the end bears against the wire protection shoulder. Where chase nipples are used, align raceways so the coupling is square to the box and tighten the chase nipple so no threads are exposed.

S. Install pull wires in empty raceways. Utilize polyester line with not less than 200-lb tensile strength. Leave at least 12 inches of slack at each end of the pull wire.

T. Telephone and Signal System Raceways: In addition to the above requirements, install raceways in maximum lengths of 150 feet and with a maximum of two 90-degree bends or equivalent. Separate lengths with pull or junction boxes where necessary to comply with these requirements.

U. Install raceway sealing fittings according to manufacturer's written instructions. Locate fittings at suitable, approved, and accessible locations and fill them with UL-listed sealing compound. For concealed raceways, install each fitting in a flush steel box with a blank cover plate having a finish similar to that of adjacent plates or surfaces. Install raceway sealing fittings at the following points:

1. Where conduits pass from warm to cold locations, such as the boundaries of refrigerated spaces.
2. Where conduit pass from the interior to the exterior of a building.
3. Where otherwise required by NEC.

V. Apply firestopping to cable and raceway penetrations of fire-rated floor, ceiling, and wall assemblies to achieve fire-resistance rating of the assembly. Boxes installed in fire-rated floor, ceiling, and wall assemblies shall result in no larger than a 16 square-inch penetration in the fire-rated wall surface and the quantity of penetrations shall not be greater than 100 square-inches for every 100 square feet of fire-rated wall area. Where boxes are located on both sides of a fire-rated wall, the boxes shall have a minimum of a 24" horizontal spacing, where a 24" horizontal spacing cannot be achieved, furnish and install listed fire-rated putty on the boxes as required by the IBC.

W. Route conduit through roof openings for piping and ductwork where possible; otherwise, install roof penetrations in accordance with roofing system requirements. Coordinate with roofing installer.

X. Stub-up Connections: Extend conduits through concrete floor for connection to freestanding equipment. Install with an adjustable top or coupling threaded inside for plugs set flush with the finished floor. Extend conductors to equipment with rigid steel conduit; FMC may be used 6 inches above the floor. Install screwdriver-operated, threaded flush plugs flush with floor for future equipment connections.

Y. Flexible Connections: Use maximum of 6 feet of flexible conduit for recessed and semi-recessed lighting fixtures; for equipment subject to vibration, noise transmission, or movement; and for all motors. Use liquidtight flexible conduit in wet or damp locations. Install separate ground conductor across flexible connections.

Z. PVC Externally Coated, Rigid Steel Conduits: Use only fittings approved for use with that material. Patch all nicks and scrapes in PVC coating after installing conduits.

AA. Surface Raceways: Install a separate, green, ground conductor in raceways from junction box supplying the raceways to receptacle or fixture ground terminals.
BB. Conduits shall not be routed on or above the roof without prior approval from the Engineer. Instead, the branch circuits shall be routed at the structure level below the roof to feed roof-top equipment. When approval is granted to route conduits on or above the roof, the conduits shall be strapped to COOPER industries DB series support blocks at intervals not exceeding NEC requirements. The conduits shall not be rested directly on the roof. It shall be permissible to penetrate the roof adjacent mechanical or electrical equipment to power that respective equipment.

3.4 SUPPORT INSTALLATION

A. Install support devices to securely and permanently fasten and support electrical components.
B. Install individual and multiple raceway hangers and riser clamps to support raceways. Provide U-bolts, clamps, attachments, and other hardware necessary for hanger assemblies and for securing hanger rods and conduits.
C. Support parallel runs of horizontal raceways together on trapeze- or bracket-type hangers, at least every 8 feet.
D. Size supports for multiple raceway installations so capacity can be increased by a 25 percent minimum in the future.
E. Support individual horizontal raceways with separate, malleable-iron pipe hangers or clamps.
F. Install 1/4-inch diameter or larger threaded steel hanger rods, unless otherwise indicated.
G. Spring-steel fasteners specifically designed for supporting single conduits or tubing may be used instead of malleable-iron hangers for 1-1/2-inch and smaller raceways serving lighting and receptacle branch circuits above suspended ceilings and for fastening raceways to slotted channel and angle supports.
H. Arrange supports in vertical runs so the weight of raceways and enclosed conductors is carried entirely by raceway supports, with no weight load on raceway terminals.
I. Simultaneously install vertical conductor supports with conductors.
J. Separately support cast boxes that are threaded to raceways and used for fixture support. Support sheet-metal boxes directly from the building structure or by bar hangers. If bar hangers are used, attach bar to raceways on opposite sides of the box and support the raceway with an approved fastener not more than 24 inches from the box.
K. Install metal channel racks for mounting cabinets, panelboards; disconnect switches, control enclosures, pull and junction boxes, transformers, and other devices unless components are mounted directly to structural elements of adequate strength.
L. Install sleeves for cable and raceway penetrations of concrete slabs and walls unless core-drilled holes are used. Install sleeves for cable and raceway penetrations of masonry and fire-rated gypsum walls and of all other fire-rated floor and wall assemblies. Install sleeves during erection of concrete and masonry walls.
M. Securely fasten electrical items and their supports to the building structure, unless otherwise indicated. Do not fasten supports to piping, ductwork, mechanical equipment, or conduit. Perform fastening according to the following unless other fastening methods are indicated:
1. Masonry: Toggle bolts on hollow masonry units and expansion bolts on solid masonry units.
2. New Concrete: Concrete inserts with machine screws and bolts.
3. Existing Concrete: Expansion bolts.
4. Steel: Spring-tension clamps on steel.
5. Light Steel: Sheet-metal screws.
6. Fasteners: Select so the load applied to each fastener does not exceed 25 percent of its proof-test load.

N. Do not drill structural steel members.
O. All supports and attachments shall meet project seismic zone requirements.

3.5 BOX INSTALLATION

A. Do not install boxes back-to-back in walls.
B. Locate boxes in masonry walls to require cutting of masonry unit edge only. Coordinate masonry cutting to achieve neat openings for boxes.
C. Provide knockout closures for unused openings.
D. Support boxes independently of conduit except for cast boxes that are connected to two rigid metal conduits, both supported within 12 inches of box.
E. Use 4" boxes with multiple-gang mudring where more than one device are mounted together; do not use sectional boxes. Provide barriers to separate wiring of different voltage systems.
F. Install boxes in walls without damaging wall insulation.
G. Coordinate mounting heights and locations of outlets mounted above counters, benches, and backsplashes.
H. Position outlets to locate lighting fixtures as shown on reflected ceiling plans.
I. In inaccessible ceiling areas, position outlets and junction boxes within 6 inches of recessed luminaire, to be accessible through luminaire ceiling opening.
J. Provide recessed outlet boxes in finished areas; secure boxes to interior wall and partition studs, accurately positioning to allow for surface finish thickness. Use stamped steel stud bridges for flush outlets in hollow stud walls, and adjustable steel channel fasteners for flush ceiling outlet boxes.
K. Align wall-mounted outlet boxes for switches, thermostats, and similar devices.
L. For boxes installed in metal construction, use rigid support metal bar hangers or metal bar fastened to two studs or with metal screws to metal studs.
M. Set floor boxes level and adjust to finished floor surface.
N. Set floor boxes level and trim after installation to fit flush to finished floor surface.
O. Install hinged-cover enclosures and cabinets plumb. Support at each corner.
P. Locate pull and junction boxes above accessible ceilings or in unfinished areas. Support pull and junction boxes independent of conduit.
Q. Minimum box size to be 4” square by 2 1/8” deep.

3.6 LABELING

A. Label coverplate of all pull and junction boxes by system served. Indicate panel circuits for power and lighting boxes.

3.7 CLEANING

A. On completion of installation, including outlet fittings and devices, inspect exposed finish. Remove burrs, dirt, and construction debris and repair damaged finish, including chips, scratches, and abrasions.

END OF SECTION 260533
SECTION 26 05 36
CABLE TRAYS

PART 1 - 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 cable trays and accessories.

1.3 SUBMITTALS
   A. Submit shop drawings, product data, manufacturer’s installation instructions and maintenance
      manuals.

1.4 COORDINATION
   A. Coordinate layout and installation of cable tray with other installations.
      1. Revise locations and elevations from those indicated as required to suit field conditions
         and as approved by owner.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

2.2 CABLE TRAYS
   A. Above accessible ceilings: 4-inch-deep, width as indicated on the drawings, basket type.
   B. Above data racks: Aluminum, 4-inch-deep, width as indicated on the drawings, ladder type, six
      inch rung spacing.
   C. Fabricate cable tray products with rounded edges and smooth surfaces.

2.3 CABLE TRAY ACCESSORIES
   A. Fittings:  Tees, crosses, risers, elbows, and other fittings as required, of same materials and
      finishes as cable tray, to form a continuous cable tray system.
   B. Barrier Strips:  Where indicated on the drawings; same materials and finishes as cable tray.
   C. Cable tray supports and connectors as recommended by cable tray manufacturer.
PART 3 - EXECUTION

3.1 INSTALLATION

A. Install cable tray in accordance with manufacturer's written instructions.
B. Remove burrs and sharp edges from cable trays.
C. Fasten cable tray supports securely to building structure as specified.
D. Install expansion connectors where cable tray crosses a building expansion joint and in cable tray runs that exceed 90 feet.
E. Make changes in direction and elevation using standard fittings.
F. Make cable tray connections using standard fittings.
G. Workspace: Install cable trays with sufficient space to permit access for installing cables.

3.2 CLEANING

A. On completion of cable tray installation, including fittings, inspect exposed finish. Remove burrs, dirt, and construction debris and repair damaged finishes, including chips, scratches, and abrasions.

END OF SECTION 260536
SECTION 26 05 43
UNDERSLAB AND UNDERGROUND ELECTRICAL WORK

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 under slab conduits and related electrical work.

PART 2 - PRODUCTS

2.1 CONDUIT

A. All shall be provided with fittings and accessories approved for this purpose. Refer to Section 26 05 33.

2.2 PRECAST CONCRETE MANHOLE

A. Structural reinforced, size as indicated, with inserts for cable racks and pulley eyes.

2.3 BARE COPPER GROUND CONDUCTOR

A. Medium hard drawn copper conductor, # 4/0 AWG stranded (unless otherwise noted).

PART 3 - EXECUTION

3.1 GENERAL

A. Electrical system layouts indicated on the drawings are generally diagrammatic, but shall be followed as closely as actual construction and work of other trades will permit.

3.2 CONDUIT INSTALLATION

A. Plastic conduit shall be installed on 2 inch sand base and covered by 2 inch sand back fill. Multiple runs shall maintain 3 inch minimum separation between runs. Plastic conduit shall not be installed in rock base.

B. Underground conduit entering building shall be provided with one 10 foot section of rigid steel conduit at point of penetration of foundation, footing or basement wall, with approximately equal lengths inside and outside building line. Ream the smaller inside diameter conduit smooth to prevent conductor damage.

C. Stagger conduit couplings by a minimum of 12 inches. All risers to grade shall be rigid steel.

D. All rigid steel conduits shall be encased in 3 inch minimum concrete envelope.
E. After completion of concrete encased duct bank, a 12 inch mandrel, ¼ inch less in diameter than a conduit, shall be pulled through each conduit.
F. Install 1/8 inch diameter pull line in each underground conduit.
G. Burial depths of conduits shall comply with the NEC (minimum).
H. Provide underground type plastic line markers: permanent, brightly colored, continuously printed plastic tape, intended for direct burial service, not less than 6 inches wide, reading “Caution Buried Electrical Line.” Install continuous line markers located directly over buried line at 6 inches above top of conduit, during back filling operation.

3.3 CONCRETE DUCT BANK CONSTRUCTION

A. Provide plastic spacers at maximum 5'-0" centers to maintain 3 inch spacing between conduits.
B. Drive two reinforcing bars to anchor the conduits at 10'-0" on centers to prevent floating during concrete pour.
C. Provide one warning tape (see 3.2.H. above) for each 12 inch width of concrete duct bank.

END OF SECTION 260543
SECTION 26 08 00
LIGHTING SYSTEM COMMISSIONING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS:
   A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Specification Sections, apply to this Section.

1.2 SUMMARY:
   A. This Section includes requirements for commissioning the lighting system and its controls.
   B. The registered design professional is responsible to provide evidence of lighting systems commissioning and completion in accordance to the provisions of this section.

1.3 DEFINITIONS:
   A. Architect: Includes Architect identified in the Contract for Construction between Owner and Contractor, plus consultant/design professionals responsible for design of HVAC, electrical, communications, controls for HVAC systems, and other related systems.
   B. RDP: Registered Design Professional
   C. Systems, Subsystems, and Equipment: Where these terms are used together or separately, they shall mean "as-built" systems, subsystems, and equipment.

1.4 COMMISSIONING DOCUMENTATION:
   A. Commissioning Plan: A commissioning plan will be developed by a registered design professional or approved agency and shall include the following items:
      1. A narrative description of the activities that will be accomplished during each phase of commissioning, including the personnel intended to accomplish each of the activities.
      2. A listing of the specific equipment, appliances or systems to be tested and a description of the tests to be performed.
      3. Functions to be tested.
      4. Conditions under which the test will be performed.
      5. Measurable criteria for performance
   B. Test Checklists: RDP, with assistance of Architect/Engineer, shall develop test checklists for each system, subsystem, or equipment including interfaces and interlocks, and include a separate entry, with space for comments, for each item to be tested. Prepare separate checklists for each mode of operation and provide space to indicate whether the mode under test responded as required. Provide space for testing personnel to sign off on each checklist.
      1. Name and identification of tested item.
2. Test number.
3. Time and date of test.
4. Indication of whether the record is for a first test or retest following correction of a problem or issue.
5. Date of the test and name of parties involved as applicable.
6. Individuals present for test.
8. Note if re-test is necessary.

C. Test and Inspection Reports: RDP shall record test data, observations, and measurements on test checklists. Photographs, forms, and other means appropriate for the application shall be included with data. RDP shall compile test and inspection reports and tests and inspection certificates and include them in systems manual and commissioning report.

D. Corrective Action Documents: RDP shall document corrective action taken for systems and equipment that fail tests. Include required modifications to systems and equipment and revisions to test procedures, if any. Retest systems and equipment requiring corrective action and document retest results.

E. Issues Log: RDP shall prepare and maintain an issues log that describes design, installation, and performance issues that are at variance with the Contract Documents. Identify and track issues as they are encountered, documenting the status of unresolved and resolved issues.

1. Creating an Issues Log Entry:
   a. Identify the issue with unique numeric or alphanumeric identifier by which the issue may be tracked.
   b. Assign a descriptive title of the issue.
   c. Identify date and time of the issue.
   d. Identify test number of test being performed at the time of the observation, if applicable, for cross-reference.
   e. Identify system, subsystem, and equipment to which the issue applies.
   f. Identify location of system, subsystem, and equipment.
   g. Include information that may be helpful in diagnosing or evaluating the issue.
   h. Note recommended corrective action.
   i. Identify commissioning team member responsible for corrective action.
   j. Identify expected date of correction.
   k. Identify person documenting the issue.

2. Documenting Issue Resolution:
   a. Log date correction is completed or the issue is resolved.
   b. Describe corrective action or resolution taken. Include description of diagnostic steps taken to determine root cause of the issue, if any.
   c. Identify changes to the Contract Documents that may require action.
   d. State that correction was completed and system, subsystem, and equipment is ready for retest, if applicable.
   e. Identify person(s) who corrected or resolved the issue.
f. Identify person(s) documenting the issue resolution.

3. Issues Log Report: On a periodic basis, but not less than for each commissioning team meeting, RDP shall prepare a written narrative for review of outstanding issues and a status update of the issues log. As a minimum, RDP shall include the following information in the issues log and expand it in the narrative:

a. Issue number and title.
b. Date of the identification of the issue.
c. Name of the commissioning team member assigned responsibility for resolution.
d. Expected date of correction.

F. Commissioning Report: RDP shall document results of the commissioning process including unresolved issues and performance of systems, subsystems, and equipment. The commissioning report shall indicate whether systems, subsystems, and equipment have been completed and are performing according to the Contract Documents. The commissioning report shall include, but is not limited to, the following:

1. Lists and explanations of substitutions; compromises; variances in the Contract Documents; record of conditions; and, if appropriate, recommendations for resolution. This report shall be used to evaluate systems, subsystems, and equipment and shall serve as a future reference document during Owner occupancy and operation. It shall describe components and performance that exceed requirements of the Contract Documents. It may also include a recommendation for accepting or rejecting systems, subsystems, and equipment.
2. Commissioning plan.
3. Testing plans and reports.
4. Corrective modification documentation.
5. Issues log.
6. Completed test checklists.

G. Systems Manual: RDP shall gather required information and compile systems manual. Systems manual shall include, but is not limited to, the following:

1. Submittal Data stating equipment installed and selected options for each piece of equipment requiring maintenance.
2. Operation and maintenance data on each piece of equipment requiring maintenance. Required routine maintenance actions shall be clearly identified.
3. Name and address of at least one service agency.
4. Lighting controls system maintenance and calibration information.
5. A narrative of how each system is intended to operate, including recommended setpoints.

PART 2 - PRODUCTS – NOT USED
PART 3 - EXECUTION

3.1 TESTING:

A. Testing shall ensure that the control hardware and software are calibrated, adjusted, programmed and in proper working condition in accordance with the construction documents and manufacturers installation instructions.

B. Testing shall ensure that the lighting controls meet all provisions of the applicable energy code.

C. Perform tests using design conditions whenever possible. Where occupant sensors, time switches, programmable schedule control, photosensor’s or daylighting controls are installed, the following procedures shall be performed:

1. Confirm that the placement, sensitivity and time-out adjustments for occupant sensors yield acceptable performance.
2. Confirm that the time switches and programmable schedule controls are programmed to turn the lights off.
3. Confirm that the placement and sensitivity adjustments for photosensor controls reduce electric light based on the amount of usable daylight in the space as specified.

END OF SECTION 260800
SECTION 26 09 23
LIGHTING CONTROL DEVICES

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 time switches, photoelectric relays, occupancy sensors, and multi-pole
   lighting relays and contactors.
B. Related Sections include the following:

1.3 SUBMITTALS

A. Submit shop drawings and product data, including all wiring diagrams.

PART 2 - PRODUCTS

2.1 GENERAL LIGHTING CONTROL DEVICE REQUIREMENTS

A. Line-Voltage Surge Protection: Include in all 120- and 277-V solid-state equipment. Comply with
   UL 1449.

2.2 TIME SWITCHES

A. Description: Electromechanical-dial type complying with UL 917.

   1. Astronomic dial.
   2. Two contacts, rated 30 A at 277-V ac, unless otherwise indicated.
   3. Eight-day program uniquely programmable for each weekday and holidays.
   4. Skip-day mode.

2.3 LIGHTING CONTROL SYSTEM

A. Description of Work: Extent of lighting control system work is indicated by drawings, and by the
   requirements of this section. It is defined to include low voltage lighting control panels, switch
   inputs, and wiring.
1. Type of lighting control equipment and wiring specified in this section include the following: Low Voltage Lighting Control Panels.

### B. SYSTEM DESCRIPTION

1. The lighting control system shall consist of low voltage relay control panels with 32 programmable switch inputs and shall offer 32 control relays.
2. Each low voltage lighting control panel shall be microprocessor controlled with an integral 4 x 16 - 64 character display and with a programming keypad.
3. Programmable intelligence shall include Time-Of-Day control, 32 holiday dates, warn occupants of an impending off, timed inputs, preset control, auto daylight savings, astronomical clock w/offsets, and local control.

<table>
<thead>
<tr>
<th>Feature</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>TOD</td>
<td>64 Time-Of-Day/holiday schedules for 365 day programming</td>
</tr>
<tr>
<td>Holidays</td>
<td>32 holiday dates</td>
</tr>
<tr>
<td>Warn Off</td>
<td>Flash lights and provide an extra 1 second to 99 minutes of illumination</td>
</tr>
<tr>
<td>Preset</td>
<td>Pre-programmed switch patterns</td>
</tr>
<tr>
<td>Timed Inputs</td>
<td>Switch input timers 1-999 minutes</td>
</tr>
<tr>
<td>Timed Overrides</td>
<td>Timed override 1-999 minutes, resumes to normal schedule</td>
</tr>
<tr>
<td>Local Control</td>
<td>From alpha-numeric keypad &amp; local switch</td>
</tr>
<tr>
<td>Astronomical</td>
<td>Longitude and latitude input with sunset-sunrise offsets to customize outdoor lighting Clock</td>
</tr>
<tr>
<td>Auto Daylight</td>
<td>Automatically adjusts the clock at the appropriate dates, selectable Savings Adjust.</td>
</tr>
<tr>
<td>Priorities</td>
<td>Establishes a hierarchy for inputs and network control commands</td>
</tr>
<tr>
<td>Masking</td>
<td>Provides permission orientation to switch inputs and network commands thereby ensuring building lighting control integrity.</td>
</tr>
<tr>
<td>Soft-Linking</td>
<td>Group linking for rapid programming</td>
</tr>
</tbody>
</table>

4. Relays may be designated as either normally open or normally closed from software. Relay status shall not only disclose commanded relay status but next scheduled state to occur.

5. Each control panel shall provide a Warn Off (flash the lights) to inform the occupants of an impending Off command. The Warn Off command shall provide an adjustable time duration of 1 second to 99 extra minutes. The occupants may exit the premises with adequate lighting or cancel the Warn Off by overriding the lighting zone. This option occurs with all Off commands except local overrides.

6. The controller shall permit lighting to be overridden on for after hours use or cleaning. The controller shall provide optional switch timer assignments or timed overrides. The override choices for various relays shall provide special event occurrences and the controller shall return to the programmed state. Also, the controller shall provide priority and masking choices to customize the functions of switch inputs, thereby enabling
switches to function differently at different times of the day to meet special facility operational requirements. These overrides shall be hard-wired inputs.

7. Programming the controller shall be through the local integral keypad. Descriptive information shall assist the user to employ the system without a programming manual.

8. Priorities and/or Masking shall be assigned to inputs, telephone override, and global commands to insure building integrity. Priorities enable or disable the inputs based on Time-Of-Day scheduling in the controller. Masks shall permit: On only, Off only and On & Off control for intelligent after hours utilization of the controlled facility

9. The lighting control system may be fully programmed through PC programming software. Programming shall be permitted through a direct RS-232 or RS-485 connection, and modem.

C. HARDWARE FEATURES

1. Operator Interface: The control panel programming interface resides in firmware in the control panel. The programming interface shall consist of a circuit board mounted keypad capable of linking switch inputs to relay outputs and schedule assignments. Systems that utilize blocking diode technology for relay assignments shall not be acceptable.

   a. The integral keypad shall provide access to the main programming features. The keypad shall permit the user to manually command any or all relays individually. Each panel shall control its own loads from internal memory. A control system that relies on a central control computer/processor or external time clocks shall not be permitted.

2. Contact inputs: The control system shall permit 32 dry contacts (Digital/Switch Inputs) for override purposes. Momentary 3 wire or 2 wire (toggle) inputs shall be supported. Maintained contacts shall be supported as 2 wire (SPST) inputs. Inputs shall be dry contacts (24 VDC @ 12 ma. internally supplied to the inputs). An input shall be software linked to any number of relays for override control.

   a. The controller shall provide timers for each switch input. Each switch input timer shall be capable of 0-999 minutes. Software shall enable or disable switch inputs based on Time Of Day scheduling.

3. Relay Type: The system shall utilize control relays which are rated to 20 amps at 277 VAC. The relays shall be magnetically held and are provided in groups of eight. Relays that are latched or mechanically held are not acceptable. The relays shall be rated for 10 million mechanical operations. A limited 10 year warranty shall be provided on the individual relays.

4. Photocell Control: The controller shall accept user adjustable ambient light sensors. The controller shall provide power for the sensor thereby eliminating any external power supply. Sensors shall provide for both outdoor and indoor applications and provide a dry contact to the controller once the threshold is reached. The sensor shall provide user adjustable dead band control.

5. Modular Design: The control system shall employ all modular connectors to avoid repeat wiring in case of component failure. The system CPU board shall be mounted on quick
release hinge pins that shall permit an entire change out of the processor and input board in less than 1 minute.

a. All connections for the switch inputs shall incorporate modular connectors. The relay board shall be modular and designed for rapid field replacement or upgrading. Systems that do not employ modular connectors shall not be acceptable.

6. Hardware Output Options

a. Latching Relay Card (LRC): The controller shall provide an option for remote placement of the control relays. A modular card shall connect into the relay compartment. Twisted (3) conductor cable shall power and control the remote mounted relays. Maximum distance is 500 feet employing 18 AWG conductor.

b. Modular Relay Card (MRC): The controller shall provide an option for modular relay control. The Modular Relay Card (MRC) shall offer the feature of controlling two pole voltages such as 208, 240, and 480VAC in a Normally Open or Normally Closed configuration. Single pole is offered for 120 and 277VAC in a Normally Open and Absolute Zero Configuration. This relay card shall also provide visual indication of relay status. Relays shall be individually exchangeable with plug in low voltage connectors. Combinations of relays shall be permitted since relay modules shall snap into and lock in location. Two pole modules require two relay locations for a maximum of four two pole relays per card. All other relay modules use 1 relay location for a maximum of eight per card. All Modular Relay Card components shall be warranted for 10 years.

c. Two Pole Relay Card (TPRC): The controller shall provide an option for two pole relay control. The Two Pole Relay Card TPRC shall offer the feature of controlling two pole voltages such as 208, 240, and 480 VAC lighting loads at 20 amps. The relays shall be modular in design and offer manual hand override control. This optional relay card shall also provide a visual indication of relay status. The 208, 240 VAC version shall provide 8 relays per card whereas the 480 VAC version shall provide 4 relays per card. Combinations of relays shall be permitted since relays shall snap into location.

d. Automatic Relay Card (ARC): The system shall utilize hybrid control relays that are rated to 20 amps at 277 VAC. The hybrid relay shall combine a high speed electronic switch with a mechanical relay to create a unique switching device. The hybrid design shall look at each AC phase and shall close the electronic switch precisely at the absolute zero crossing. The mechanical relay in parallel shall follow and close after the in-rush current condition. The relay shall provide an integral switch for both manual hand operation and visual indication of relay status. The relays shall be rated for 10 million mechanical operations. A limited 2 year warranty shall be provided on the individual relays.

e. Lighted Switch Card (LSC): The controller shall provide an option for pilot light wall switch annunciation. A modular card shall connect into the controller board and shall provide power to illuminate pilot light switches. This option shall confirm relay operation. When a relay is in the "ON" position the pilot light switch shall be illuminated.

7. Diagnostic Aids: Each control panel shall incorporate diagnostic aids for confirmation of proper operation, or in case of failure these aids shall guide the individual in rapid troubleshooting of the system.

a. The control panels shall employ both a backlit supertwist LCD and LED’s that indicates:
   - POWER (LED)
   - SYSTEM OK (LED)
- NETWORK COMMUNICATIONS (LED)
- ON/OFF STATUS of EACH RELAY (LED & LCD)
- SYSTEM CLOCK and DATE (LCD)
- PROGRAMMING CONFIRMATION (LCD)
  (TOD, HOLIDAY, ON/OFF, & PRESET)

b. Control systems that do not provide visual self help diagnostics shall not be acceptable.

8. Memory Back-up: The system shall utilize a memory back-up device that is system integrated and shall be non-serviceable. The data in RAM shall be protected against power interruptions lasting as long as 7 days. The power interrupt protection circuit shall be entirely maintenance-free.

9. Multi-tapped Transformer: The control panel shall incorporate the use of a multi-tapped transformer. The panel shall not require specification of voltage for each control location. The voltages of 120 & 277 VAC shall be available with each control panel.

10. Status Indication of Relays: The system shall provide visible status indication of all relays through the window of each control panel. The visual indication shall disclose On/Off status and relay number.

11. Service Override & Priority Override: The control panel shall provide a three position master-service override for the control unit. The service override shall not be accessible from the exterior.

a. The master service override provides a single three position switch with the option of All Off, Auto, and All On, respectively. This master switch shall operate all of the relays in the controller. This switch shall override and supersede all commands from the logic board when the switch is in the All On or All Off position. The master switch shall function to override all the relays should the logic board programming differ from the space function.

b. The system shall remember the last command to the individual relays. Upon returning the master override switch to the Auto position, the relays shall return to the most recent command state. This will occur even if the last command happened during the master override condition.

c. Additionally, the system shall provide external priority override for the entire panel. Through an externally maintained contact the override card shall place the panel in a priority state. This external contact will supersede any other programmed state and will command all the relays ON or OFF depending on operational choice. This priority state will continue until the external contact is removed. Once the external override is removed the control panel will return the relays to the appropriate programmed state.

12. Lockable Enclosure: Each control panel shall be enclosed in a lockable NEMA class 1 enclosure. The enclosure shall be manufactured out of 1/16" steel and shall provide pre-punched knockouts for efficient installation.

13. Panels: The low voltage controller shall exist in two sizes of relay enclosures. The enclosure maximum sizes shall be 32 relays per cabinet. The 16 size will employ two relays cards and the 32 will utilize 4 relay cards. Relays shall be provided in groups of eight relays per card.

14. High Voltage Barriers: The low voltage controller shall provide as an option the ability to provide a barrier for either voltage separation or emergency circuit separation. The 16-size enclosure shall permit one barrier and the 32-size enclosure shall permit up to three
locations where the barrier(s) may be installed. The barrier shall be painted red to denote the difference.

15. Modem: The control system shall be capable of modem communications. Each control panel shall provide a serial communications port for external tele-communications. The modem shall utilize the Hayes compatibility standard and enable modem access as defined by the Bell 212A and CCITT V.22 protocol standards.

16. Telephone Overrides (TIM): The control system shall provide intelligent software for the Telephone Interface Module (TIM) option. The optional TIM unit shall allow modem communications and touch tone overrides from any touch tone phone. The control system shall be multi-tasking and permit up to one TIM for each control panel.
   
   a. Override Operation: Touch-tone interface shall permit the control panel to command pre-assigned control points On\Off. All user interfaces shall be through the twelve Touch-tone keys on the telephone. All entries into the override system shall be prompted by a digitized voice. Systems not employing voice guided override instruction are not acceptable.
   
   b. The TIM shall provide individual control passwords. Each password shall allow a preset group designation (number of relays) and the duration of the telephone override. TIM shall also provide a password to prevent entry into the override control system.

17. Software: System provided shall include the manufactures PC based interface software package. The PC based interface software shall provide access to lighting control system files within a Microsoft Windows environment. The software package shall allow individual panel programming to be executed locally, direct connection, Ethernet connection or remotely through a modem. The central programming software shall permit the user to modify the control panel programming or configuration in an "OFF-LINE" mode. This software package shall store all programmed data and archive for future use. Systems using third party software are not acceptable.

The following features shall be standard in the PC based software:
   
   a. Standard Software Features:
      1) Real Time Relay Status Monitoring
      2) Alpha-Numeric Descriptors
      3) Communications: Direct, Network, Ethernet and Modem
      4) Network Status Indication
      5) Global Software Modifications
      6) Manual Relay Commands
      7) Remote Pattern Commands
      8) Preset Options
   
   b. File Maintenance
      1) Archive Programs
      2) Data Base Restoration
      3) Uploading and Downloading of Programs
   
   c. Software package shall permit the PC to be utilized for other functions (i.e. word processing, data-base, & etc.) besides lighting control. Systems that require an "on-line" dedicated computer for control system operation shall not be acceptable.

18. PC Interface (RS-232 port): The controller shall permit PC programming through software. The controller shall provide a RJ-12 connection for RS-232 programming.
Programming shall be permitted through either a local connection or remotely through a modem. PC software shall permit multiple file storage for data archival and for seasonal facility requirements. Operator commands may be issued directly from the PC keyboard.

D. MANUFACTURERS

1. Cooper Controls, Greengate
2. Lutron
3. Lighting Control & Design
4. nLight

E. PRODUCT SUPPORT AND SERVICE

1. Factory Support: Factory telephone support shall be available at no cost to the owner. Factory assistance shall consist of solving programming or application questions concerning the control equipment.

F. WARRANTY

1. Manufacturer shall supply a 2 year warranty on all hardware and software. A limited 10 year warranty shall be provided on the standard relay card.

2.4 PHOTOELECTRIC RELAYS

A. Description: Solid state, with single-pole, double-throw dry contacts rated to operate connected relay or contactor coils or microprocessor input, and complying with UL 773A.
B. Light-Level Monitoring Range: 0 to 3500 fc, with an adjustment for turn-on/turn-off levels.
C. Time Delay: Prevents false operation.
D. Outdoor Sealed Units: Weather tight housing, resistant to high temperatures and equipped with sun-glare shield and ice preventer.

2.5 OCCUPANCY SENSORS

A. Occupancy sensors indicated on the plans are to establish room controls and sensor quantities. The contractor is to verify sensor placement with the local manufacturer’s representative or the manufacture to ensure proper coverage and functionally of the specific sensor(s) installed. The contractor is to return and make any adjustments necessary to the occupancy sensor settings and/or placement needed to maintain proper functionality within 30 days after the owner/tenant takes occupancy of the project.
B. Lighting control system shall include all occupancy sensors, power packs, and control wiring required to form a complete system.
C. All occupancy sensors shall be dual/multi technology, manufactured by Unenco, Wattstopper, Lightolier Controls, Sensor Switch, or pre-approved equal unless otherwise noted.
D. Ceiling and Wall Mount Units: Shall utilize dual/multi technology detection methods. Unit receives
control power from a separately mounted auxiliary power and control unit, and operates power switching contacts in that unit.

E. Switch-Box-Mounting Units: Shall utilize dual/multi technology detection methods. Unit receives power directly from switch leg of the 120- or 277-V ac circuit it controls and operates integral power switching contacts. Unit is to have integral manual controls and is to be mounted at standard switch height.

F. Operation: Turns lights on when room or covered area is occupied and off when unoccupied, unless otherwise indicated.

1. Time Delay for Turning Lights Off: Adjustable over a range from 1 to 30 minutes, minimum. Time delay to be set at 20 minutes unless otherwise directed. Contractor shall verify time delay with the owner/tenant prior to final occupancy.
2. Manual Override Switch: Where indicated on drawings; turns lights off manually regardless of elapsed time delay.
3. Sensor shall be located and/or adjusted to detect occupancy within 1-foot of entry into room or area controlled by the occupancy sensor.

G. Auxiliary Power and Control Units: As follows:

1. Relays rated for a minimum of 20-A normal ballast load.
2. Sensor Power Supply: Rated to supply the number of connected sensors.
3. Relays shall have an auxiliary contact(s) for integration with HVAC or other building control systems.

H. Passive-Infrared Type: Detects occupancy by a combination of heat and movement in zone of coverage.

I. Ultrasonic Type: Emits a beam of ultrasonic energy and detects occupancy through use of Doppler's principle in discerning movement in zone of coverage by sensing a change in pattern of reflected ultrasonic energy. Ultrasonic frequency shall be 25 Khz or greater and sensor shall be temperature and humidity resistant.

J. Dual-Technology Type: Uses a combination of passive-infrared and ultrasonic or microphonic detection methods to distinguish between occupied and unoccupied conditions for area covered. Particular technology or combination of technologies that controls each function (ON or OFF) is selectable in the field by operating controls on unit.

K. All sensors shall be capable of operating normally with electronic ballast and compact fluorescent systems.

L. 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.

M. All sensors shall have readily accessible, user adjustable controls for time delay and sensitivity. Controls shall be recessed to limit tampering.

N. In the event of failure, a bypass manual “override on” feature shall be provided on each sensor.
When bypass is utilized, lighting shall remain on constantly. The override feature shall be designed for use by building maintenance personnel and shall not be readily accessible by building occupants.

O. All sensors shall provide an LED indication light to verify that motion is being detected and that the unit is working.

P. All sensors shall have no leakage current in OFF mode and shall have voltage drop protection.

2.6 MULTIPOLe CONTACTORS AND RELAYs

A. Description: Electrically operated and mechanically held, and complying with UL 508 and NEMA ICS 2.

1. Current Rating for Switching: UL listing or rating consistent with type of load served.

2. Control Coil Voltage: Match control power source.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install equipment level and plumb and according to manufacturer's written instructions.

3.2 CONTROL WIRING INSTALLATION

A. Install wiring between sensing and control devices according to manufacturer's written instructions.

B. Wiring Method: Install all wiring in raceways.

C. Bundle, train, and support wiring in enclosures.

D. Ground equipment.

E. Connections: Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values.

3.3 IDENTIFICATION

A. Provide Brady wire markers or equivalent on all conductors.

3.4 FIELD QUALITY CONTROL

A. Inspect control components for defects and physical damage.

B. Verify settings of photoelectric devices with photometer.

C. Electrical Tests: Use particular caution when testing devices containing solid-state components. Perform the following according to manufacturer's written instructions:
1. Continuity tests of circuits.
2. Operational Tests: Set and operate devices to demonstrate their functions and capabilities in a methodical sequence that cues and reproduces actual operating functions.

D. Correct deficiencies, make necessary adjustments, and retest. Verify that specified requirements are met.
E. The Lighting Control Panel shall be tested and listed under the UL 906 Energy Management Equipment Standards.

3.5 CLEANING

A. Cleaning: Clean equipment and devices internally and externally using methods and materials recommended by manufacturers, and repair damaged finishes.

END OF SECTION 260923
SECTION 26 24 13
MAIN SWITCHBOARDS

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 main switchboards.
B. Related sections:
   1. Section 26 05 01 - Field Test and Operational Check.
   2. Section 26 05 26 - Grounding.

1.3 REFERENCES

A. FS W-C-375 - Circuit Breakers, Molded Case, Branch Circuit and Service.
B. NEMA AB 1 - Molded Case Circuit Breakers.
C. NEMA PB 2 - Dead Front Distribution Switchboards.
D. NEMA PB 2.1 - Instructions for Safe Handling, Installation, Operation and Maintenance of
   Deadfront Switchboards Rated 600 Volts or Less.

1.4 SUBMITTALS

A. Product Data: For each type of switchboard, overcurrent protective device, ground-fault
   protector, accessory, and component indicated. Include dimensions and manufacturer’s technical
data on features, performance, electrical characteristics, ratings, and finishes.
B. Include front and side views of enclosures with overall dimensions shown; conduit entrance
   locations and requirements; nameplate legends; size and number of bus bars per phase, neutral,
   and ground; switchboard instrument details; instructions for handling and installation of
   switchboard; and electrical characteristics including voltage, frame size and trip ratings, withstand
   ratings, one line and wiring diagrams, and time-current curves of all equipment and components.
C. Field test reports – See Section 26 05 01.

1.5 OPERATION AND MAINTENANCE DATA

A. Submit operation and maintenance data. Include the following:
1. Routine maintenance requirements for switchboards and all installed components.
2. Manufacturer's written instructions for testing and adjusting overcurrent protective devices.
3. Time-current curves, including selectable ranges for each type of overcurrent protective device.

1.6 DELIVERY, STORAGE, AND HANDLING:

A. Store in a clean, dry space. Maintain factory wrapping or provide an additional heavy canvas or heavy plastic cover to protect units from dirt, water, construction debris, and traffic.
B. Handle in accordance with NEMA PB2.1 and manufacturer's written instructions. Lift only with lugs provided for the purpose. Handle carefully to avoid damage to switchboard internal components, enclosure, and finish.

1.7 COORDINATION

A. Coordinate layout and installation of switchboards and components with other construction, including conduit, piping, equipment, and adjacent surfaces. Maintain required workspace clearances and required clearances for equipment access doors and panels.
B. Coordinate size and location of concrete bases. Cast anchor-bolt inserts into bases.

1.8 SPARE PARTS

A. Keys: Furnish 3 each to owner.
B. Fuses: Furnish to owner 3 spare fuses of each type and rating installed.
C. Fuse Pullers: Furnish one fuse puller to owner.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. General Electric, Cutler-Hammer, Siemens, Square D Co.; Schneider Electric Brands, or approved equal.

2.2 SWITCHBOARD CONSTRUCTION AND RATINGS:

A. Factory-assembled, dead front, metal-enclosed, and self-supporting switchboard assembly conforming to NEMA PB 2, and complete from incoming line terminals to load-side terminations. Provide lugs appropriate for conductors used.
B. Switchboard electrical ratings and configurations as shown on Drawings.
C. Equipment shall be fully rated to interrupt symmetrical short-circuit current available at terminals or the rating indicated on the plans, whichever is higher. Series rating is not acceptable unless specifically indicated on the plans.
D. Line and Load Terminations: Accessible from the front of the switchboard, suitable for the conductor materials used.
E. Bus Material: Copper sized in accordance with NEMA PB 2.
F. Bus Arrangement: Use A-B-C sequence in left-to-right, top-to-bottom, and front-to-rear arrangement throughout.
G. Bus Connections: Bolted, accessible from front or rear for maintenance.
H. Enclosure shall be NEMA PB 2 Type 1 - General Purpose. Sections shall align at front and rear. Provide NEMA 3R Enclosure when indicated on plans.
I. Switchboard Height (NEMA 1) : 90 inches, excluding floor sills, lifting members and pull boxes.
J. Finish: Manufacturer’s standard light gray enamel over external surfaces. Coat internal surfaces with minimum one coat corrosion resisting paint, or plate with cadmium or zinc.

2.3 SWITCHING AND OVERCURRENT PROTECTIVE DEVICES-

A. Main Circuit Breaker Assemblies:

1. Main Circuit breakers (unless otherwise indicated on plans) shall be insulated case type as indicated on plans with temperature insensitive, solid state trips, current sensors and solid state logic circuit integral with the frame. All circuit breakers shall be of same design for over-current and ground fault trip coordination.

2. All Main Circuit Breakers rated for 1200 Amp or higher shall have the following features:

   a. UL listed for 80 percent load application unless otherwise indicated on plans as 100% rated.
   c. Adjustable [S] Short time-delay and pick-up.
   d. Adjustable [I] Instantaneous trip.
   e. Adjustable [R] Reduced Energy Let-Through (RELT) Instantaneous trip. This feature shall be provided on breakers to provide a temporary setting for the instantaneous trip setting of the breaker. Setting shall be adjustable down to 1.5X of the rating plug and shall be enabled through a switch mounted on front of the switchboard. The switch shall be combined with an indicating light that positively indicates that the RELT is enabled or disabled.
   f. For 277/480Y systems rated 1000 Amp or higher - Adjustable [G] Ground fault pick-up and delay is required.
g. Where Indicated special zone control interlocking for main breaker and future main and tie breaker of double-ended substation switchboard.

h. Short circuit, overload and ground fault trip indicators.

i. Trip device of circuit breakers shall be of the same type for tripping coordination and shall allow for the UL listed field installation of internal accessories (Auxiliary Switch, Shunt Trip, Undervoltage release, Bell Alarm Switch) without removal of cover to install. Breaker shall include Accessories as indicated on plans.

j. Circuit breaker handle accessories shall provide provisions for locking handle in the 'ON' or 'OFF' position.

B. ALL Feeder Breaker Assemblies 1200 Amp and above:

1. Feeder Circuit breakers 1200 Amp may be Molded Case or Individually Mounted, 1600 Amp and above shall be Insulated Case with temperature insensitive, solid state trips, current sensors and solid state logic circuit integral with the frame. All circuit breakers shall be of same design for over-current and ground fault trip coordination. The Circuit breakers shall have the following features:

a. UL listed for 80 percent load application unless otherwise indicated on plans as 100% rated.


c. Adjustable [S] Short time-delay and pick-up.

d. Adjustable [I] Instantaneous trip.

e. Adjustable [G] Ground fault pick-up and delay where indicated or required be NEC.

f. Adjustable [R] Reduced Entergy Let-Through (RELT) Instantaneous trip. This feature shall be provided on breakers to provide a temporary setting for the instantaneous trip setting of the breaker. Setting shall be adjustable down to 1.5X of the rating plug and shall be enabled through a switch mounted on front of the switchboard. The switch shall be combined with an indicating light that positively indicates that the RELT is enabled or disabled.

g. Where Indicated special zone control interlocking for main breaker and future main and tie breaker of double-ended substation switchboard.

h. Short circuit, overload and ground fault trip indicators. Feeder Circuit Breaker Assemblies below 1200 Amp:

1. Feeder Circuit breakers below 1200 Amp shall be digital solid state true RMS sensing Molded Case Circuit Breakers with temperature insensitive, solid state trips, current sensors and solid state logic circuit integral with the frame. All circuit breakers shall be of
same design for over-current and ground fault trip coordination. The Circuit Breakers shall have the following minimum features:

a. UL listed for 80 percent load application unless otherwise indicated on plans.
b. Long time pickup (ampere setting) determined by interchangeable rating plug.
c. Adjustable instantaneous with short time tracking function.
d. Circuit Breaker shall allow the UL listed field installation internal accessories (Auxiliary Switch, Shunt Trip, Undervoltage release, Bell Alarm Switch) without removal of cover to install. Circuit Breaker shall include Accessories as indicated on plans.
e. Circuit breaker handle accessories shall provide provisions for locking handle in the 'ON' or 'OFF' position.

2. Where specifically indicated or required by NEC

a. Adjustable \([L]\) Long time time-delay and ampere setting.
b. Adjustable \([S]\) Short time-delay and pick-up.
c. Adjustable \([I]\) Instantaneous trip.
d. Adjustable \([G]\) Ground fault pick-up and delay where indicated or required be NEC.
e. Where Indicated special zone control interlocking for main breaker and future main and tie breaker of double-ended substation switchboard.
f. Short circuit, overload and ground fault trip indicators.
h. Trip device of circuit breakers shall be of same type for tripping coordination.

Feeder Circuit Breaker Assemblies 150 Amp and below:

1. Feeder Circuit breakers 150 Amp and below shall be thermal Magnetic Circuit breaker: Inverse time current element for low level overloads, and instantaneous magnetic trip element for short circuits, unless otherwise indicated or required to meet Section 2.4 C above. Minimum features below:

a. UL listed for 80 percent load application unless otherwise indicated on plans.
b. Circuit Breaker shall allow the UL listed field installation internal accessories (Auxiliary Switch, Shunt Trip, Undervoltage release, Bell Alarm Switch) without removal of cover to install. Circuit Breaker shall include Accessories as indicated on plans.
c. Circuit breaker handle accessories shall provide provisions for locking handle in the 'ON' or 'OFF' position.

2. Where specifically indicated or required by NEC

a. Adjustable \([L]\) Long time time-delay and ampere setting with Long time pickup (ampere setting) determined by interchangeable rating plug.
b. Adjustable [S] Short time-delay and pick-up.
c. Adjustable [I] Instantaneous trip.
d. Adjustable [G] Ground fault pick-up and delay where indicated or required be NEC.
e. Where Indicated special zone control interlocking for main breaker and future main and tie breaker of double-ended substation switchboard.
f. Short circuit, overload and ground fault trip indicators.
h. Trip device of circuit breakers shall be of same type for tripping coordination.

E. Fused Switch Assemblies:

1. FS W-S-865; quick-make, quick-break, load interrupter enclosed knife switch with externally operable handle. Provide interlock to prevent opening front cover with switch in ON position. Handle lockable in OFF position. Fuse Clips: FS W-F-870. Designed to reject all except Class R fuses, type as specified.

2. Switch handles shall be provided with provisions for locking handle in the ‘ON’ or ‘OFF’ position.

3. Fusible Switch Assemblies, Larger than 800 Amperes: Bolted pressure contact switches. Fuse Clips: FS W-F-870. Designed to accommodate Class L fuses.

4. Fuse Manufacturers: Bussmann, Shawmut, Brush, or approved equal.

5. Fuse Sizes: as indicated on the drawings. Provide an appropriate sized spare fuse cabinet (with nameplate and directory) with one spare set of fuses (minimum of three) for each current rating and type used on the entire project. All fuses shall be of the same manufacturer.

2.4 INSTRUMENTATION (when indicated on plans)

A. Three five ampere current transformers per breaker, including main terminated in a shorting block.

B. Three 120V potential transformers for main incoming voltage.

C. Meter. Provide a UL listed and digital multifunction power monitor. The monitor case shall be fully enclosed and shielded. The monitor shall accept a voltage monitoring range of up to 600 volts, phase to phase. The Monitor shall provide true RMS measurements of voltage, phase to neutral and phase to phase; current, per phase and neutral; real power, reactive power, apparent power, power factor and frequency. The Monitor shall monitor max/min average demand values for all current and power readings. The demand interval shall be user programmable. The Monitor shall have an accuracy of +/- 0.1% or better for volts and amps, and 0.2% for power functions, and shall meet IEC6187 (0.2%). The monitor shall include a three line, integrated, light-emitting diode (LED) display. The display shall provide user access to all phase voltages (phase to neutral and phase to phase), currents (phase and neutral), watts, VARs, VA, power factor, frequency and kwh. The monitor shall be microprocessor based and shall be fully user programmable. The monitor shall be provided with an RS485 digital communications port. The Monitor shall
communicate using a MODBUS RTU protocol and shall have a communication baud rate of at
least 57k. The monitor shall be provided with one KYZ pulse outputs

2.5 OPTIONAL FEATURES

A. When indicated on drawings, provide single phasing protection with UL listed phase monitor,
relays, shunt trip coils and all necessary accessories and wiring to trip designated circuit breakers
(with motor loads) when voltage of any phase drops below 88 percent of rated voltage. Taylor
“Phase Guard” Model PND with a two second delay.

2.6 LUGS AND HARDWARE

A. Cable connectors shall be mechanical type lugs, suitable for copper or aluminum cables. All
hardware used on conductors shall have high tensile strength and a suitable protective finish. All
connections shall be made with Belville washers.

2.7 PROVISIONS FOR HANDLING

A. Provide adequate lifting means.
B. Switchboard shall be capable of being rolled or moved into installation position and bolted directly
to the floor without use of floor sills.

2.8 WIRING

A. Provide all necessary control and instrumentation wiring.
B. Provide fuses, fuse blocks, control transformers, terminal blocks with suitable numbering strips,
relays, auxiliary contact switches on circuit breakers as required.
C. Locate terminal blocks for remote load monitoring transducers in CT compartment for future
extension by Owner.
D. All low voltage and control wiring shall be physically isolated from live busses so that safe access
can be obtained without de-energizing the switchboard.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install switchboard in locations shown on Drawings, in accordance with manufacturer’s written
instructions and NEMA PB 2.1.
B. Tighten accessible bus connections and mechanical fasteners after placing switchboard.
C. Provide 2” high concrete leveling pad under switchboard. Dimension 6” larger than footprint of
equipment. Anchor to pad with ¼” anchor bolts.

3.2 FIELD QUALITY CONTROL

A. Testing: Refer to Section 26 05 01 – Field Test and Operational Check.
3.3 IDENTIFICATION

A. Provide engraved lamacoid nameplate for the switchboard and each component.
B. Provide warning signs.

3.4 ADJUSTING AND CLEANING

A. Set field-adjustable switches and circuit breaker trip ranges.
B. Adjust all operating mechanisms for free mechanical movement.
C. On completion of installation, inspect interior and exterior of switchboards. Remove paint splatters and other spots. Vacuum dirt and debris; do not use compressed air to assist in cleaning. Repair exposed surfaces to match original finish.

END OF SECTION 262413
PART 1 - GENERAL

1.1 DESCRIPTION

A. Includes But Not Limited To -

1. Furnish and install panelboards as described in Contract Documents.

PART 2 - PRODUCTS

2.1 MATERIAL

A. Main panelboard -

1. Switch and fuse type.
2. Minimum interrupting capacity of 100,000 amperes or as shown otherwise.
4. Ground bus bonded to cabinet.
5. Hinged door cover.

B. Sub-Panelboard -

1. Circuit breakers of type and size shown on Drawings. Multi-pole breakers shall be common trip.
2. Minimum interrupting capacity of 10,000 amperes or as shown otherwise.
3. Bussing arranged as required.
5. Ground bus bonded to cabinet.
6. Copper bussing.
7. Quality Standard - Square D "NQOD".
8. Hinged door cover.

C. Panelboard Cabinets -
1. Mono-flat (no screws) for flush or surface mounting as indicated with locking doors with card index holders and three keys.
2. Key locks alike.

D. Approved Manufacturers -

1. Cutler Hammer
2. General Electric
3. Square D
4. ITE Imperial

PART 3 - EXECUTION

3.1 INSTALLATION

A. Identify panelboards with black laminated plastic name plates with white 1/8 inch engraved letters. Attach with screws.
B. Provide typewritten circuit schedules in panelboard to identify panelboard and each branch breaker.
C. All panelboards shall have hinged door covers.
D. At completion of project contractor shall clean all panels which includes vacuuming inside of panel and wiping down all panels.

END OF SECTION 262416
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 ac general-purpose starters rated 600 V and less.

1.3 SUBMITTALS

A. Product Data: For each type of enclosed starter. Include dimensions and manufacturer's technical data on features, performance, electrical characteristics, ratings, and finishes.
B. Shop Drawings: For each enclosed starter.
   1. Dimensioned plans, elevations, sections, and details, including required clearances and service space around equipment. Show tabulations of installed devices, equipment features, and ratings. Include the following:
      a. Enclosure types and details.
      b. Nameplate legends.
      c. Short-circuit current rating of integrated unit.
      d. UL listing for series rating of overcurrent protective devices in combination starters.
      e. Features, characteristics, ratings, and factory settings of individual overcurrent protective devices in combination starters.
C. Coordination Drawings: Floor plans showing dimensioned layout, required working clearances, and required area above and around enclosed starters where pipe and ducts are prohibited. Show enclosed starter layout and relationships between electrical components and adjacent structural and mechanical elements. Show support locations, type of support, and weight on each support. Indicate field measurements.
D. Maintenance Data: For enclosed starters and components, include the following:
   1. Routine maintenance requirements for enclosed starters and all installed components.
   2. Manufacturer's written instructions for testing and adjusting overcurrent protective devices.
E. Load-Current and Overload-Relay Heater List: Compile after motors have been installed and
arrange to demonstrate that selection of heaters suits actual motor nameplate full-load currents.

1.4 QUALITY ASSURANCE

A. Manufacturer Qualifications: Maintain, within 100 miles of project site, a service center capable of providing training, parts, and emergency maintenance and repairs.
B. Source Limitations: Obtain enclosed starters of a single type through one source from a single manufacturer.
C. Electrical Components, Devices, and Accessories: Listed and labeled as defined in the NEC, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
D. Comply with the NEC.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Store enclosed starters indoors in clean, dry space with uniform temperature to prevent condensation. Protect enclosed starters from exposure to dirt, fumes, water, corrosive substances, and physical damage.

1.6 COORDINATION

A. Coordinate layout and installation of enclosed starters with other construction including conduit, piping, equipment, and adjacent surfaces. Maintain required workspace clearances and required clearances for equipment access doors and panels.
B. Coordinate features of enclosed starters and accessory devices with pilot devices and control circuits to which they connect.
C. Coordinate features, accessories, and functions of each enclosed starter with ratings and characteristics of supply circuit, motor, required control sequence, and duty cycle of motor and load.

1.7 EXTRA MATERIALS

A. Furnish extra materials described below that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
   1. Spare Fuses: Furnish one set of three of each type and rating.
   2. Indicating Lights: Two of each type installed.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers:
   1. Manual and Magnetic Enclosed Starters:
2.2 MANUAL ENCLOSED STARTERS

A. Description: NEMA ICS 2, general purpose, Class A, with toggle action and overload element.

2.3 MAGNETIC ENCLOSED STARTERS

A. Description: NEMA ICS 2, Class A, full voltage, non-reversing, across the line, unless otherwise indicated.
B. Control Circuit: 120 V; obtained from integral control power transformer of sufficient capacity to operate connected pilot, indicating and control devices, plus 100 percent spare capacity.
C. Combination Starter: Factory-assembled combination starter and disconnect switch.
   1. Fusible Disconnecting Means: NEMA KS 1, heavy-duty, fusible switch with rejection-type fuse clips rated for fuses. Select and size fuses to provide Type 2 protection according to IEC 947-4-1, as certified by a nationally recognized testing laboratory.
D. Overload Relay: Ambient-compensated type with inverse-time-current characteristic and NEMA ICS 2 tripping characteristic. Provide with heaters or sensors in each phase matched to nameplate full-load current of specific motor to which they connect and with appropriate adjustment for duty cycle.

2.4 ENCLOSURES

A. Description: Flush- or surface-mounted cabinets as indicated. NEMA 250, Type 1, unless otherwise indicated to comply with environmental conditions at installed location.
   1. Outdoor Locations: NEMA 250, Type 3R.
   3. Other Wet or Damp Indoor Locations: NEMA 250, Type 4.
   4. Hazardous Areas Indicated on Drawings: NEMA 250, Type 7C.
   5. A minimum wiring space of 2” clear on both sides and 4” clear top and bottom. Open and accessible through the door.
2.5 ACCESSORIES

A. Devices shall be factory installed in starter enclosure, unless otherwise indicated.
C. Stop and Lockout Push-Button Station: Momentary-break, push-button station with a factory-applied hasp arranged so padlock can be used to lock push button in depressed position with control circuit open.
D. Control Relays: Auxiliary and adjustable time-delay relays.
E. All starters shall include a terminal strip for all control connections and be accessible through front door.
F. All starters to be furnished with 4 sets of normally open / normally closed auxiliary contacts.

2.6 FACTORY FINISHES

A. Finish: Manufacturer's standard paint applied to factory-assembled and -tested enclosed starters before shipping.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas to receive enclosed starters for compliance with requirements, installation tolerances, and other conditions affecting performance.
B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 APPLICATIONS

A. Select features of each enclosed starter to coordinate with ratings and characteristics of supply circuit and motor; required control sequence; duty cycle of motor, drive, and load; and configuration of pilot device and control circuit affecting starter functions.
B. Select horsepower rating of starters to suit motor controlled.

3.3 INSTALLATION

A. For control equipment at walls, bolt units to wall or mount on lightweight structural-steel channels bolted to wall. For starters not at walls, provide freestanding uni-strut racks.
B. Enclosed Starter Fuses: Install fuses in each fusible switch.

3.4 IDENTIFICATION

A. Provide engraved lamacoid nameplate for each starter indicating equipment served.

3.5 CONTROL WIRING INSTALLATION
A. Install wiring between enclosed starters according to Section 26 05 19 - Conductors and Cables.
B. Bundle, train, and support wiring in enclosures.
C. Connect hand-off-automatic switch and other automatic-control devices where applicable.
   1. Connect selector switches to bypass only manual- and automatic-control devices that have no safety functions when switch is in hand position.
   2. Connect selector switches with enclosed starter circuit in both hand and automatic positions for safety-type control devices such as low- and high-pressure cutouts, high-temperature cutouts, and motor overload protectors.

3.6 CONNECTIONS
A. Conduit installation requirements are specified in other Sections 26 05 33 – Raceways and Boxes. Drawings indicate general arrangement of conduit, fittings, and specialties.
B. Ground equipment.
C. Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values.

3.7 FIELD QUALITY CONTROL
A. Verify that enclosed starters are installed and connected according to the contract documents.
B. Verify that electrical wiring installation complies with manufacturer's submittal and installation requirements.
C. Complete installation and startup checks according to manufacturer's written instructions.

3.8 ADJUSTING
A. Set field-adjustable switches and circuit-breaker trip ranges.

3.9 CLEANING
A. Clean enclosed starters internally, on completion of installation, according to manufacturer's written instructions. Vacuum dirt and debris; do not use compressed air to assist in cleaning.

END OF SECTION 262418
SECTION 26 2 726
WIRING DEVICES

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 receptacles, switches, and finish plates.

1.3 DEFINITIONS
   A. GFCI: Ground-fault circuit interrupter.
   B. TVSS: Transient voltage surge suppressor.

1.4 SUBMITTALS
   A. Submit shop drawings and product data.

1.5 COORDINATION
   A. Receptacles for Owner-Furnished Equipment: Match plug configurations.

PART 2 - PRODUCTS

2.1 MANUFACTURERS
   A. Manufacturers:
   B. Wiring Devices:
      1. Bryant; Hubbell, Inc.
      2. GE Company; GE Wiring Devices.
      3. Hubbell Wiring Device – Kellems
      4. Leviton Manufacturing Co., Inc.
      5. Pass & Seymour/Legrand; Wiring Devices Div.
      6. Cooper Wiring Devices
      7. Or approved equal.
   C. Wiring Devices for Hazardous (Classified) Locations:

D. Multi-outlet Assemblies:
   1. Wiremold.
   3. Or approved equal.

2.2 RECEPTACLES

A. General Requirements for All Devices
   1. Each device shall have an amperage rating not less than that of the branch circuit(s) overcurrent protection device. White color, unless noted otherwise.
      a. Emergency devices backed up by an emergency generator and the associated cover plates shall be Red color.
   2. Wiring Devices, Components, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
   3. All devices shall be Commercial Specification Grade (Construction specification grade is prohibited), unless noted otherwise.
      a. All convenience receptacles shall be Heavy-Duty 125 V, 20 A: Comply with NEMA WD 1, NEMA WD 6 Configuration 5-20R, UL 498, and FS W-C-596. Subject to compliance with requirements, provide Hubbell Wiring Device-Kellems; 5362 Series or similar.
   4. All devices in Hospitals and all patient care areas within non-hospital buildings shall be Hospital Grade.
      a. Hospital-Grade, Heavy Duty, Duplex Convenience Receptacles, 125 V, 20 A: Comply with NEMA WD 1, NEMA WD 6 Configuration 5-20R, UL 498 Supplement sd, and FS W-C-596. Subject to compliance with requirements, provide Hubbell Wiring Device-Kellems; 8300 Series or similar.

B. Straight-Blade: All devices shall be Tamper Resistant where required by the National Electric Code and/or local amendments.
   1. Tamper Resistant—Convenience Receptacles: 125 V, 20 A: Comply with NEMA WD 1, NEMA WD 6 Configuration 5-20R, UL 498 Supplement sd, and FS W-C-596. Subject to compliance with requirements, provide Hubbell Wiring Device-Kellems; HBL5362xxTR Series or similar.

C. GFCI Receptacles: Duplex convenience receptacle with integral ground fault current interrupter. Provide one device for each location, daisy-chaining devices to achieve GFCI protection is not approved for this project.
1. Duplex GFCI Convenience Receptacles, 125 V, 20 A.

2. Straight Blade, non-feed through type.

3. Comply with NEMA WD 1, NEMA WD 6, UL 498, UL 943 Class A, and FS W-C-596.

4. Include indicator light that shows when the GFCI has malfunctioned and no longer provides proper GFCI protection.

5. Subject to compliance with requirements, provide Hubbell Wiring Device-Kellems; GFRST20xx Series or similar.

D. Isolated-Ground Receptacles: Equipment grounding contacts connected only to the green grounding screw terminal of the device with inherent electrical isolation from mounting strap, orange plastic face.

1. General Description: Straight Blade, 125 V, 20 A, Configuration 5-20R. Comply with NEMA WD 1, NEMA WD 6, UL 498, UL 1449, and FS W-C-596, with integral TVSS in line to ground, line to neutral, and neutral to ground.

2. TVSS Components: Multiple metal-oxide varistors; with a nominal clamp-level rating of 400 V and minimum single transient pulse energy dissipation of 240 J, according to IEEE C62.41.2 and IEEE C62.45.

3. Active TVSS Indication: Visual and audible, with light visible in face of device to indicate device is "active" or "no longer in service."

4. Subject to compliance with requirements, provide Hubbell Wiring Device-Kellems; HBL5362SA Series or similar.

5. Devices: Listed and labeled as isolated-ground receptacles.

6. Isolation Method: Integral to receptacle construction and not dependent on removable parts.

E. TVSS Receptacles: Duplex type, NEMA WD 6, with integral TVSS in line to ground, line to neutral, and neutral to ground, blue plastic face.

1. General Description: Straight Blade, 125 V, 20 A, Configuration 5-20R. Comply with NEMA WD 1, NEMA WD 6, UL 498, UL 1449, and FS W-C-596, with integral TVSS in line to ground, line to neutral, and neutral to ground.

2. TVSS Components: Multiple metal-oxide varistors; with a nominal clamp-level rating of 400 V and minimum single transient pulse energy dissipation of 240 J, according to IEEE C62.41.2 and IEEE C62.45.

3. Active TVSS Indication: Visual and audible, with light visible in face of device to indicate device is "active" or "no longer in service."

4. Subject to compliance with requirements, provide Hubbell Wiring Device-Kellems; HBL5362SA Series or similar.

F. Mulit-Outlet assemblies: Metal with White color finish, unless noted otherwise.
1. Two-piece surface (painted steel, brushed aluminum) raceway, with factory-wired multi-outlet harness.

2. Components shall be products from single manufacturer designed for use as a complete, matching assembly of raceways and receptacles.

3. Receptacles: 20 A, 125-V, NEMA WD 6 Configuration 5-20R receptacles complying with NEMA WD 1, UL 498, and FS W-C-596.

4. Receptacle Spacing: 12 inches

5. Wiring: No. 12 AWG solid, Type THHN copper, single circuit

### 2.3 SWITCHES

A. Snap Switches: General-duty, quiet type, rated 20 amperes, 120/277 volts AC. Handle: white plastic, unless noted otherwise.

1. **TOGGLE SWITCHES:** Heavy-duty, quiet type, rated 20 amperes, 120/277 volts AC Comply with NEMA WD 1, UL 20, and FS W-S-896.
   a. Single Pole: Subject to compliance with requirements, provide Hubbell Wiring Device-Kellems; 1221 Series or similar.
   b. Double Pole: Subject to compliance with requirements, provide Hubbell Wiring Device-Kellems; 1222 Series or similar.
   c. Three Way: Subject to compliance with requirements, provide Hubbell Wiring Device-Kellems; 1223 Series or similar.
   d. Four Way: Subject to compliance with requirements, provide Hubbell Wiring Device-Kellems; 1224 Series or similar.

2. Pilot-Light Switches, Single pole, with neon-lighted handle, illuminated when switch is “on”, 20 A, for 120 and 277 V. Subject to compliance with requirements, provide Hubbell Wiring Device-Kellems; HBL1221PL Series or similar.

3. Illuminated Switches, Single pole, with neon-lighted handle, illuminated when switch is "off." 20 A, for 120 and 277 V. Subject to compliance with requirements, provide Hubbell Wiring Device-Kellems; HBL1221IL Series or similar.

4. Key-Operated Switches, 120/277 V, 20 Amp, with factory-supplied key in lieu of switch handle. Subject to compliance with requirements, provide Hubbell Wiring Device-Kellems; HBL1221L Series or similar.

B. Dimmer Switches: Modular, full-wave, solid-state units with integral, quiet on/off switches and audible and electromagnetic noise filters

2. Incandescent Lamp Dimmers: Modular, 120 V, 60 Hz with continuously adjustable slide; single pole with soft tap or other quiet switch; electromagnetic filter to eliminate noise, RF, and TV interference; and 5-inch wire connecting leads.

3. Fluorescent Lamp Dimmers: Modular; compatible with dimmer ballasts; trim potentiometer to adjust low-end dimming; dimmer-ballast combination capable of consistent dimming to a maximum of 1 percent of full brightness.

2.4 WALL PLATES

A. Single and combination types match corresponding wiring devices.
   
   1. Cover plate: Smooth white plastic, unless noted otherwise.
   
   2. Cover plate for surface mounted devices: Galvanized steel.
   
   3. Weatherproof cover plate: While in use, gasketed, cast metal, hinged device covers.
   
   4. Plate-Securing Screws: Metal with head color to match plate finish.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install devices and assemblies plumb and secure.

B. Install wall plates when painting is complete.

C. Install wall dimmers to achieve indicated rating after derating for ganging as instructed by manufacturer.

D. Do not share neutral conductor on load side of dimmers.

E. Arrangement of Devices: Unless otherwise indicated, mount flush, vertically, with height as indicated or six inches above counters.

F. Group adjacent switches under single, multigang wall plates.

G. Protect devices and assemblies during painting.

H. Install wall switches with off position down.

I. Install cover plates on switch, receptacle, and blank outlets.

3.2 IDENTIFICATION

A. Switches and receptacles: Identify panelboard and circuit number from which served. Use machine-printed, pressure-sensitive, abrasion-resistant label tape on the outside of the face plate for receptacles and on the inside of the face plate for switches; utilize durable wire markers or
tags within all outlet boxes. Labels shall be Brother ½” TZ tape, black ink on clear, extra-strength adhesive tape, with size 18 text or engineer approved equal. Use matching label printer.

3.3 CONNECTIONS

A. Connect wiring device grounding terminal to outlet box with bonding jumper.

B. Connect wiring device grounding terminal to branch-circuit equipment grounding conductor.

C. Isolated-Ground Receptacles: Connect to isolated-ground conductor routed to designated isolated equipment ground terminal of electrical system.

D. Tighten electrical connectors and terminals according to manufacturer’s published torque-tightening values.

3.4 FIELD QUALITY CONTROL

A. Test wiring devices for proper polarity and ground continuity. Check each device to verify operation.

B. Test GFCI operation according to manufacturer’s written instructions.

C. Replace damaged or defective components.

3.5 CLEANING

A. Internally clean devices, device outlet boxes, and enclosures. Replace stained or improperly painted wall plates or devices.

END OF SECTION 262726
SECTION 26 28 13
FUSES

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 cartridge fuses, rated 600 V and less, for use in switches, panelboards, switchboards, starters, and motor control centers; and spare fuse cabinets.

1.3 SUBMITTALS

A. Product Data: Include dimensions and manufacturer's technical data on features, performance, electrical characteristics, and ratings for each fuse type indicated.

1.4 QUALITY ASSURANCE

A. Source Limitations: Provide fuses from a single manufacturer.
B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in the NEC, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
C. Comply with NEMA FU 1.
D. Comply with the NEC.

1.5 PROJECT CONDITIONS

A. Where ambient temperature to which fuses are directly exposed is less than 40 deg F or more than 100 deg F, apply manufacturer's ambient temperature adjustment factors to fuse ratings.

1.6 COORDINATION

A. Coordinate fuse ratings with HVAC and refrigeration equipment nameplate limitations of maximum fuse size.

1.7 EXTRA MATERIALS

A. Furnish extra materials described below that match products installed and that are packaged in original cartons or containers and identified with labels describing contents.

1. Fuses: Furnish one set of three of each type and size.

PART 2 - PRODUCTS
2.1 MANUFACTURERS
A. Manufacturers:
   2. Gould Shawmut.
   4. Or approved equal.

2.2 CARTRIDGE FUSES
A. Characteristics: NEMA FU 1, nonrenewable cartridge fuse; class and current rating indicated; voltage rating consistent with circuit voltage.

2.3 SPARE FUSE CABINET
A. Cabinet: Wall-mounted, 0.05-inch thick steel unit with full-length, recessed piano-hinged door and key-coded cam lock and pull.
B. Size: Adequate for storage of spare fuses specified with 15 percent spare capacity minimum.
C. Finish: Gray, baked enamel.
D. Identification: "SPARE FUSES" in 1-1/2-inch- high letters on exterior of door.
E. Fuse Pullers: For each size fuse.

PART 3 - EXECUTION
3.1 EXAMINATION
A. Examine utilization equipment nameplates and installation instructions. Install fuses of sizes and with characteristics appropriate for each piece of equipment.
B. Evaluate ambient temperatures to determine if fuse rating adjustment factors must be applied to fuse ratings.
C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION
A. Install fuses in fusible devices. Arrange fuses so rating information is readable without removing fuse.
B. Install spare fuse cabinet.

3.3 IDENTIFICATION
A. Install labels indicating fuse replacement information on inside door of each fused switch.
PART 1 - GENERAL

1.1 RELATED DOCUMENTS
   A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 Specification sections, apply to work of this section.

1.2 WORK INCLUDED
   A. Provide and install motor disconnects.
   B. Provide and install circuit disconnects.

1.3 REFERENCES
   A. Underwriters' Laboratory, Inc. - Annual Product Directories.
   B. NEMA - Classification of Standard Types of Nonventilated Enclosures for Electric Controllers.

1.4 REGULATORY REQUIREMENTS
   A. Conform to National Electrical Code and to applicable inspection authority.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS
   A. Cutler-Hammer/Westinghouse, General Electric, Siemens, Square D, or approved equal.

2.2 COMPONENTS
   A. Motor and circuit disconnects shall have an Underwriters' Laboratory label.
   B. Single Phase 120 Volt Disconnect Switches: Single pole toggle switch with thermal overload motor protection where indicated. A Horse Power rated switch may be used where fractional horse power motors have internal overload protection.
   C. Single or Three Phase Motor Disconnect Switches: two or three pole heavy duty or fusible where other loads are on same circuit, 250 or 600 volt as required in NEMA Type 1, 3R, or 4 enclosures designed to reject all except Class 'R' fuses.

2.3 ACCEPTABLE MANUFACTURERS - FUSES
   A. Cooper Bussmann, Edison, Littelfuse, Ferraz Shawmut, or approved equal.

2.4 FUSES
   A. As indicated on the drawings. All shall be of the same manufacturer. Provide one spare set of
fuses (minimum of three) for each current rating and type used. See Section 26 28 13.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install motor and circuit disconnect as indicated on Drawings and as required by Code. Where fuses are indicated, provide fuses correlated with full load current of motors provided.

END OF SECTION 262815
SECTION 26 28 16
ENCLOSED SWITCHES AND CIRCUIT BREAKERS

PART 1 - GENERAL

1.1 DESCRIPTION

A. Includes But Not Limited To -
   1. Furnish and install disconnects as described in Contract Documents.

PART 2 - PRODUCTS

2.1 MATERIAL

A. Heavy duty quick-make, quick-break type, fused or nonfused safety switch with visible knife blade as shown on the drawings.
B. Motor circuit disconnects shall be horsepower rated.
C. Enclosures shall be NEMA Type 1 or, where indicated as weatherproof, NEMA Type 3R.
D. Approved Manufacturers:
   1. Cutler Hammer
   2. General Electric
   3. Siemens
   4. Square D

PART 3 - EXECUTION

3.1 INSTALLATION

A. Identify all disconnect switch nameplates with panel, circuit number and device served. Nameplates shall be black laminated plastic with 1/8 inch white engraved letters. Attach with screws.

END OF SECTION 262816
PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 Specification sections, apply to work of this section.

1.2 WORK INCLUDED

A. Transient Voltage Surge Suppression (TVSS) or Surge Protective Device (SPD) suitable for protection of electronic equipment and electrical systems 600 volts or less.

B. Definition: The term Transient Voltage Surge Suppression (TVSS) describes the equipment called a Surge Protective Device (SPD) necessary for the protection of all AC electrical circuits and equipment from the affects of lightning induced voltages, external switching transients, and internally generated switching transients resulting from inductive and/or capacitive load switching.

1.3 REFERENCES

A. Underwriters Laboratories, Inc. (UL) No. 1449 Rev. 2 Standard for Fire and Safety-TVSS


C. Federal Information Processing Standards Publication 94 (FIPS PUB 94).

1.4 SUBMITTALS

A. Submit product data under provisions of Division 1.

B. Manufacturers’ Product Data: Submit material specifications and installation data for products specified under Part 2.

C. Performance Specification: The specification shall provide the minimum information as listed below.

1. Electrical characteristics and ratings for each type of SPD.

2. Drawings shall be provided indicating SPD’s dimensions, weights, mounting provisions, and connection details to the power system.

3. Provide documentation of the SPD’s UL 1449 listing. Any submittal without this documentation will be rejected.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS
A. Current Technology, Cutler Hammer/Westinghouse, General Electric, Southern Tier Technologies, Siemens, Square D or Tycor International.
B. Substitutions: Under provisions of Division 1.

2.2 GENERAL

A. The TVSS System as required, shall consist of a Service Protection Panel for each service rated 600 volts or less, and Branch Panel Protectors as indicated on the drawings.
B. All devices shall operate as a total coordinated and engineered system, as well as being engineered as a system by the manufacturer.
C. Maximum continuous operating voltages of any system component shall not be less than 115 percent of the nominal system operating voltage.
D. All TVSS components shall be rated with an operating temperature range of 30 to 120 degrees Fahrenheit, and from 0 to 85 percent humidity noncondensing.
E. TVSS components shall operate in altitudes up to 20,000 feet above sea level.
F. No system component shall generate appreciable magnetic fields or sufficient fields to damage stored magnetic data.
G. Average power consumption of any single TVSS system shall be 1 watt per phase or less with zero percent total harmonic distortion.
H. Nominal system frequency is 60 Hertz; operating frequency range of the TVSS system shall be 0 to 400 Hertz.
I. All SPD's shall be connected in parallel with the power system they are protecting. Series connected components shall not be used. Suppression paths shall not be ground.
J. All SPD's shall be UL 1449 Rev 2 listed and bear the UL label.
K. All SPD's shall be equipped with integral in line fusing.
L. All SPD's shall bolt directly to the panelboard bussing or utilize a specialized cable designed to minimize voltage let-thru in the event of a surge.

2.3 MAIN SERVICE SPD

A. The Main Service SPD enclosure shall be NEMA ‘1’ construction, factory primed and painted.
B. The Main Service SPD shall be installed parallel via a circuit breaker or fused switch rated for the interrupting current of the Main Switchboard or Panel, or the unit shall have 200K AIC internal fuses for direct bus bar mount.
C. During normal suppression operation, the unit shall not short circuit or crowbar the power flow that would result in an interruption to the load.
D. Unit shall not require interruption of building power for maintenance.
E. Provide visual indication on the cover of the enclosure to indicate proper systems operation.

F. Surge Current Capacity: Total surge current per phase (based on an 8 x 20 microsecond waveform) that the device is capable of surviving shall not be less than 250 kA per phase, or 125 kA per mode on L-G, L-N and N-G (WYE system); L-L and L-G (Delta system).

G. The Main Service SPD shall be UL 1449 Rev 2 listed for Permanently Connected Products. The surge voltage rating (SVR) per UL 1449 Rev 2 shall be as follows for each service voltage:

<table>
<thead>
<tr>
<th>Voltage Configuration</th>
<th>UL (SVR) Level</th>
</tr>
</thead>
<tbody>
<tr>
<td>120 Volts, Single Phase</td>
<td>400 Vpk (L-N)</td>
</tr>
<tr>
<td>240/120 Volt, Single Phase</td>
<td>400 Vpk (L-N)</td>
</tr>
<tr>
<td>208Y/120 Volt, Three Phase</td>
<td>400 Vpk (L-N)</td>
</tr>
<tr>
<td>240 Volt, Single Phase</td>
<td>500 Vpk (L-L)</td>
</tr>
<tr>
<td>240 Volt, Three Phase, Delta</td>
<td>600 Vpk (L-L)</td>
</tr>
<tr>
<td>480Y/277 Volt, Three Phase</td>
<td>800 Vpk (L-N)</td>
</tr>
<tr>
<td>480 Volt, Three Phase, Delta</td>
<td>1000 Vpk (L-L)</td>
</tr>
</tbody>
</table>

H. ANSI/IEEE Category C3 Let Through Voltage: The let through voltage based on IEEE C62.41 and C62.45 recommended procedures for Category C3 surges (20 kV, 10 kA) shall be less than:

<table>
<thead>
<tr>
<th>Modes</th>
<th>Modes</th>
</tr>
</thead>
<tbody>
<tr>
<td>L-N, 208Y/120</td>
<td>500V</td>
</tr>
<tr>
<td>L-N, 480Y/277</td>
<td>900V</td>
</tr>
</tbody>
</table>

I. ANSI/IEEE Category B3 Let Through Voltage: Let through voltage based on IEEE C62.41 and C62.45 recommended procedures for the ANSI/IEEE Category B3 ringwave (6 kV, 500 amps) shall be less than:

<table>
<thead>
<tr>
<th>Modes</th>
<th>Modes</th>
</tr>
</thead>
<tbody>
<tr>
<td>L-N, 08Y/120</td>
<td>130V</td>
</tr>
<tr>
<td>L-N, 480Y/277</td>
<td>00V</td>
</tr>
</tbody>
</table>

J. Withstand: Each unit must be capable of surviving more than 3000 ANSI/IEEE C62.41 Category C transients without failure or degradation of UL 1449 Rev 2 SVR.

K. The voltage protection level (clamping voltage) shall be provided for a 10x1000 microsecond waveform per ANSI/IEEE C62.41-1991 for B3 location categories using IEEE C62.45-1987 testing techniques (power applied). The voltage protection level (clamping voltage) shall not exceed the SVR rating provided in paragraph 2.3 G. above.

L. The Service Panel TVSS shall be furnished with terminal connections capable of accepting up to #1/0 conductors.

M. The transient suppression capability shall be equal bi-directionally and shall treat both the positive and negative impulses with separate suppressor modules per phase.

N. Electrical Noise Filter: Each unit shall include a high performance EMI/RFI noise rejection filter. Noise attenuation for electric line noise shall be 50 dB at 100 kHz using the MIL-STD-220A insertion loss test method. The unit shall be complimentary listed to UL 1283.

O. Suppression shall be line to neutral, line to ground, and neutral to ground with the exception of a delta configuration which is line to line.

2.4 BRANCH PANEL SPD
A. Where Branch Panel SPD's are installed in conjunction with a Main Service SPD, it shall operate as a totally coordinated engineered system. It shall achieve performance equal to or better than the UL 1449 Rev 2 rating of the source point unit.

B. The Branch Panel SPD shall be listed to UL 1449 Rev 2.

C. The suppression path shall not be ground.

D. The unit shall not short circuit or crowbar the power flow that would result in an interruption to the load.

E. Scheduled parts replacement or preventative maintenance shall not be required.

F. The modules shall be bi-polar and bi-directional treating negative transients identically to positive transients with separate positive and negative suppression modules.

G. The Branch Panel SPD enclosure shall be NEMA '1' construction, and be factory primed and painted.

H. The SPD's shall be furnished with power on indication status (one per phase).

I. Surge Current Capacity: Total surge current per phase (based on an 8 x 20 microsecond waveform) that the device is capable of surviving shall not be less than 120 kA per phase, or 60 kA per mode on L-G, L-N and N-G (Wye system); L-L and L-G (Delta system).

J. The Branch Panel SPD shall be UL 1449 Rev 2 listed for Permanently Connected Products. The surge voltage rating (SVR) per UL 1449 shall be as follows for each service voltage:

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<thead>
<tr>
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<th>UL (SVR) Level</th>
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</thead>
<tbody>
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<td>800 Vpk (L-N)</td>
</tr>
<tr>
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K. ANSI/IEEE Category C3 Let Through Voltage: The let through voltage based on IEEE C62.41 and C62.45 recommended procedures for Category C3 surges (20 kV, 10 kA) shall be less than:

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<th>208Y/120</th>
<th>480Y/277</th>
</tr>
</thead>
<tbody>
<tr>
<td>L-N</td>
<td>500V</td>
<td>900V</td>
</tr>
</tbody>
</table>

L. ANSI/IEEE Category B3 Let Through Voltage: Let through voltage based on IEEE C62.41 and C62.45 recommended procedures for the ANSI/IEEE Category B3 ringwave (6 kV, 500 amps) shall be less than:

<table>
<thead>
<tr>
<th>Modes</th>
<th>08Y/120</th>
<th>480Y/277</th>
</tr>
</thead>
<tbody>
<tr>
<td>L-N</td>
<td>130V</td>
<td>00V</td>
</tr>
</tbody>
</table>

M. Lifecycle: Each unit must be capable of surviving more than 2500 Category C transients without failure or degradation of UL 1449 clamp voltage.
N. The Branch Panel SPD shall be integral with the panelboard and bolt directly to the panelboard bussing or utilize a specialized cable designed to minimize voltage let thru in the event of a surge.

O. Electrical Noise Filter: Each unit shall include a high performance EMI/RFI noise rejection filter. Noise attenuation for electric line noise shall be 50 dB at 100 kHz using the MIL-STD-220A insertion loss test method. The unit shall be complimentary listed to UL 1283.

PART 3 - EXECUION

3.1 WARRANTY

A. Warranty: The equipment shall be warranted against defects in material and/or workmanship for a minimum of five years.

3.2 INSTALLATION

A. The installation shall comply with the manufacturers' printed instructions, and any national and local wiring codes.

3.3 IDENTIFICATION

A. Refer to Electrical Identification, Section 16 195, for identification requirements.

3.4 FIELD QUALITY CONTROL

A. The TVSS System shall be installed in accordance with the manufacturers' printed instructions to maintain warranty.

B. Upon completion of installation, the TVSS System shall not require testing of any kind.

END OF SECTION 264314
SECTION 26 5 100
INTERIOR BUILDING LIGHTING

PART 1 - GENERAL

1.1 DESCRIPTION
   A. Includes But Not Limited To -
      1. Furnish and install lighting system as described in Contract Documents complete with lamps.

1.2 JOB CONDITIONS
   A. Coordination -
      1. Coordinate with ceiling layout to obtain symmetrical arrangement of fixtures in acoustical tile ceiling.

PART 2 - PRODUCTS

2.1 MATERIAL
   A. Lighting Fixtures -
      1. See Fixture Schedule on Drawings.
   B. All alternate light fixture packages shall be submitted a minimum of ten (10) days prior to bid for approval.
   C. LED light fixture -
      1. See lighting fixture schedule

PART 3 - EXECUTION

3.1 INSTALLATION
   A. Do not locate light fixtures in closet or storage areas within 18 inches of shelves.
   B. Where recessed lighting fixtures are to be installed, provide openings, plaster rings, etc., of exact dimensions for such fixtures to be inserted in openings. Terminate circuits for recessed fixtures in an extension outlet box near fixture and connect with 1/2 inch flexible conduit in accordance with Contract Documents.
   C. Where fluorescent units are shown installed end to end, provide suitable connectors or collars to connect adjoining units to appear as a continuous unit.
   D. Each fixture shall be wired with a 72 inch piece of flexible conduit connected to a blank covered junction box located in the accessible ceiling space within 36 inches of the fixture connection point.
E. Do not install fixture lens enclosures or louvers in fixtures until general construction work is complete, including painting.

F. All light fixtures and lamps shall be left clean at the time of substantial completion of the work. It is the responsibility of the electrical contractor for protection and final cleaning of fixtures. If fixtures are dirty at completion of the project, the Contractor shall clean them at no additional cost to the Owner.

3.2 Light Fixture Attachment

A. Light fixtures in ceiling grid shall be mechanically attached to grid per NEC 410-16 (two per fixture unless independently supported).

   1. Surface-mounted fixtures shall be attached to grid.
   2. Pendant-hung fixtures shall be directly supported from structure with 9-gauge wire (or approved alternative).
   3. Rigid lay-in or can light fixtures:

      a. 10 lbs. - one wire to structure (may be slack).
      b. 11 to 56 lbs. - two wires from housing to structure (may be slack).
      c. 57 lbs. - supported directly to structure by approved method.
SECTION 26 56 00
EXTERIOR LIGHTING

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 exterior lighting units with luminaires, lamps, ballasts, poles/support structures, and accessories.
B. Related Sections include the following:
   1. Section 26 09 23 - Lighting Control Devices.
   2. Section 26 51 00 - Interior Lighting for interior fixtures, lamps, ballasts, emergency lighting units, and accessories; and for exterior luminaires normally mounted on buildings.

1.3 DEFINITIONS

A. Lighting Unit: A luminaire or an assembly of luminaires complete with a common support, including pole, post, or other structure, and mounting and support accessories.
B. Luminaire (Light Fixture): A complete lighting device consisting of lamp(s) and ballast(s), when applicable, together with parts designed to distribute light, to position and protect lamps, and to connect lamps to power supply.

1.4 SUBMITTALS

A. Product Data: For each type of lighting unit indicated, arranged in order of lighting unit designation. Include data on features, accessories and finishes.
B. Maintenance data for lighting units.

1.5 QUALITY ASSURANCE

A. Luminaires and Accessories: Listed and labeled as defined in the NEC, Article 100, for their indicated use, location, and installation conditions by a testing agency acceptable to authorities having jurisdiction.
B. Comply with ANSI C2.
C. Comply with the NEC.

1.6 DELIVERY, STORAGE, AND HANDLING OF POLES

A. Retain factory-applied pole wrappings on metal poles until just before pole installation. For poles
with nonmetallic finishes, handle with web fabric straps.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Products: As indicated on the drawings.

2.2 LUMINAIRES

A. Metal Parts: Free from burrs, sharp corners, and edges.
B. Sheet Metal Components: Corrosion-resistant aluminum, unless otherwise indicated. Form and support to prevent warping and sagging.
C. Housings: Rigidly formed, weather- and light-tight enclosures that will not warp, sag, or deform in use. Provide filter/breather for enclosed luminaires.
D. Doors, Frames, and Other Internal Access: Smooth operating, free from light leakage under operating conditions, and arranged to permit re-lamping without use of tools. Arrange doors, frames, lenses, diffusers, and other pieces to prevent accidental falling during re-lamping and when secured in operating position. Provide for door removal for cleaning or replacing lens. Arrange to disconnect ballast when door opens.
E. Exposed Hardware Material: Stainless steel.
F. Plastic Parts: High resistance to yellowing and other changes due to aging, exposure to heat, and ultraviolet radiation.
G. Lenses and Refractors: Materials as indicated. Use heat- and aging-resistant, resilient gaskets to seal and cushion lens and refractor in luminaire doors.
H. High-Intensity-Discharge Ballasts: Comply with ANSI C82.4. Constant wattage autotransformer or regulating high-power-factor type, unless otherwise indicated.

1. Ballast Fuses: One in each ungrounded supply conductor. Voltage and current ratings as recommended by ballast manufacturer.
2. Single-Lamp Ballasts: Minimum starting temperature of minus 40 deg C.
3. Open-circuit operation will not reduce average life.
4. High-Pressure Sodium Ballasts: Equip with a solid-state igniter/starter having an average life in pulsing mode of 10,000 hours at an igniter/starter case temperature of 90 deg C.
5. Noise: Uniformly quiet operation, with a noise rating of B or better.

I. Verify availability of space to install device at or close to ballast. Unit as specified is suitable for full 15-a branch-circuit protection. Coordinate with Drawings.
J. Lamps: Comply with the standard of the ANSI C78 series that is applicable to each type of lamp. Provide luminaires with indicated lamps of designated type, characteristics, and wattage. Where a lamp is not indicated for a luminaire, provide medium wattage lamp recommended by
manufacturer for luminaire.

1. Metal-Halide Color Temperature and Minimum Color-Rendering Index: 3600 K and 70 CRI, unless otherwise indicated.

2.3 LUMINAIRE SUPPORT COMPONENTS

A. Description: Comply with AASHTO LTS-3 for pole or other support structures, brackets, arms, appurtenances, base, and anchorage and foundation.

B. Wind-Load Strength of Total Support Assembly: Adequate to carry support assembly plus luminaires at indicated heights above grade without failure, permanent deflection, or whipping in steady winds of 80 mph with a gust factor of 1.3. Support assembly includes pole or other support structures, brackets, arms, appurtenances, base, and anchorage and foundation.

C. Finish: Match finish of pole/support structure for arm, bracket, and tenon mount materials.

D. Mountings, Fasteners, and Appurtenances: Corrosion-resistant items compatible with support components.

1. Materials: Will not cause galvanic action at contact points.
2. Mountings: Correctly position luminaire to provide indicated light distribution.
3. Anchor Bolts, Nuts, and Washers: Hot-dip galvanized after fabrication unless stainless-steel items are indicated.

E. Pole/Support Structure Bases: Anchor type with hold-down or anchor bolts, leveling nuts, and bolt covers.

F. Steel Poles: Tubing complying with ASTM A 500, Grade B, carbon steel with a minimum yield of 46,000 psig; one-piece construction up to 40 feet in length with access handhole in pole wall.

G. Steel Mast Arms: Fabricated from NPS 2 black steel pipe, continuously welded to pole attachment plate with span and rise as indicated.

H. Metal Pole Brackets: Match pole metal. Provide cantilever brackets without underbrace, in sizes and styles indicated, with straight tubular end section to accommodate luminaire.

I. Pole-Top Tenons: Fabricated to support luminaire or luminaires and brackets indicated, and securely fastened to pole top.

J. Concrete for Pole Foundations: Comply with Division 3.

2.4 FINISHES

A. Steel: Grind welds and polish surfaces to a smooth, even finish.

1. Galvanized Finish: Hot-dip galvanize after fabrication to comply with ASTM A 123.
2. Surface Preparation: Clean surfaces to remove dirt, oil, grease, and other contaminants.
that could impair paint bond. Remove mill scale and rust, if present, from uncoated steel.

3. Interior: Apply one coat of bituminous paint on interior of pole, or otherwise treat to prevent corrosion.

4. Polyurethane Enamel: Manufacturer’s standard finish consisting of one or more coats of primer and two finish coats of high-gloss, high-build polyurethane enamel.

5. Color: As indicated on the drawings.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Concrete Foundations: Construct according to Division 3.

B. Install poles as follows:

1. Use web fabric slings (not chain or cable) to raise and set poles.
2. Mount pole to foundation with leveling nuts, and tighten top nuts to torque level recommended by pole manufacturer.
3. Secure poles level, plumb, and square.
4. Grout void between pole base and foundation. Use non-shrinking or expanding concrete grout firmly packed in entire void space.
5. Use a short piece of 1/2-inch-diameter pipe to make a drain hole through grout. Arrange to drain condensation from interior of pole.

C. Luminaire Attachment: Fasten to indicated structural supports.

D. Lamp luminaires with indicated lamps according to manufacturer’s written instructions. Replace malfunctioning lamps.

3.2 CONNECTIONS

A. Ground equipment.

1. Tighten electrical connectors and terminals according to manufacturer’s published torque-tightening values.

B. Ground metal poles/support structures.

3.3 FIELD QUALITY CONTROL

A. Inspect each installed unit for damage. Replace damaged units.

3.4 CLEANING AND ADJUSTING

A. Clean units after installation. Use methods and materials recommended by manufacturer.
SECTION 27 11 01
TELECOM RACEWAY SYSTEMS

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. A. This Section includes telecom raceway systems.

1.3 RELATED WORK
   A. Section 26 05 33 – Raceways and Boxes.
   B. Section 26 05 36 – Cable Trays.

1.4 SYSTEM DESCRIPTION
   A. A. Conduit, cable trays and boxes to form an empty raceway system.

PART 2 - PRODUCTS

2.1 EQUIPMENT
   A. Conduit: Refer to Section 26 05 33.
   B. Cable trays: Refer to Section 26 05 36.
   C. Outlet, pull or junction boxes: Refer to Section 26 05 33.

PART 3 - EXECUTION

3.1 INSTALLATION
   A. Provide pullboxes in telecom conduit runs spaced less than 100 feet apart, and on the backboard
      side of runs with more than two right angle bends. Place telecom label on pull and junction boxes.
   B. Provide pullwire in each telecom conduit run.

END OF SECTION 271101
SECTION 28 13 00
ACCESS CONTROL

Part 1. GENERAL

Section 1.01 SUMMARY

A Section includes:
   (i) Door Access Control
   (ii) Vehicle Gate Access Control
   (iii) Pedestrian Gate Access Control

Section 1.02 ACTION SUBMITTALS

A Product Data: For each type of product.
   (i) Provide all manufacturer colors and materials as base of bid.

B Shop Drawings: Site Plan and Floor Plan showing location of all devices, conduit, and wiring schematic.
   (i) Architect will provide AutoCAD backgrounds if requested by contractor.

Section 1.03 SCOPE OF SERVICE

A The Contractor is responsible for provide a design build delivery method that is compatible with the Idaho Transportation Departments Standard and Requirements.

B The system shall be a standalone system with battery back-up. System to have web interface that is compatible with ITD’s Hirsch/Velocity system.

C Provide access control system for 7 Doors, 1 New Vertical Pivot Vehicle Access gate (By Others), and two pedestrian chain-link gates with web interface compatible with Velocity System.

Section 1.04 QUALITY ASSURANCE

A Provide products produced by a single manufacturer.

B Installer Qualifications: A company specializing in installation with minimum three (3) years’ experience and employs experienced installers who have a minimum of 3 years of experience installing access control in a commercial application.

C Furnish product type materials from the same production.

D All wiring to be provided in conduit in exposed spaces.

E All wiring to be organized in a neat and organized manner. Exposed wiring to be installed in D-Rings to cluster wiring together.

F Conceal all wiring where possible.

G All equipment to be grounded and surge protected.
Section 1.05 DELIVERY, STORAGE, AND HANDLING

A Deliver products in manufacturer's original sealed packaging.

B Deliver, store, and handle products using means and methods that will prevent damage.
   (i) Protect against damage from moisture, direct sunlight, surface contamination, and other causes.

C Before installing equipment, verify the facility is climate controlled.

Section 1.06 CLOSEOUT SUBMITTALS

A Provide as-built Product Data & Shop Drawings showing locations of all equipment, pathways, and devices.

B Provide 1 year of technical assistance and service at no cost to the owner.

C Provide the following access devices, supply to owner:
   (i) 25 Cards
   (ii) 25 Phobs

Part 2. PRODUCTS

Section 2.01 MANUFACTURERS

A Hirsch / Velocity or compatible product.

Section 2.02 CONTROL PANELS

A All control panels to located in Information Technology Room (IT Room).

B All control panels are to have keyed lock.
   (i) Provide 4 Copies to each lock.

Section 2.03 SURGE AND TAMPER PROTECTION

A Surge Protection: Protect components from voltage surges originating external to equipment housing and entering through power, communication, signal, control, or sensing leads. Include surge protection for external wiring of each conductor-entry connection to components.

   (i) Minimum Protection for Power Connections 120 V and More: Auxiliary panel suppressors complying with requirements in Division 26 Section "Transient-Voltage Suppression for Low-Voltage Electrical Power Circuits."

   (ii) Minimum Protection for Communication, Signal, Control, and Low-Voltage Power Connections: Comply with requirements in electrical drawings.

B Tamper Protection: Tamper switches on enclosures, control units, pull boxes, junction boxes, cabinets, and other system components shall initiate a tamper-alarm signal when unit is opened or partially disassembled. Control-station control-unit alarm display shall identify tamper alarms and indicate locations.

Section 2.04 DOORS

(i) Provide access control for all doors shown on plans. Refer to door hardware schedule.
(ii) Provide numerical keypad with phob/card access.
   a. Provide numerical keypad with phob/card access on both sides of doors.

(iii) Doors are to have the ability to be schedule controlled.

(iv) Coordinate with mason, door supplier, and framer for access to all locations.

(v) Location of Keypad to be shown on shop drawings and confirmed by owner.

Section 2.05 VEHICLE ACCESS GATE

A Provide two High-Low with two (numerical keypad with card/phob access). One per each height.

   (i) One high-low pedestal to be located on each side of vehicle access gate.

B Provide below grade connection between access gate and new lab facility.

C Provide below grade connection between high-low access gate pedestals and new facility.

D Vertical pivot access control gate to have safety close loop.

Section 2.06 CHAIN LINK PEDESTRIAN GATE ACCESS

A Provide Access control for two new chain-link pedestrian gates.

B Provide one keypad access control with phob/card access on each side of gate.

C To be mounted on self-supporting pedestal.

D Gate can be secured either by MAG lock with default lock position or lever style door latch with electric strike.

   (i) If electric strike method is selected, access control contractor to provide lockset and hardware necessary to provide a complete access control system.

   (ii) Man gates to default in locked position in power is lost.

E Gates to access control provided by underground conduit from home Run from IT Room.

   (i) Conduit to be terminated to provide a sealed system that is weathertight.

Section 2.07 ACCESS CONTROL SOFTWARE

A Access Control Software to be Hirsch Velocity certified software.

B No other software will be accepted.

C Software interface to include floor plan graphic showing all access points for control.

   (i) Upon Request Architect will provide PDF, Jpg, or AutoCAD file to be used for graphic.

Section 2.08 ACCESS CONTROL READERS

A All gate and door access control readers are to be mounted at ADA compliant heights and readily accessible.
B All exterior access control readers are designed and tested for exterior applications.

Section 2.09 CONDUITS

A All Conduit to be PVC.

Section 2.10 WIRING

A All wiring to be determined by access control designer. To be selected based on exposure, environmental conditions, and industry standards for Access Control Systems.

Section 2.11 SPARE AND REPLACEMENT PARTS

A Provide one extra card reader of each product type for future replacement.

B Product to be stored in original packaging.

Part 3. EXECUTION

Section 3.01 GENERAL

A Contractor is to not proceed until submittals are approved by the owner.

B Contractor to design the system that is compatible with ITD’s standard specifications for access control.

C The Access control for this facility is independent and directly connected to the adjacent administrative building.

D The Access Control has access by internet to ITD’s Velocity System.

E The contractor is responsible for verification of described system above and coordination with ITD’s statewide access control system.

(i) Contractor must coordinate with the local field representative at the District 1 campus.

F Contractor to coordinate with Electrical Contractor, Door & Hardware Manufacturer and Supplier, Chain Link Supplier, and Vehicle Access Gate Contractors.

G Contractor is responsible for all conduits and pathways, coordinate pathways with door supplier.

H Provide all hardware, software, programming tools, licenses, and documentation necessary to control and modify the system. The minimum level of modification includes addition and deletion of devices, circuits, zones, addition, and deletion of users, changing of user permissions, and control system operations.

Section 3.02 POST-BID MEETING

A Contractor to schedule a time to meet with construction manager, electrician, door supplier/installer, framer, and mason prior to the start of construction to coordinate conduit, wire, and other access control element installation.

(i) Verify and locate all pathways and connections.

(ii) Verify scopes of work of each trade.

(iii) Verify necessary requirements from other trades for installation.
B Provide anticipated schedule of different phases of scope of work. Multiple mobilization will be necessary to provide rough-in and finish installation. Coordinate with Owner’s Construction Manager.

C Contractor to coordinate all power and internet connections with electrician, Local D-1 Field Representative and ITD’s IT professionals.

Section 3.03 EXAMINATION

A Do not proceed with installation until all wet work such as concrete, terrazzo, plastering and painting has been completed and thoroughly dried out, except rough-in work (installation of conduit, D-rings, and other elements that must be installed prior to finishes.

B Inspect location of all equipment prior to installation.

Section 3.04 PREPARATION

A Prepare all equipment prior to installation.

B Terminate all conduits to appropriate locations.

C If plywood backing is required for installation of equipment, contractor shall include in cost of work.

D Owner will be responsible for providing a secure internet connection for equipment. Coordinate with owner and electrician.

Section 3.05 INSTALLATION

A Install in accordance with manufacturer’s instructions for application and installation.

B Contractor shall furnish all necessary interconnections, services, and adjustments required for a complete and operable system as specified. Control signals, communications, and data transmission lines grounding shall be installed as necessary to preclude grounding loops, noise, and surges from affecting system operation. Equipment, materials, installation, workmanship, inspection, and testing shall be in accordance with manufacturer’s recommendations and as modified herein.

C Consult the manufacturer’s installation manuals for all wiring diagrams, schematics, physical size, etc. before beginning system installation.

D All control panels, conduits, and devices are to be securely attached to adjoining structures.

E Contractor is responsible for all trench required for their system.

F Install all underground conduits prior to foundation and slab on grade installation. Stub conduits as necessary.

   (i) Coordinate construction with concrete contractor.

G Install all conduit in masonry walls during wall construction or coordinate scope of work with masonry contractor.

H Upon completion of wood framing contractor to rough in all necessary conduit for electrical wires to be installed at later date.

I Provide necessary ceiling and wall junction boxes to access conduit at later date and pull wire. Provide blank junction box covers.

   (i) Conceal junction boxes where possible above ceilings or in storage or mechanical spaces where possible. If not possible install in less visible locations.
(ii) Install all boxes and conduits true and level.

J Install grounding systems and surge protection.

K Install wiring, Devices, and control panels once all surfaces have been finished.

(i) Terminate all devices and wiring.

L Connect power and internet to control panels.

M Install all software necessary for operation.

N Start-up System and Test System for full operation. Coordinate with owner on anticipated operation, ie schedules, access groups, etc.

(i) Repair any issues that may arise that prohibit the full operation of the system.

O Program system. Coordinate with ITD’s IT professionals for system wide connection.

**Section 3.06 ADJUSTING AND CLEANING**

A Clean and adjust all devices to new condition.

B Protect systems where needed until owner takes operation of facility.

C Adjust all devices to verify they are true and plumb.

**Section 3.07 PROTECTION**

A Protect all devices, panels, and wiring until hand over of facility to owner.

**Section 3.08 TRAINING**

A Provide onsite training for (2) local representatives on the operation of the system. Assume standard training and duration needed for an administrator of the system. Assume 8 hours of training.

A. END OF SECTION 28 13 00
Section 284600 - Fire Detection and Alarm

Part 1. GENERAL

Section 1.01 SECTION INCLUDES

A  Fire alarm system design and installation, including all components, wiring, and conduit.

B  Transmitters for communication with supervising station.

C  Replacement and removal of existing fire alarm system components, wiring, and conduit indicated.

D  Maintenance of fire alarm system under contract for specified warranty period.

Section 1.02 REFERENCE STANDARDS


B  ADA Standards - 2010 ADA Standards for Accessible Design; 2010.

C  IEEE C62.41.2 - IEEE Recommended Practice on Characterization of Surges in Low-Voltage (1000 V and less) AC Power Circuits; 2002 (Corrigendum 2012).

D  NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.


Section 1.03 SUBMITTALS

A  See Administrative Requirements, for submittal procedures.

B  Evidence of designer qualifications.

C  Design Documents: Submit all information required for plan review and permitting by authorities having jurisdiction, including but not limited to floor plans, riser diagrams, and description of operation:

(i) Copy (if any) of list of data required by authority having jurisdiction.

(ii) NFPA 72 "Record of Completion", filled out to the extent known at the time.
(iii) Clear and concise description of operation, with input/output matrix similar to that shown in NFPA 72 Appendix A-7-5-2.2(9), and complete listing of software required.

(iv) System zone boundaries and interfaces to fire safety systems.

(v) Location of all components, circuits, and raceways; mark components with identifiers used in control unit programming.

(vi) Circuit layouts; number, size, and type of raceways and conductors; conduit fill calculations; spare capacity calculations; notification appliance circuit voltage drop calculations.

(vii) List of all devices on each signaling line circuit, with spare capacity indicated.

(viii) Manufacturer's detailed data sheet for each component, including wiring diagrams, installation instructions, and circuit length limitations.

(ix) Description of power supplies; if secondary power is by battery include calculations demonstrating adequate battery power.

(x) Certification by either the manufacturer of the control unit or by the manufacturer of each other component that the components are compatible with the control unit.

(xi) Certification by the manufacturer of the control unit that the system design complies with Contract Documents.

(xii) Certification by Contractor that the system design complies with Contract Documents.

D Evidence of installer qualifications.

E Evidence of maintenance contractor qualifications, if different from installer.

F Inspection and Test Reports:

(i) Submit inspection and test plan prior to closeout demonstration.

(ii) Submit documentation of satisfactory inspections and tests.

(iii) Submit NFPA 72 "Inspection and Test Form," filled out.

G Shop Drawings: Submit a complete set of Shop Drawings Including and subject to:

(i) System matrix identifying the relationships of all inputs to all outputs. This shall include all connected detection devices and addressable field modules.

(ii) Floor plan layouts showing device locations, conduit routing and wiring interconnection requirements between each device. Floor plans shall indicate equipment provided to meet 520 Hz sounder requirements in all sleeping or other areas required by NFPA, whether such locations are indicated on the construction drawings or not.

(iii) Diagram or floor plan showing 120VAC connections, including panelboard and circuit connections for all fire alarm control panels, notification appliance circuit panels, and interface to all door hold open devices, door closers, and any auxiliary equipment requiring 120VAC interconnects.
(iv) Standby battery size calculations showing current draws for each device and module during standby, alarm and trouble conditions.

(v) Voltage drop calculations for notification-appliance circuits.

(vi) Shop drawings that reflect conduit and wiring routing, or that show different or additional device locations than those shown on the contract documents shall at the contractors expense and shall not constitute a reason for a change order.

H General Submittal Requirements:

(i) Submittals shall be approved by authorities having jurisdiction prior to submitting them to Engineer.

Section 1.04 Operating and Maintenance Data

A Complete set of specified design documents, as approved by authority having jurisdiction.

B Additional printed set of project record documents and closeout documents, bound or filed in same manuals.

C Contact information for firm that will be providing contract maintenance and trouble call-back service.

D List of recommended spare parts, tools, and instruments for testing.

E Replacement parts list with current prices, and source of supply.

F Detailed troubleshooting guide and large scale input/output matrix.

G Preventive maintenance, inspection, and testing schedule complying with NFPA 72; provide printed copy and computer format acceptable to Owner.

H Detailed but easy to read explanation of procedures to be taken by non-technical administrative personnel in the event of system trouble, when routine testing is being conducted, for fire drills, and when entering into contracts for remodeling.

I Project Record Documents:

(i) Complete set of floor plans showing actual installed locations of components, conduit, and zones.

(ii) "As installed" wiring and schematic diagrams, with final terminal identifications.

(iii) "As programmed" operating sequences, including control events by device, updated input/output chart, and voice messages by event.

J Closeout Documents:

(i) Certification by manufacturer that the system has been installed in compliance with manufacturer's installation requirements, is complete, and is in satisfactory operating condition.

(ii) NFPA 72 "Record of Completion", filled out completely and signed by installer and authorized representative of authority having jurisdiction.

(iii) Maintenance contract.
Section 1.05 QUALITY ASSURANCE

A Designer Qualifications: NICET Level III or IV (3 or 4) certified fire alarm technician or registered fire protection engineer, employed by fire alarm control panel manufacturer, Contractor, or installer.

B Installer Qualifications: Firm with minimum 3 years documented experience installing fire alarm systems of the specified type and providing contract maintenance service as a regular part of their business.

(i) Authorized representative of control unit manufacturer; submit manufacturer's certification that installer is authorized; include name and title of manufacturer's representative making certification.

(ii) Installer Personnel: At least 2 years of experience installing fire alarm systems.

(iii) Supervisor: NICET level III or IV (3 or 4) certified fire alarm technician; furnish name and address.

(iv) Contract maintenance office located within 100 miles of project site.

C Maintenance Contractor Qualifications: Same entity as installer or different entity with specified qualifications.

Section 1.06 WARRANTY

A Provide control panel manufacturer's warranty that system components other than wire and conduit are free from defects and will remain so for 2 years after date of Substantial Completion.

B Provide installer's warranty that the installation is free from defects and will remain so for 2 years after date of Substantial Completion.

Part 2. PRODUCTS

Section 2.01 MANUFACTURERS

A Fire Alarm Control Units and Accessories:


(vi) National Time & Signal: www.natsco.net/#sle.


(viii) Simplex, a brand of Johnson Controls: www.simplex-fire.com/#sle.

(ix) Engineer approved equal..
(x) Provide control units made by the same manufacturer.

B Initiating Devices and Notification Appliances:

(i) Provide initiating devices and notification appliances made by the same manufacturer, where possible.

C Substitutions:

(i) For other acceptable manufacturers of control units specified, submit product data showing equivalent features and compliance with Contract Documents.

(ii) For substitution of products by manufacturers not listed, submit product data showing features and certification by Contractor that the design will comply with Contract Documents.

Section 2.02 FIRE ALARM SYSTEM

A System Description:

(i) Source Limitations for Fire-Alarm System and Components: Components shall be compatible with and operate as an extension of existing system. Provide system manufacturer's certification that all components provided have been tested as, and will operate as, a system.

(ii) Analog addressable system dedicated to fire-alarm service only.

(iii) All components provided shall be listed for use with the selected system.

B System Operational Description:

(i) Fire-alarm signal initiation shall be by one or more of the following devices and systems:


2) Heat detectors.

3) Smoke detectors.

4) Duct smoke detectors.

5) Carbon monoxide detectors.

6) Automatic sprinkler system water flow.

7) Kitchen fire-extinguishing system operation signal.

8) Pre-action sprinkler system activation signal.

(ii) Fire-alarm signal shall initiate the following actions within 3 seconds:

1) Continuously operate alarm notification appliances.

2) Identify alarm zone at fire-alarm control unit and remote annunciators.
3) Transmit an alarm signal to the remote alarm receiving station.

4) Turn on all fire alarm strobe and horns throughout the building.

5) Turn on system alarm notifications at the fire alarm control panel.

6) Start the reset / alarm silence disable timer to guarantee that alarm signals will sound for a minimum period of 10 minutes.

7) Operate alarm relay contacts to release all magnetically or electrically held doors secured thru the access control system. Note: only the doors within the zone in alarm shall be released; other doors outside of the alarmed zone shall remain secure until a detector within the same zone is in alarm.

8) Release fire and smoke doors held open by magnetic door holders.

9) Switch heating, ventilating, and air-conditioning equipment controls to fire-alarm mode.

10) Close smoke dampers in air ducts of designated air-conditioning duct systems. The mechanical controls shall activate or deactivate the air handling systems in accordance with NFPA-90A.

11) Transmit signals to building elevator control panel to initiate return to main floor or alternate floor. Upon reset of the fire alarm control panel, the elevators shall automatically resume normal operations.

12) Transmit signals to the elevator shunt trip device to disconnect power to the elevator equipment prior to sprinkler release.

13) Operate the DACT.

14) Transmit/receive signal of pre-action fire suppression sprinkler systems.

15) Transmit/receive signal of kitchen equipment fire suppression systems.

16) Activate emergency lighting control.

17) Activate emergency shutoffs for gas and fuel supplies.

18) Record events in the system memory.

(iii) Supervisory signal initiation shall be by one or more of the following devices and systems:

1) Valve supervisory switch.

2) Elevator shunt-trip supervision.

3) Loss of communication with any panel on the network.

(iv) System trouble signal initiation shall be by one or more of the following devices and actions:

1) Open circuits, shorts, and grounds in designated circuits.

2) Opening, tampering with, or removing alarm-initiating and supervisory signal-initiating devices.
3) Loss of primary power at fire-alarm control unit.

4) Ground or a single break in internal circuits of fire-alarm control unit.

5) Abnormal ac voltage at fire-alarm control unit.

6) Break in standby battery circuitry.

7) Failure of battery charging.

8) Abnormal position of any switch at fire-alarm control unit or annunciator.

(v) System Trouble and Supervisory Signal Actions:

1) Initiate notification appliances.

2) Annunciate at fire-alarm control unit and remote annunciators.

3) After a time delay of 200 seconds, transmit a trouble or supervisory signal to the remote alarm receiving station.

4) Operate the DACT.

(vi) Alarm Reset: Key accessible RESET function resets alarm system out of ALARM mode if alarm initiating circuits have cleared.

(vii) Drill Sequence of Operation: Manual DRILL function causes ALARM mode operation to:

1) Sound and display local fire alarm signaling devices.

2) Indicate location of alarm zone on fire alarm control panel and on remote annunciator panel.

C Fire Alarm System: Provide a new automatic fire detection and alarm system:

(i) Provide all components necessary, regardless of whether shown in Contract Documents or not.

(ii) Comply with the following;

1) ADA Standards.

2) The requirements of the State Fire Marshal.

3) The requirements of the local authority having jurisdiction.

4) Applicable local codes.

5) Contract Documents (drawings and specifications).

6) NFPA 72; where the word "should" is used consider that provision mandatory; where conflicts between requirements require deviation from NFPA 72, identify deviations clearly on design documents.
D  Circuits:

(i) Initiating Device Circuits (IDC): Class B.
(ii) Signaling Line Circuits (SLC): Class B.
(iii) Notification Appliance Circuits (NAC): Class B.

E  Spare Capacity:

(i) Initiating Device Circuits: Minimum 25 percent spare capacity.
(ii) Notification Appliance Circuits: Minimum 25 percent spare capacity.
(iii) Fire Alarm Control Units: Capable of handling all circuits utilized to capacity without requiring additional components other than plug-in control modules.

F  Power Sources:

(i) Primary: Existing dedicated branch circuits of the facility power distribution system.
(ii) Secondary: Storage batteries.
(iii) The entire system shall operate on 24 VDC, filtered switch mode power supply with 6 Amps rated current.
(iv) The FACP shall have a battery charging circuit with automatic charger that shall maintain standby batteries in a fully charged condition. The battery capacity shall be capable of complying with the following requirements:

1) Twenty-four (24) hours of battery standby with five (5) minutes of alarm signaling at the end of this Twenty-four (24) hour period. This capacity shall include a 20 percent safety margin to the calculated amp-hour rating.
(v) The power supply shall comply with UL 864 and NFPA 70 for power limiting.
(vi) The FACP will indicate a trouble condition if there is a loss of AC power or if the batteries are missing or of insufficient capacity to support proper system operation in the event of AC failure. A “Battery Test” will be performed automatically every minute to check the integrity of the batteries. The test must disconnect the batteries from the charging circuit and place a load on the battery to verify the battery condition.
(vii) In the event that it is necessary to provide additional power in excess of the capabilities of the FACP power supply, Distributed Power Module(s) shall be added to the system design, as required.

G  Remote Power Supply and Battery Charger:

(i) Include a remote power supply and battery charger as required.
(ii) The remote power supply shall be connected to the main system bus at a distance of up to 6000 feet and be programmed through the FACP control unit.
(iii) The remote power supply shall provide a minimum of 35 Ah of battery charging capability.
Section 2.03 FIRE SAFETY SYSTEMS INTERFACES

A Supervision: Provide supervisory signals in accordance with NFPA 72 for the following:

(i) Sprinkler water control valves.

(ii) Dry-pipe sprinkler system pressure.

(iii) Elevator shut-down control circuits.

B Alarm: Provide alarm initiation in accordance with NFPA 72 for the following:

(i) Sprinkler water flow.

(ii) Elevator lobby, elevator hoistway, and elevator machine room smoke detectors.

(iii) Generator room heat detector.

(iv) Duct smoke detectors.

C Elevators:

(i) Elevator lobby, hoistway, and machine room smoke detectors: Elevator recall for fire fighters' service.

(ii) Elevator Machine Room Heat Detector: Shut down elevator power prior to hoistway sprinkler activation.

(iii) Sprinkler pressure or waterflow: Shut down elevator power prior to hoistway sprinkler activation.

D HVAC:

(i) Duct Smoke Detectors: Close dampers indicated; shut down air handlers indicated.

E Doors:

(i) Smoke Barrier Door Magnetic Holders: Release upon activation of smoke detectors in smoke zone on either side of door, upon alarm from manual pull station on same floor, and upon sprinkler activation on same floor.

(ii) Electromagnetic Door Locks on Egress Doors: Unlock upon activation of any alarm initiating device or suppression system in smoke zone that doors serve as egress from.

Section 2.04 COMPONENTS

A General:

(i) Provide flush mounted units where installed in finish areas; in unfinished areas, surface mounted unit are acceptable.

(ii) Provide legible, permanent labels for each control device, using identification used in operation and maintenance data.

B Fire Alarm Control Units: Analog, addressable type; listed, classified, and labeled as suitable for the purpose intended.

601 E. Front Ave. Ste. 201 Coeur d’Alene, Idaho 83814 Ph: 208.664.1773 Email: marcn@millerstauffer.com
(i) The FACP shall have a single button operation for the reset and silence functions. No user code shall be required to perform these functions.

(ii) The FACP shall automatically test the smoke detectors in compliance with NFPA standards to ensure that they are within listed sensitivity parameters and be listed with Underwriters Laboratories for this purpose.

(iii) The FACP shall have a built-in UL approved digital communicator. The digital communicator must be an integral part of the control panel and be capable of reporting all zones or points of alarm, supervisory, and trouble conditions as well as all system status information such as loss of AC, low battery, ground fault, and loss of supervision to any remote devices with individual and distinct messages to a central station or remote station. The communicator must also be capable of up/downloading of all system programming options, Event history and Sensitivity compliance information to a PC on site or at a remote location.

(iv) The digital communicator shall have an answering machine bypass feature that will allow the panel to respond to communication even on phone lines that have other communication equipment present. The communicator shall be capable of reporting via SIA and Contact ID formats. The communicator shall have a delayed AC loss report function which will provide a programmable report delay plus a 10-25 min random component to help ease traffic to the central station during a power outage. No controls that use External modems for remote programming and diagnostics shall be accepted.

(v) The FACP shall compensate for the accumulation of contaminants that affect detector sensitivity. The FACP shall have day/night sensitivity adjustments, maintenance alert feature (differentiated from trouble condition), detector sensitivity selection, auto-programming mode.

(vi) The FACP shall have a built-in annunciator with a LCD display having a minimum of 80 characters with the capability of having an additional eight supervised remote annunciators connected in the field.

(vii) The FACP built-in annunciator shall include LED indicators for General alarm, Supervisory, System trouble, System Silence and Power. When in the normal condition the LCD shall display time and date based on a 200 year clock which is capable of automatic daylight savings time adjustments. All controls and programming keys shall be silicone mechanical type with tactile and audible feedback. The annunciators shall have two levels of user codes that will allow the limitation of operating system programming to authorized individuals.

(viii) The FACP shall include an audible system trouble sounder as an integral part of the control unit. Provisions shall also be provided for an optional supervised remote trouble signal.

(ix) The FACP shall have three form “C” dry contacts, one will be dedicated to trouble conditions, the other two will be programmable for alarm, trouble, sprinkler supervisory, notification, pre-alarm, water flow, manual pull, aux. 1 or aux. 2. The trouble contact shall be normal in an electrically energized state so that any total power loss (AC and Backup) will cause a trouble condition. In the event that the microprocessor on the FACP fails the trouble contacts shall also indicate a trouble condition.

(x) The FACP shall include a ground fault detection circuit, to detect positive and negative grounds on all field wiring. The ground fault detector shall operate the general trouble devices as specified but shall not cause an alarm to be sounded. Ground fault will not interfere with the normal operation, such as alarm, or other trouble conditions.
C Initiating Devices:

(i) Addressable Systems:

1) Addressable Devices: Individually identifiable by addressable fire alarm control unit.

2) Provide suitable addressable interface modules as indicated or as required for connection to conventional (non-addressable) devices and other components that provide a dry closure output.

(ii) Manual Pull Stations:

1) Pull Stations shall provide a dual-color LED visible through handle of station that blinks green to indicate normal operation and remains steady red in an alarm condition.

2) Pull Stations shall provide key operated test and reset lock using lock plate actuator. Keys shall be compatible with and matching FACP locks.

3) Pull Stations shall be of die-cast metal or Lexan construction.

4) Provide 5 extra.

(iii) Smoke Detectors:

1) Detectors shall have a flashing status LED for visual supervision. When the detector is actuated, the LED will produce quick flashes or latch on steady at full brilliance. The detector may be reset by actuating the control panel’s reset switch. The sensitivity of the detector shall be capable of being selected and measured by the control panel without the need for external test equipment.

2) Detectors and Detector bases shall provide a vandal security-locking feature that shall be used in those areas as indicated on the construction drawings. The locking feature shall be field selectable when required and will prevent Detector removal without the use of a removal key device.

3) It shall be possible to perform a sensitivity test of Smoke Detectors without the need of generating smoke. The test method shall simulate the effects of products of combustion in the chamber to ensure testing of the detector circuits.

4) Detectors shall have completely closed back to restrict entry of dust and air turbulence and have a 30 mesh insect screen. Electronics of the unit shall be shielded to protect against false alarms from E.M.I. and R.F.I

5) Provide 5 extra.

(iv) Heat Detectors:

1) Provide 5 extra.

D Notification Appliances:

(i) Notification Appliances shall be listed for indoor use and shall meet the requirement of FCC Part 15 Class B. All inputs shall be compatible with standard reverse polarity supervision circuit wiring by the FACP. Notification Appliances shall be electronic and use solid-state circuitry.
(ii) The Horn and the audible portion of Single Tone Notification Appliances shall have a minimum of three (3) field selectable settings for dBA levels and shall have a choice of continuous or temporal (Code 3) audible outputs.

(iii) The Horn and the audible portion of the Multiple Tone Notification Appliances shall provide eight (8) fields selectable alarm tones. The tones shall consist of: HORN, BELL, MARCH TIME HORN, CODE-3 HORN, CODE-3 TONE, SLOW WHOOP, SIREN and HI/LO. Tone selection shall be by durable dip switch assembly and not clips or jumpers. The Multi-tone Audible appliance shall be UL Listed under Standard 464 for Audible Signal Appliances. The audible and the strobe shall be able to operate from a single notification appliance circuit while producing any of these tones. The appliance shall provide two output sound levels: STANDARD and HIGH dBA. The HIGH dBA setting shall provide a minimum 5 dBA increase in sound output at nominal voltage. The HIGH anechoic dBA measurement at 10 feet at the alarm HORN SETTING shall be 90 dBA minimum.

(iv) The strobe portion of the Notification Appliance shall produce a flash rate of one (1) flash per second over the Regulated Voltage Range and shall incorporate a Xenon flash tube enclosed in a rugged Lexan lens. Where wall mount, Notification Appliances are indicated on the design drawings, the strobe intensity shall have field selectable settings for: 15/30/75/110cd or 135/185cd. The selector switch for selecting the candela setting shall be tamper resistant. Where ceiling mount, Notification Appliances are indicated on the design drawings, the strobe intensity shall have field selectable settings for 15/30/75/95cd or 115/177cd.

(v) Synchronization of the strobe portion of the Notification Appliance shall be compatible with the FACP and not require additional synchronization modules.

E Remote Annunciators:

(i) Remote annunciators shall match the layout and functionality of the annunciator on the FACP.

(ii) The fire system shall be capable of supporting up to 8 Remote Annunciators in any combination.

(iii) The Remote Annunciator shall be able to acknowledge, silence and reset alarms without the use of a code.

(iv) The Remote Annunciator shall silence and reset alarms with the user of a code or firefighter’s key.

(v) The Remote Annunciator shall have 20 programmable user codes that will limit the operating system programming to authorized individuals.

(vi) The FACP shall allow all annunciators to accommodate multiple users input simultaneously.

(vii) The Remote Annunciator shall be capable of operating at a distance of 6000 feet from the main control panel on unshielded non-twisted cable.

F IP Communicator:

(i) The IP Communicator shall be connected to any FACP DACT telephone ports, the system shall be capable of transmitting Contact ID formatted alarms, supervisory or troubles to a system Network Control Center via Ethernet over a private or public WAN/LAN, Intranet or Ethernet.

(ii) The IP Communicator shall include connections to the Fire Alarm Control Panel’s phone outputs and shall convert the contact ID protocol into Ethernet Packets.

(iii) The IP Communicator shall be completely field programmable by the installer.
(iv) The IP Communicator shall provide the following system information and test signals:

1) Independent Zone (Alarm, trouble, non-alarm, supervisory). Including information to enable the central station to have details concerning the location for response.

2) Independent Addressable Device Status.

3) AC (Mains) Power Loss.

4) Low Battery and Earth Fault.

5) System Off Normal.

6) 24 Hour Test Signal.

7) Abnormal Test Signal.

(v) The IP Communicator shall include connections to the Fire Alarm Control Panel’s phone outputs and shall convert the contact ID protocol into Ethernet Packets.

(vi) The IP Communicator shall be capable of providing simulated phone lines to the FACP. The IP Communicator shall communicate over IP or GSM primary and shall be transparent to the FACP normal operation over phone lines.

(vii) The IP Communicator shall operate from 120 VAC, 60Hz power with a maintenance free battery backup capable of providing the required standby time of 24 hours followed by 5 minutes of alarm.

G Circuit Conductors: Copper.

(i) All wire and cable conform to NEC 760 compliant wiring and must be approved for Fire Protective Signaling Circuit use. All system wiring shall conform to NFPA 70 requirements.

(ii) Addressable loop cable: #18 AWG Twisted pair cable with overall shield.

(iii) Horn/Strobe: Minimum #14 AWG, #12 AWG for distances with creating greater than 3% drop in voltage.

(iv) Power Circuits: Minimum #12 AWG.

(v) Cables for RS-485 devices (remote annunciators) shall be twisted-shielded pair, Belden #9841 or equal, for the data signal.

H Auxiliary Devices:

(i) Relays outputs (Elevator systems, HVAC systems, Sprinkler Systems, etc): See Addressable Output Module.

(ii) System interface inputs (Elevator systems, HVAC systems, Sprinkler Systems, etc): See Addressable Input Module.

(iii) A metal enclosure or junction box shall be provided for each relay and/or module.
I  Locks and Keys: Deliver keys to Owner.
   (i) Provide the same standard lock and key for each key operated switch and lockable panel and cabinet; provide 5
       keys of each type.

J  Instruction Charts: Printed instruction chart for operators, showing steps to be taken when a signal is received
   (normal, alarm, supervisory, and trouble); easily readable from normal operator’s station.
   (i) Frame: Stainless steel or aluminum with polycarbonate or glass cover.
   (ii) Provide one for each control unit where operations are to be performed.
   (iii) Obtain approval of Owner prior to mounting; mount in location acceptable to Owner.
   (iv) Provide extra copy with operation and maintenance data submittal.

K  Storage Cabinet for Spare Parts and Tools: Steel with baked enamel finish, size appropriate to quantity of parts
   and tools.
   (i) Locate as directed by Owner.

L  Document boxes and frames:
   (i) Acceptable Manufacturers: Space Age Electronics, or equal.
   (ii) Fire Document Box (FDB) 12”x14” model SSU00672. Located at FACP.
   (iii) Fire Code Graphics Frame (CGF) model SSU52010. Locate one (1) at each Remote Fire Alarm Annunciator
       Panel.

Part 3. EXECUTION

Section 3.01 INSTALLATION

   A  Install in accordance with applicable codes, NFPA 72, NFPA 70, and Contract Documents.

   B  Conceal all wiring, conduit, boxes, and supports where installed in finished areas.

   C  Obtain Owner’s approval of locations of devices, before installation.

   D  Install instruction cards and labels.

   E  The entire system shall be installed in accordance with approved manufacturer’s wiring diagram. The contractor
       shall furnish all conduit, wiring, outlet boxes, junction boxes, cabinets and similar devices necessary for the
       complete installation. All wiring shall be of the type recommended by the manufacturer, approved by the local Fire
       Department, and shall be installed in conduit throughout.

   F  Make conduit and wiring connections to door release devices, sprinkler flow switches, sprinkler valve tamper
       switches, fire suppression system control panels, duct smoke detectors, and kitchen hood control panels.
       (i) Fire/smoke damper interface: Provide one interface relay for each duct smoke detector.

601 E. Front Ave. Ste. 201 Coeur d’Alene, Idaho 83814 Ph: 208.664.1773 Email: marcn@millerstauffer.com
(ii) Provide interface relays, proper programming, associated wiring and connections to interface with smoke control panels, ventilation equipment, red cell annunciator LEDs, over door annunciators and light bars as described herein.

G Raceways:

(i) All wiring shall be in a conduit system separate from other building wiring.

(ii) All wiring shall be in minimum ¾” rigid (non-flexible) metallic raceway.

(iii) Surface access to existing alarm initiating circuits in public areas shall be via UL listed surface metal raceways (minimum equivalent to ¾” conduit) and box extensions.

(iv) Provide red colored fittings, conduit bodies and junction boxes for all fire alarm circuits. All junction boxes shall be labeled “Fire Alarm”.

H Wiring:

(i) All cable shall be installed in conduit as per NEC Article 760.

(ii) All wiring shall be completely supervised. In the event of a primary power failure, disconnected standby battery, disarrangement of any components, any open circuits or grounds in the system, an audible and visual trouble signal shall be activated until the system is restored to normal.

(iii) All conductors shall be color-coded. Coding shall be consistent throughout the facility. Green wire shall be used only for equipment ground.

(iv) Fire Alarm Control Panel shall be connected to separate dedicated branch circuit from the building emergency panel, maximum 20 amps AT 120VAC.

(v) Provide isolated loop circuit protectors on each circuit extending beyond the building line with copper conductors.

(vi) Leave 8-inch wire tails at each device box and 36-inch wire tails at the Fire Alarm Control Panel and Remote Annunciator Panel(s).

(vii) All splices or connections shall be made within approved junction boxes and with approved fittings. Boxes shall be red and/or labeled “FIRE ALARM SYSTEM” by decal or other approved markings.

(viii) Single-Station Smoke Detectors: Where more than one smoke alarm is installed within a dwelling or suite, they shall be connected so that the operation of any smoke alarm causes the alarm in all smoke alarms to sound.

(ix) Remote Status and Alarm Indicators: Install in a visible location near each smoke detector, sprinkler water-flow switch, and valve-tamper switch that is not readily visible from normal viewing position.

(x) Audible and visible signals of each alarm notification device shall be on separate circuits to allow the audible signal to be controlled separately from the visible signal. All visible signals shall be synchronized as shown on the drawings and as directed by the Code Enforcing Authority.

I Unless otherwise noted on the drawings, plans, specifications or by the Architect or Engineer; the recommended mounting heights, and requirements are as follows:
(i) Fire Alarm Control Panels: Mount control panels so all visual indicators and controls at 60 inches above floor level.

(ii) Remote Annunciators: Install annunciators 54 inches (1370 mm) above floor to bottom.

(iii) Audio-Visual Devices: Install audible and visual devices 90 inches (2286 mm) to center above floor.

(iv) Manual Stations: Install manual station with operating handle 48 inches (1220 mm) above floor.

(v) Heat and Smoke Detectors: The location of detectors shown on the plans is schematic only. Smoke- or Heat-Detector Spacing shall comply with NFPA 72.

(vi) Detectors should be located on the highest part of a smooth ceiling so that the edge of the detector is no closer than 4 inches from a sidewall. Ceilings with beams, joists or soffits that exceed 8 inches in depth require special planning and closer spacing. Verify with manufacturer.

(vii) Smoke detectors should be installed to favor the air flow towards return openings and not located closer than 3 feet from air supply diffusers which could dilute smoke before it reaches the detector. No detectors shall be installed in direct airflow.

(viii) Heat and smoke detectors should be located near the center of the open area which they are protecting, thus providing coverage generally for 15 foot radius for smoke detectors and a 25 foot radius for heat detectors. Verify location with Architect or Engineer.

(ix) Duct smoke detector mounting: Field verify locations of round ducts and provide round duct adapter on all round ducts.

(x) Mount end-of-line device in box with last device or separate box adjacent to last device in circuit.

(xi) Elevator Shafts: Install a heat detector within 24 inches (610 mm) of each sprinkler head. Coordinate temperature rating and location with sprinkler rating and location. Do not install smoke detectors in sprinkled elevator shafts.

Section 3.02 INSPECTION AND TESTING FOR COMPLETION

A Notify Owner 7 days prior to beginning completion inspections and tests.

B Notify authorities having jurisdiction and comply with their requirements for scheduling inspections and tests and for observation by their personnel.

C Provide the services of the installer’s supervisor or person with equivalent qualifications to supervise inspection and testing, correction, and adjustments.

D Prepare for testing by ensuring that all work is complete and correct; perform preliminary tests as required.

E Provide all tools, software, and supplies required to accomplish inspection and testing.

F Perform inspection and testing in accordance with NFPA 72 and requirements of local authorities; document each inspection and test.
G Correct defective work, adjust for proper operation, and retest until entire system complies with Contract Documents.

H Prepare test and inspection reports.

Section 3.03 OWNER PERSONNEL INSTRUCTION

A Provide the following instruction to designated Owner personnel:

B Administrative: One-hour session(s) covering issues necessary for non-technical administrative staff; classroom:
   (i) Initial Training: 3 sessions pre-closeout.

C Furnish the services of instructors and teaching aids; have copies of operation and maintenance data available during instruction.

Section 3.04 CLOSEOUT

A Closeout Demonstration: Demonstrate proper operation of all functions to Owner.
   (i) Be prepared to conduct any of the required tests.
   (ii) Have at least one copy of operation and maintenance data, preliminary copy of project record drawings, input/output matrix, and operator instruction chart(s) available during demonstration.
   (iii) Have authorized technical representative of control unit manufacturer present during demonstration.
   (iv) Demonstration may be combined with inspection and testing required by authority having jurisdiction; notify authority having jurisdiction in time to schedule demonstration.
   (v) Repeat demonstration until successful.

Section 3.05 MAINTENANCE

A Provide to Owner, at no extra cost, a written maintenance contract for 1 year, to include the work described below.

B Perform routine inspection, testing, and preventive maintenance required by NFPA 72, including:
   (i) Maintenance of fire safety interface and supervisory devices connected to fire alarm system.
   (ii) Repairs required, unless due to improper use, accidents, or negligence beyond the control of the maintenance contractor.
   (iii) Record keeping required by NFPA 72 and authorities having jurisdiction.

C Provide trouble call-back service upon notification by Owner:
   (i) Provide on-site response within 2 hours of notification.
   (ii) Include allowance for call-back service during normal working hours at no extra cost to Owner.
(iii) Owner will pay for call-back service outside of normal working hours on an hourly basis, based on actual time spent at site and not including travel time; include hourly rate and definition of normal working hours in maintenance contract.

D Provide a complete description of preventive maintenance, systematic examination, adjustment, cleaning, inspection, and testing, with a detailed schedule.

E Maintain a log at each fire alarm control unit, listing the date and time of each inspection and call-back visit, the condition of the system, nature of the trouble, correction performed, and parts replaced. Submit duplicate of each log entry to Owner's representative upon completion of site visit.

F Comply with Owner's requirements for access to facility and security.

Section 3.06 DOCUMENTATION AND TRAINING

A The contractor shall compile and provide to the owners three (3) complete manuals on the completed system to include operating and maintenance instruction, catalog cuts of all equipment and components, as-built wiring diagrams and a manufacturer's suggested spare parts list.

B In addition to the above manuals, the contractor shall provide the services of the manufacturer's trained representative for a period of four (4) hours to instruct the owners' designated personnel on the operation and maintenance of the entire system.

END OF SECTION 284600
SECTION 312000 – EARTH MOVING

Part 1. GENERAL

Section 1.01 SECTION INCLUDES

A SUMMARY

B DEFINITIONS

C INFORMATIONAL SUBMITTALS

Section 1.02 SUMMARY

A Section Includes:

(i) Excavating and filling for rough grading the Site.

(ii) Preparing subgrades for slabs-on-grade walks pavements turf and grasses and plants.

(iii) Excavating and backfilling for buildings and structures.

(iv) Drainage course for concrete slabs-on-grade.

(v) Subbase course for concrete walks pavements.

(vi) Subbase course and base course for asphalt paving.

(vii) Excavating and backfilling trenches for utilities and pits for buried utility structures.

Section 1.03 DEFINITIONS

A Backfill: Soil material used to fill an excavation.

(i) Initial Backfill: Backfill placed beside and over pipe in a trench, including haunches to support sides of pipe.

(ii) Final Backfill: Backfill placed over initial backfill to fill a trench.

B Base Course: Aggregate layer placed between the subbase course and hot-mix asphalt paving.

C Bedding Course: Aggregate layer placed over the excavated subgrade in a trench before laying pipe.

D Borrow Soil: Satisfactory soil imported from off-site for use as fill or backfill.

E Drainage Course: Aggregate layer 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.

(i) Authorized Additional Excavation: Excavation below subgrade elevations or beyond indicated lines and dimensions as directed by Architect. Authorized additional excavation and replacement material will be paid for according to Contract provisions for changes in the Work.
Section 1.04 INFORMATIONAL SUBMITTALS  
a) Material test reports.

Part 2. PRODUCTS  
A SOIL MATERIALS  
(i) General: Refer to Civil General Notes and electrical site general notes for materials required for this project.

Part 3. EXECUTION  
Section 3.01 PREPARATION  
A Protect structures, utilities, sidewalks, pavements, and other facilities from damage caused by settlement, lateral movement, undermining, washout, and other hazards created by earth-moving operations.
B Protect and maintain erosion and sedimentation controls during earth-moving operations.
C Protect subgrades and foundation soils from freezing temperatures and frost. Remove temporary protection before placing subsequent materials.

Section 3.02 EXCAVATION, GENERAL  
A Unclassified Excavation: Excavate to subgrade elevations regardless of the character of surface and subsurface conditions encountered. Unclassified excavated materials may include rock, soil materials, and obstructions. No changes in the Contract Sum or the Contract Time will be authorized for rock excavation or removal of obstructions.

(i) If excavated materials intended for fill and backfill include unsatisfactory soil materials and rock, replace with satisfactory soil materials.

Section 3.03 EXCAVATION FOR STRUCTURES  
A 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.
(i) Excavations for Footings and Foundations: Do not disturb bottom of excavation. Excavate by hand to final grade just before placing concrete reinforcement. Trim bottoms to required lines and grades to leave solid base to receive other work.

Section 3.04 EXCAVATION FOR WALKS AND PAVEMENTS

A Excavate surfaces under walks and pavements to indicated lines, cross sections, elevations, and subgrades.

Section 3.05 EXCAVATION FOR UTILITY TRENCHES

A Excavate trenches to indicated gradients, lines, depths, and elevations.

B Excavate trenches to uniform widths to provide the following clearance 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.

(i) Clearance: 12 inches (300 mm) each side of pipe or conduit, unless otherwise indicated.

C Trench Bottoms: Excavate and shape trench bottoms to 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.

(i) Excavate trenches 6 inches (150 mm) deeper than elevation required in rock or other unyielding bearing material to allow for bedding course.

D Trenches in Tree- and Plant-Protection Zones:

(i) Hand-excavate to indicated lines, cross sections, elevations, and subgrades. Use narrow-tine spading forks to comb soil and expose roots. Do not break, tear, or chop exposed roots. Do not use mechanical equipment that rips, tears, or pulls roots.

(ii) Do not cut main lateral roots or taproots; cut only smaller roots that interfere with installation of utilities.

(iii) Cut and protect roots according to requirements in Section 015639 "Temporary Tree and Plant Protection."

Section 3.06 SUBGRADE INSPECTION

A Proof-roll subgrade below the building slabs and pavements with a pneumatic-tired dump truck to identify soft pockets and areas of excess yielding. Do not proof-roll wet or saturated subgrades.

B Reconstruct subgrades damaged by freezing temperatures, frost, rain, accumulated water, or construction activities, as directed by Architect, without additional compensation.

Section 3.07 UNAUTHORIZED EXCAVATION

A Fill unauthorized excavation under foundations or wall footings by extending bottom elevation of concrete foundation or footing to excavation bottom, without altering top elevation. Lean concrete fill, with 28-day compressive strength of 2500 psi (17.2 MPa), may be used when approved by Architect.

(i) Fill unauthorized excavations under other construction, pipe, or conduit as directed by Architect.

Section 3.08 STORAGE OF SOIL MATERIALS

A Stockpile borrow soil materials and excavated satisfactory soil materials without intermixing. Place, grade, and shape stockpiles to drain surface water. Cover to prevent windblown dust.
(i) Stockpile soil materials away from edge of excavations. Do not store within drip line of remaining trees.

Section 3.09 UTILITY TRENCH BACKFILL

A Place backfill on subgrades free of mud, frost, snow, or ice.

B 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.

C Trenches under Footings: 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 Section 033000 "Cast-in-Place Concrete."

D Trenches under Roadways: Provide 4-inch- (100-mm-) thick, concrete-base slab support for piping or conduit less than 30 inches (750 mm) below surface of roadways. After installing and testing, completely encase piping or conduit in a minimum of 4 inches (100 mm) of concrete before backfilling or placing roadway subbase course. Concrete is specified in Section 033000 "Cast-in-Place Concrete."

E Initial Backfill: Place and compact initial backfill of satisfactory soil, free of particles larger than 1 inch (25 mm) in any dimension, to a height of 12 inches (300 mm) over the pipe or conduit.

   (i) Carefully compact initial backfill under pipe haunches and compact evenly up on both sides and along the full length of piping or conduit to avoid damage or displacement of piping or conduit. Coordinate backfilling with utilities testing.

F Final Backfill: Place and compact final backfill of satisfactory soil to final subgrade elevation.

Section 3.10 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 as follows:

   (i) Under grass and planted areas, use satisfactory soil material.

   (ii) Under walks and pavements, use satisfactory soil material.

   (iii) Under steps and ramps, use engineered fill.

   (iv) Under building slabs, use engineered fill.

   (v) Under footings and foundations, use engineered fill.

Section 3.11 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.

   (i) Do not place backfill or fill soil material on surfaces that are muddy, frozen, or contain frost or ice.

   (ii) Remove and replace, or scarify and air dry, otherwise satisfactory soil material that exceeds optimum moisture content by 2 percent and is too wet to compact to specified dry unit weight.

Section 3.12 COMPACITION OF SOIL BACKFILLS AND FILLS
A Place backfill and fill soil materials in layers as indicated in Civil General Notes and Geotechnical Evaluation.

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 D698.

Section 3.13 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 Rough Grading: Slope grades to direct water away from buildings and to prevent ponding. Finish subgrades to elevations required to achieve indicated finish elevations, within the following subgrade tolerances:

(i) Turf or Unpaved Areas: Plus or minus 1 inch (25 mm).

(ii) Walks: Plus or minus 1 inch (25 mm).

(iii) 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.

Section 3.14 SUBBASE AND BASE COURSES UNDER PAVEMENTS AND WALKS

A Place subbase course and base course on subgrades free of mud, frost, snow, or ice.

B On prepared subgrade, place subbase course and base course under pavements and walks as follows:

(i) Shape subbase course and base course to required crown elevations and cross-slope grades.

(ii) Place subbase course and base 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.

(iii) Compact subbase course and base course at optimum moisture content to required grades, lines, cross sections, and thickness to not less than [95] percent of maximum dry unit weight according to ASTM D698 and ASTM D1557.

Section 3.15 DRAINAGE COURSE UNDER CONCRETE SLABS-ON-GRADE

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:

(i) 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.

(ii) Compact each layer of drainage course to required cross sections and thicknesses to not less than 95 percent of maximum dry unit weight according to ASTM D698.

Section 3.16 FIELD QUALITY CONTROL
A 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 Architect.

B 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 materials to depth required; recompact and retest until specified compaction is obtained.

Section 3.17 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 correction period elapses, remove finished surfacing, backfill with additional soil material, compact, and reconstruct surfacing.

(i) Restore appearance, quality, and condition of finished surfacing to match adjacent work, and eliminate evidence of restoration to greatest extent possible.

Section 3.18 DISPOSAL OF SURPLUS AND WASTE MATERIALS

A Remove surplus satisfactory soil and waste materials, including unsatisfactory soil, trash, and debris, and legally dispose of them off Owner's property.

END OF SECTION 312000
SECTION 32 31 00
FENCES AND GATES

Part 1. GENERAL

Section 1.01 SUMMARY
A Section includes:
(i) Chain-Link Fence
(ii) Chain-Link Pedestrian Access Gates
(iii) Vertical Pivot Access Gate with Operator

Section 1.02 ACTION SUBMITTALS
A Product Data: For each type of product.
B Shop Drawings: Show fence extent and typical construction details.

Section 1.03 CLOSEOUT SUBMITTALS
A Operation and maintenance data.

Section 1.04 DELIVERY, STORAGE, AND HANDLING
A Deliver materials to site in an undamaged condition. Store materials off the ground to provide protection against damage and staining caused by ground contact.
B Protect all materials while materials are being stored.
C Secure materials as necessary from theft of damage.

Section 1.05 QUALITY ASSURANCE
A Installer must have 5 years’ experience installing commercial chain-link fences and gates.
B All materials must be secured by one supplier, unless not feasible.
C Obtain measurements at the Site to verify layout information and dimensions for fencing and gates in relation to reference points provided by Owner or Indicated in the Contract Documents.

Part 2. PRODUCTS

Section 2.01 GENERAL
A Scope:
(i) Three Access pedestrian gates (Two with Access control and one with Pad Lock)
(ii) Additional length of fence. All posts are to be cemented and installed per manufacturer instructions.
B  Provide Structural Analysis where needed, provide additional members, or increase member size, thickness, or weight.

C  Location & Extent: Refer to architectural site plan for extent new fence layout.

D  Existing Fence: The existing fencing materials can be used if not damaged or in poor condition, otherwise new materials must be supplied.

Section 2.02 CHAIN LINK FENCE

A  Material: Galvanized Steel.

B  Fabric: Match Existing fabric size.
   (i) One-Piece fabric widths.
   (ii) Wire mesh shall be woven throughout in form of approximately uniform square mesh with parallel sides and horizontal and vertical diagonals of approximately uniform dimensions, of size and gage as existing.

C  Posts: Match existing fence post sizes.
   (i) The pipe shall be commercial grade, plain-end steel pipe with standard-weight walls. Steel strip used for manufacturer of pipe shall comply with ASTM F1083, schedule 40 pipe with minimum yield strength of 25,000 psi and protected with zinc.

D  Fittings: Comply with ASTM F626.

E  Top Rail, Bottom Rail, and other Supports: Match existing fence construction methods.
   (i) End, Corner, and Pull Posts: Provide end, corner, and pull posts of following minimum sizes:
      a. Up to six feet fabric height:
         a) 2.375 inches OD pipe weighing 3.65 pounds per linear foot.
      b. Over six feet fabric height and less than eight feet fabric height:
         a) 2.875 inches OD pipe weighing 5.79 pounds per linear foot.
      c. Over eight feet fabric height:
         a) 3.50 inches OD pipe weighing 7.58 pounds per linear foot
   (ii) Line Posts: Provide line posts of following minimum sizes and weights:
      a. 1. Up to six feet fabric height:
         a) 1.90 inches OD pipe weighing 2.72 pounds per linear foot.
      b. 2. Over six feet fabric height and less than eight feet fabric height:
         a) 2.375 inches OD pipe weighing 3.65 pounds per linear foot.
      c. 3. Over eight feet fabric height:
a) 3.50 inches OD pipe; weight of 7.58 pounds per linear foot.

(iii) Gate Posts: Provide gate posts for supporting single gate leaf, or one leaf of a double gate installation, for nominal gate widths as follows:

a. Up to six feet wide:
   a) 2.875 inches OD pipe weighing 5.79 pounds per linear foot.

b. Over six feet wide and up to 13 feet wide:
   a) Four inches OD pipe weighing 9.11 pounds per linear foot.

c. Over 13 feet wide and up to 18 feet wide:
   a) 6.625 inches OD pipe weighing 18.97 pounds per linear foot.

d. Over 18 feet wide:
   a) 8.625 inches OD pipe weighing 28.55 pounds per linear foot.

(iv) Top Rail: Provide top rails, unless otherwise shown or indicated, conforming to the following:

a. 1.660 inch OD pipe weighing 2.27 pounds per linear foot.

b. Provide in manufacturer's longest lengths, with expansion-type coupling 0.051-inch thick rail sleeves, approximately seven inches long, for each joint.

c. Provide means for attaching top rail securely to each gate, corner, pull, and end post.

(v) Center Rails Between Line Posts: Provide center rails between line posts at corners only, (or where shown), consisting of 1.660-inch OD pipe weighing 2.27 pounds per linear foot.

(vi) Roll-Formed Steel: Provide rolled steel shapes produced from structural-quality steel conforming to ASTM A1011, Grade 45, with minimum yield strength of 45,000 pounds psi. Protective coating system shall conform to ASTM F1043, as specified.

(vii) Post Brace Assembly: Provide bracing assemblies at end and gate posts, and at both sides of corner and pull posts, with horizontal brace located at mid-height of fabric.

   a. Use 1.900-inch OD pipe weighing 2.72 pounds per linear foot for horizontal brace and 3/8-inch diameter rod with turnbuckle for diagonal truss.

F Height: Match Existing.

Section 2.03 GATES

A Swing gates shall comply with ASTM F900.

B Gate hinges shall be double clamping offset type. To hold gate in the open or closed positions, provide each gate frame with a keeper that automatically engages gate shoe set in concrete. Gates shall have drop latch with provision for padlock.

(i) Gate Hinges: Pressed or forged steel or malleable iron to suit gate size, non-lift-off type, 180-degree offset heavy-industrial hinges, 1.5 pair per leaf.
(ii) Latch: Forked type or plunger bar type to permit operation from either side of gate, with padlock eye as integral part of latch.

(iii) Keeper: Provide a gate keeper for vehicle gates that automatically engages gate leaf and holds gate leaf in open position until manually released.

C Manual Padlocked Gates: Provide each gate with heavy-duty bronze padlock and shackle chain as follows on manual lock gates:

(i) Product and Manufacturer: Provide one of the following:
   b. Or equal.

(ii) Provide three keys for each padlock. Where more than one gate is required for the same enclosure, padlocks shall be keyed identically.

(iii) Locks shall be keyed to match OWNER’s existing locks.

D Provide Access control components for gates called out to be controlled by access control.

(i) Provide lever lockset with electric strike connected to buildings access control system.

(ii) Hinges to be self-closing with hold open.

(iii) Fence Supplier to coordinate with access control contractor. Access control contractor will provide wiring and conduit, but gate hardware to be supplied by gate supplier.

(iv) Gate to remain in locked position if power is lost.

E Provide gate frames with intermediate horizontal rails. Gate frames shall be welded construction and shall be galvanized after fabrication. Provide single gates six feet or greater in width, and double gates 12 feet or greater in width, with diagonal bracing in one direction, extending from top to bottom rail.

F Gate Stops: Provide gate stops for double gates consisting of mushroom-type flush plate with anchors, set in concrete and designed to engage a center drop rod or plunger bar. Include locking device and padlock eyes as integral part of latch, using one padlock for locking both gate leaves.

G Fabricate gate perimeter frames of tubular members. Provide additional horizontal and vertical members to ensure proper gate operation and for attachment of fabric, hardware, and accessories. Space so that frame members are not more than eight feet apart. Fabricate as follows:

(i) Up to six feet high, or leaf width of eight feet or less:
   a. 1.660-inch OD pipe weighing 2.27 pounds per linear foot.

(ii) Over six feet high, or leaf width exceeding eight feet:
   a. 1.900-inch OD pipe weighing 2.72 pounds per linear foot.

H Assemble gate frames by welding or with special malleable or pressed steel fittings and rivets for rigid connections. Use the same fabric as provided for the fence. Install fabric with stretcher bars at vertical edges. Bars may also be used at top and bottom edges. Attach stretchers to gate frame at not more than 15 inches on centers. Attach hardware with rivets or by other means that will provide security against removal and breakage.
I Install diagonal cross-bracing on gates consisting of 1/2-inch diameter adjustable length truss rods provided with turnbuckles to ensure frame rigidity without sag or twist.

Section 2.04 AUXILIARY FENCING MATERIALS AND ACCESSORIES

A Wire Ties:
   (i) For tying fabric to line posts, use nine-gage, aluminum alloy 1100-H4 wire ties to match fence fabric, spaced 12 inches on centers.
   (ii) For tying fabric to rails and braces, use nine-gage, aluminum alloy 1100-H4 wire ties to match fence fabric, spaced two feet on centers.
   (iii) For tying fabric to tension wire, use 11-gage, aluminum alloy 1100-H4 wire hog ring ties to match fence fabric, spaced two feet on centers.

B Tension Wire: Provide tension wire consisting of aluminized, seven-gage, coiled spring steel wire coated with 0.40-ounces of aluminum per square foot of wire surface, minimum, in compliance with ASTM F1664.
   (i) Locate at bottom of fabric only.

C Post Caps: Pressed steel, wrought iron, or cast aluminum alloy, designed as weather-tight closure cap, for tubular posts. Provide one cap for each post unless equal protection is afforded by combination post-top cap and barbed wire supporting arm, where barbed wire is required.
   (i) Provide caps with openings to allow through-passage of top rail.
   (ii) Provide cone-type caps for terminal posts and loop-type caps for line posts.

D Stretcher Bars: One-piece lengths equal to full height of fabric, with minimum cross-section of 3/16-inch by 3/4-inch. Provide one stretcher bar for each gate and end-post, and two for each corner- and pull-post, except where fabric is integrally woven into the post.

E Stretcher Bar Bands: Pressed steel, galvanized, 0.078-inch to 0.108-inch thick depending on post diameter, spaced not greater than 15 inches on centers to secure stretcher bars to end-, corner-, pull-, and gateposts.
   (i) Bands may also be used with special fittings for securing rails to end-, corner-, pull-, and gateposts.

F Truss Rods: Steel rods, 3/8-inch diameter, merchant quality with turnbuckle.

G Concrete: 5 Sack post mix.

Section 2.05 FINISHING

A Welded Joints:
   (i) Repair zinc coatings at welded joints by applying zinc-rich paint, matching adjacent material.

Section 2.06 VERTICAL PIVOT VEHICLE GATE

A Provide 25'-0" painted steel vertical pivot gate. Gate to have barb wire on top surface. All surfaces to be finished with powered coated gray finish.

B Vertical pivot gate to be controlled by high low access control pedestal with phob / keypad controller. Controller, pedestals and wiring to be provided by the access control company.
C  Vertical Pivot Gate supplier to supply safety loops, and vehicle access loops on interior side to open gate. Loops to be installed under asphalt. Cutting asphalt in is not an acceptable method of installation for loops. New asphalt is planned at gate installation.

(i)  Gate supplier to supply loops prior to gate installation.

D  Gate to be controlled by loops, vehicle access pedestals, or vehicle remote control.

E  Height: 6’-0” minus barb wire.

F  Openings: No greater than 3” openings.

G  Provide built-in Battery Back-up.

(i)  Smart Battery charging system.

H  Programable delayed closing

I  Adjustable speed control.

J  120 VAC, Single Phase 20 amp.

K  Steel tubing Sub Structure.

L  Gate Operator:

(i)  Provide gate operator system, including gate operator, field supplied manufacturer recommended batteries, and all components needed to the gate as noted in these specifications.

a.  Gate Speed: Fully open to fully closed to open not less than 10 to 12 seconds.

b.  Frequency of Use: Continuous Duty.

c.  Operator to run on 24 Volt DC current integral power supply with stand0by battery system with built-in battery maintainer and “over charge” protection.

a)  Field supplied: Provide two (2) 12v batteries, complying with gate operator manufacturer’s requirements (group 24, 12 volt, sealed Marien Starting).

b)  Power Supply to operator: 120 VAC (20amp).

d.  Gate Operator Enclosure: Fabricate operator enclosure from steel tubing and sheet metal. Continuous seal weld all frames seams with welds ground smooth. Screw frames are not acceptable.

a)  Frame: 2” sq., 11 Ga. Steel Tubing

b)  Skins: 18 ga.

c)  Doors: 14 Ga.

d)  Mounting pads: 3” wide x 3/8” thick

e)  Finish: Standard Operator skins are powder coated Gray. Gate panels and operator skin colors are finish the same.

(ii)  Gate Operator system shall be listed to UL 325 Class II and the gate panel shall be fabricated in accordance with ASTM F2200.
Part 3. EXECUTION

Section 3.01 CHAIN LINK FENCE AND GATES

A Install per ASTM F567.

B Excavation: Drill holes of diameters specified, for post footings in firm, undisturbed or compacted soil.
   (i) For posts set in cast-in-place concrete, provide hole diameters dug or drilled a minimum of four times the largest cross section of post.
   a. Unless otherwise shown or indicated, excavate hole depths approximately three inches lower than bottom of post, with bottom of posts set not less than two feet below the surface of finished grade when in firm, undisturbed soil, plus an additional three inches for each foot increase in the fence height over four feet.

C Remove soil from excavations from the site.

D When solid rock is encountered at ground surface, drill into rock at least 12 inches for line-posts and at least 1.5 feet for end, pull, corner, and gate posts. Drill hole at least one inch greater diameter than largest dimension of post to be placed.
   (i) If solid rock is below soil overburden, drill to full depth required, except penetration into rock need not exceed the minimum depths specified above for rock encountered at ground surface.

E Setting Posts: Remove loose and foreign materials from sides and bottoms of holes, and moisten soil prior to placing concrete.
   (i) Center and align posts in holes 3-inches above bottom of excavation.
   (ii) Posts shall be set in concrete footings, except as otherwise shown or specified. Place concrete around posts in continuous pour and vibrate or tamp for consolidation. Check each post for vertical and top alignment, and hold in position during placement and finishing operations.
   (iii) Extend concrete to two inches above ground surface, or to two inches below ground surface if cover of sod, bituminous asphalt paving, or other material is shown or indicated to conceal concrete. Crown to shed water away from posts.
   (iv) Extend footings for gate posts to underside of bottom hinge. Set keeps, stops, sleeves, and other accessories into concrete as required.
   (v) Keep exposed concrete surfaces moist for at least seven days after placement, or cure with membrane curing materials, or other acceptable curing methods.

F Concrete Strength: Allow concrete to attain at least 75 percent of its minimum 28-day compressive strength, but in no case sooner than seven days after placement, before installing rails, tension wires, barbed wire, or chain-link fabric.
   (i) Do not stretch and tension fabric and wires, and do not hang gates, until concrete has attained its full design strength.

G Posts and Rails:
   (i) Line Posts: Set posts in cast-in-place concrete footings as specified, spaced not more than ten feet on centers. Provide caps on top of each post to exclude moisture and to receive top rail, unless equal protection is afforded by combination post-top cap and barbed wire supporting arm, where barbed wire is required.
(ii) Top Rails: Run rail continuously through post caps or extension arms, bending to radius for curved runs. Provide expansion couplings as recommended by the fencing manufacturer to form continuous rail between terminal posts.

(iii) Brace Assemblies: Install braces so posts are plumb when diagonal rod are under proper tension. Install brace assemblies at end-posts and at both sides of corner and pull post panels. Panels adjacent to gates shall have intermediate horizontal rails and diagonal bracing. Diagonal bracing shall run from center of first line-post to bottom of terminal-post.

H Chain-Link Fabric:

(i) Install fabric on the security side of fence, and anchor to framework so that fabric remains in tension after pulling force is released. Fasten to terminal posts and gate posts with tension bars threaded through mesh and secured with tension bands at maximum intervals of fourteen inches.

(ii) Tie to line-posts, gate frames and top and bottom rails with tie wires spaced at maximum 12 inches on posts and two feet on rails.

(iii) Connect tension bars to posts and frames by means of adjustable bolts and bands spaced not more than 14 inches apart.

(iv) Leave approximately two inches between finish ground surface and bottom selvage, except where bottom of fabric extends into concrete.

(v) Join roll of chain-link fabric by weaving a single picket into the ends of roll to form continuous mesh.

I Grounding and Bonding

(i) Fence Grounding: Provide at maximum intervals of 1,500 feet, except as follows:

   a. Ground fencing within 100 feet of buildings, structures, walkways, and roadways at maximum intervals of 750 feet.

      a) Gates and Other Fence Openings: Ground fence on each side of opening.

      b) Bond metal gates to gateposts.

      c) Bond across openings, with and without gates, except openings indicated as intentional fence discontinuities. Use No. 2-gage wire and bury wire at least 1.5 feet below finished ground surface.

(ii) Protection at Crossings of Overhead Electrical Power Lines: Ground fencing at location of crossing and at maximum distance of 150 feet on each side of crossing.

(iii) Fences Enclosing Electrical Power Distribution Equipment: Ground as required by IEEE C2, unless otherwise shown or indicated.

(iv) Grounding Method: At each grounding location, drive the ground rod vertically until the top is six inches below the finished ground surface. Connect the rod to fence with No. 6-gage conductor. Connect conductor to each fence component at grounding location, including the following:

      a) Each Barbed Wire Strand: Make grounding connections to barbed wire with wire-to-wire connectors designed for this purpose.

(v) Bonding Method for Gates: Connect bonding jumper between gate post and gate frame.
(vi) Connections: Make connections so the possibility of galvanic action or electrolysis is minimized. Provide connectors, connection hardware, conductors, and connection methods so metals in direct contact will be galvanically compatible.

a) Use electroplated or hot-tin-coated materials to ensure high conductivity and to make contact points closer in order of galvanic series.

b) Make connections with clean, bare metal at points of contact.

c) Make aluminum-to-steel connections with stainless-steel separators and mechanical clamps.

d) Make aluminum-to-galvanized-steel connections with tin-plated copper jumpers and mechanical clamps.

e) Coat and seal connections having dissimilar metals with inert material to prevent future penetration of moisture to contact surfaces.

J Adjustment and Cleaning

(i) Repair coatings damaged in the shop or at the Site by recoating with manufacturer's recommended repair compound, applied in accordance with manufacturer's directions. Repair hot-dip galvanized coatings in accordance with ASTM A780.

(ii) Gate: Adjust gate to operate smoothly, easily, and quietly, free of binding, warp, excessive deflection, distortion, nonalignment, misplacement, disruption, and malfunction throughout entire operational range. Confirm that latches and locks engage accurately and securely without forcing or binding.

(iii) Lubricate operating equipment and clean exposed surfaces.

(iv) Repair and replace broken or bent components.

Section 3.02 VERTICAL PIVOT GATE

A Examination:

(i) Installer's Examination: Examine conditions under which construction activities of this section are to be performed and insure all specified criteria is adhere to.

(ii) Submit written notification to Owner and Construction manager that such conditions are acceptable or unacceptable. If unacceptable note all deficiencies.

a. Once deficiencies are corrected obtain approval to proceed from Construction Manager.

B Electrical Service & Controls:

(i) Provide all power and control wiring required for the work in accordance with the applicable provisions of Division 26, 16 and NEC 70.

a. Electrician will provide power to operator.

b. Access Control Contractor will provide wiring for access control.

c. Connection of Operator and safety loop installation will be responsibility of Gate Installer.

(ii) Perform all trenching and backfilling associated with gate operator's installation and scope of work. Conduit shall be direct buried except under areas of vehicular traffic where it shall be reinforced concrete encased.
(iii) Ground system: All equipment and branch circuits shall be grounded. Provide driven ground rod at operator per installation manual, local code, and project requirements. Provide separate ground wire in all branch circuits.

C  Pads & Receiving Yokes

(i) Foundations: Construct Pads and yoke bases as indicated on the drawings with top concrete flat and level.

(ii) Excavation:
   a. Locate Concrete foundations for operator base on firm, undisturbed soil.
   b. Yoke Excavation: Drill or hand-excavate holes.

(iii) Vibrate or tamp concrete consolidation. Finish top of foundations, smooth and even. Cure concrete 72 hours before place operator.

(iv) Fasteners: Install operators and the receiving yoke plates with expansion bolts or hardware provided by the gate system manufacturer.

D  Operator Installation:

(i) Install units in accordance with the manufacturer's instructions.

   a. Operator Expansion Bolt Mounting: Anchor through operator footpad holes to concrete substrate only after operator final position on pad has been confirmed for exact site needs and operation.

   b. Install all loose shipped operator lower panels, debris shields if ordered, screening, and guarding per manufacturer instructions.

E  GATE INSTALLATION

(i) Connect gate to operator in accordance with gate manufacturer's instruction.

(ii) Install gate so that it is plumb and level when fully closed within the following tolerances:

   a. Maximum misalignment from true position: 1/4 inch (6.0 mm).

   b. Maximum misalignment between adjacent separated members: 1/8 inch (3.0 mm).

F  ADJUSTING

(i) Adjust and lubricate operating components for smooth, accurate operation free of binding and racking.

G  START-UP AND DEMONSTRATION

(i) Manufacturer's Service Representative: Provide at least 2 hours of manufacturer's representatives time for start-up and initial operation. Make a final check of each gate operation with Owner's personnel present and immediately before date of substantial completion or commissioning.

(ii) Instruct Owner's personnel in proper use, operation, hazards, and maintenance of gate. Review emergency provisions, including procedures to be followed if gate does not close or open. Review and demonstrate manually opening and closing the gate system in the event of total loss of power.

(iii) Instruct Owner’s personnel in proper use, operation, and maintenance of all accessories and entrapment protection devices and provisions such as but not limited to: lights, vehicle presences systems, access controls, photo eyes, contact sensors, barrier screening or fencing, etc.
(iv) Train Owner's personnel in normal procedures to be followed in checking for sources of damage to wind bracing, operational failures, or malfunctions.

(v) Full Wind Rating and Derating: Full wind load rating is subject to the wind bracing remaining in excellent condition and not compromised. Periodic inspection is a must in order to maintain full wind load rating. Any dents, bends, nicks, and loose bolts that will affect the performance of the bracing must be corrected or repaired. Additionally, non-factory supplied signage must be approved by the manufacturer.

(vi) Determine that control systems and operating devices are functioning properly.

(vii) Fill out and sign manufacturer provided Gate Installation Checklist. Installer to retain copy for records. Provide copies to the owner, General Contractor, and requesting parties or other Authorities Having Jurisdiction (AHJ).

(viii) Adjust applicable automatic timers for periods required and as directed.

H CLEANING AND PROTECTION

(i) Remove dust or other foreign matter from component surfaces. Clean finishes in accordance with manufacturer's instructions. Clean units in accordance with the manufacturer's instructions.

(ii) Protection: After installation, protect installed work until project completion.

a. Ensure that the finishes and structure of installed systems are not damaged by subsequent construction activities.

b. If minor damage to finishes occurs, repair damage in accordance with manufacturer's recommendations; provide replacement components if repaired finishes are unacceptable to Architect/Engineer.

END OF SECTION 323100
SECTI ON 32 84 00
PLANTING IRRIGATION

Part 1. GENERAL

Section 1.01 SUMMARY

A Section includes:

(i) Pipes, tubes, and fittings.
(iii) Automatic control valves.
(iv) Automatic drain valves.
(v) Sprinklers.
(vi) Quick couplers.
(vii) Controllers.
(viii) Boxes for automatic control valves.

Section 1.02 ACTION SUBMITTALS

A Product Data:

(i) Pipes, tubes, and fittings.
(iii) Automatic control valves.
(iv) Automatic drain valves.
(v) Sprinklers.
(vi) Quick couplers.
(vii) Controllers.
(viii) Boxes for automatic control valves.
(ix) Include rated capacities, operating characteristics, electrical characteristics, and furnished specialties and accessories.

B Wiring Diagrams: For power, signal, and control wiring.

C Delegated Design Submittal: For irrigation systems analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

Section 1.03 INFORMATIONAL SUBMITTALS
A Coordination Drawings: Irrigation systems, drawn to scale, on which components are indicated and coordinated with each other, using input from installers of the items involved. Also include adjustments necessary to avoid plantings and obstructions, such as signs and light standards.

B Zoning Chart: Indicate each irrigation zone and its control valve.

C Controller Timing Schedule: Indicate timing settings for each automatic controller zone.

D Field Quality-Control Submittals:
   (i) Field quality-control reports.

Section 1.04 CLOSEOUT SUBMITTALS

A Operation and maintenance data.

Section 1.05 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.

Part 2. PRODUCTS

Section 2.01 Products

A Products and Materials are identified in Landscape Drawing Plans and Specifications.

Part 3. EXECUTION

Section 3.01 EARTHWORK

A Excavating, trenching, and backfilling are specified in Section 312000 "Earth Moving."

B Install warning tape directly above pressure piping, 12 inches (300 mm) below finished grades, except 6 inches (150 mm) below subgrade under pavement and slabs.

C Drain Pockets: Excavate to sizes indicated. Backfill with cleaned gravel or crushed stone, graded from 3/4 to 3 inches (19 to 75 mm), to 24 inches (600 mm) below grade. Cover gravel or crushed stone with sheet of asphalt-saturated felt and backfill remainder with excavated material.

D Provide minimum cover over top of underground piping according to the following:
   (i) Irrigation Main Piping: Minimum depth of 30 inches (900 mm) below finished grade.
   (ii) Circuit Piping: 12 inches (300 mm).
   (iii) Drain Piping: 12 inches (300 mm).
   (iv) Sleeves: 24 inches (600 mm).

Section 3.02 INSTALLATION OF PIPING

A Location and Arrangement: Drawings indicate location and arrangement of piping systems. Install piping as indicated unless deviations are approved on Coordination Drawings.
B  Install piping at minimum uniform slope of 0.5 percent down toward drain valves.
C  Install piping free of sags and bends.
D  Install groups of pipes parallel to each other, spaced to permit valve servicing.
E  Install fittings for changes in direction and branch connections.
F  Install unions adjacent to valves and to final connections to other components with NPS 2 (DN 50) or smaller pipe connection.
G  Install flanges adjacent to valves and to final connections to other components with NPS 2-1/2 (DN 65) or larger pipe connection.
H  Install underground thermoplastic piping in accordance with ASTM D2774[ and ASTM ].
I  Install expansion loops in control-valve boxes for plastic piping.
J  Lay piping on solid subbase, uniformly sloped without humps or depressions.
K  Install ductile-iron piping in accordance with AWWA C600.
L  Install PVC piping in dry weather when temperature is above 40 deg F (5 deg C). Allow joints to cure at least 24 hours at temperatures above 40 deg F (5 deg C) before testing.

Section 3.03 JOINT CONSTRUCTION

A  Ream ends of pipes and tubes and remove burrs. Bevel plain ends of steel pipe.
B  Remove scale, slag, dirt, and debris from inside and outside of pipe and fittings before assembly.
C  Threaded Joints: Thread pipe with tapered pipe threads in accordance with ASME B1.20.1. Cut threads full and clean using sharp dies. Ream threaded pipe ends to remove burrs and restore full ID. Join pipe fittings and valves as follows:
   (i)  Apply appropriate tape or thread compound to external pipe threads unless dry seal threading is specified.
   (ii) Damaged Threads: Do not use pipe or pipe fittings with threads that are corroded or damaged. Do not use pipe sections that have cracked or open welds.
D  Flanged Joints: Select rubber gasket material of size, type, and thickness for service application. Install gasket concentrically positioned. Use suitable lubricants on bolt threads.
E  Ductile-Iron Piping Gasketed Joints: Comply with AWWA C600 and AWWA M41.
G  Copper-Tubing Soldered Joints: Apply ASTM B813 water-flushable flux to tube end unless otherwise indicated. Construct joints in accordance with ASTM B828 or CDA's "Copper Tube Handbook," using lead-free solder alloy (0.20 percent maximum lead content) complying with ASTM B32.
H  PE Piping Fastener Joints: Join with insert fittings and bands or fasteners in accordance with piping manufacturer's written instructions.
PVC Piping Solvent-Cemented Joints: Clean and dry joining surfaces. Join pipe and fittings in accordance with the following:

(i) Comply with ASTM F402 for safe-handling practice of cleaners, primers, and solvent cements.

(ii) PVC Pressure Piping: Join schedule number, ASTM D1785, PVC pipe and PVC socket fittings in accordance with ASTM D2672. Join other-than-schedule-number PVC pipe and socket fittings in accordance with ASTM D2855.

(iii) PVC Nonpressure Piping: Join in accordance with ASTM D2855.

1.1 INSTALLATION OF VALVES

J Underground Curb Valves: Install in curb-valve casings with tops flush with grade.

K Underground Iron Gate Valves, Resilient Seat: Comply with AWWA C600 and AWWA M44. Install in valve casing with top flush with grade.

(i) Install valves and PVC pipe with restrained, gasketed joints.

L Aboveground Valves: Install as components of connected piping system.

M Throttling Valves: Install in underground piping in boxes for automatic control valves.

N Drain Valves: Install in underground piping in boxes for automatic control valves.

Section 3.04 INSTALLATION OF SPRINKLERS

A Install sprinklers after hydrostatic test is completed.

B Install sprinklers at manufacturer's recommended heights.

C Locate part-circle sprinklers to maintain a minimum distance of 4 inches (100 mm) from walls and 2 inches (50 mm) from other boundaries unless otherwise indicated.

Section 3.05 INSTALLATION OF AUTOMATIC IRRIGATION CONTROL SYSTEM

A Equipment Mounting, Interior: Install controllers on interior wall, unless otherwise noted.

(i) Place and secure anchorage devices. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.

(ii) Install anchor bolts to elevations required for proper attachment to supported equipment.

B Equipment Mounting, Exterior: Install exterior freestanding controllers on precast concrete bases.

(i) Place and secure anchorage devices. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.

(ii) Install anchor bolts to elevations required for proper attachment to supported equipment.

C Install control cable in same trench as irrigation piping and at least 2 inches (50 mm) below[ or beside] piping. Provide conductors of size not smaller than recommended by controller manufacturer. Install cable in separate sleeve under paved areas.

Section 3.06 IDENTIFICATION
A Identify system components. Comply with requirements for identification specified in Section 220553 "Identification for Plumbing Piping and Equipment."

B Equipment Nameplates and Signs: Install engraved plastic-laminate equipment nameplates and signs on each automatic controller.

(i) Text: In addition to identifying unit, distinguish between multiple units, inform operator of operational requirements, indicate safety and emergency precautions, and warn of hazards and improper operations.

C Warning Tapes: Arrange for installation of continuous, underground, detectable warning tapes over underground piping during backfilling of trenches. Install detectable warning tapes on all irrigation lines.

Section 3.07 FIELD QUALITY CONTROL

A Perform tests and inspections.

B Tests and Inspections:

(i) Leak Test: After installation, charge system and test for leaks. Repair leaks and retest until no leaks exist.

(ii) Operational Test: After electrical circuitry has been energized, operate controllers and automatic control valves to confirm proper system operation.

(iii) Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

(iv) Irrigation system will be considered defective if it does not pass tests and inspections.

C Prepare test and inspection reports.

Section 3.08 ADJUSTING

A Adjust settings of controllers.

B Adjust automatic control valves to provide flow rate at rated operating pressure required for each sprinkler circuit.

C Adjust sprinklers and devices, except those intended to be mounted aboveground, so they will be flush with, or not more than [1/2 inch (13 mm)] <Insert value> above, finish grade.

Section 3.09 PIPING SCHEDULE

A Refer to Landscape Plans For piping schedules.

END OF SECTION 328400
SECTION 32 91 13
SOIL PREPARATION

Part 1. GENERAL

Section 1.01 SUMMARY

A Section includes:

   (i) Section includes planting soils specified by composition of the mixes.

Section 1.02 DEFINITIONS

A Duff Layer: A surface layer of soil, typical of forested areas, that is composed of mostly decayed leaves, twigs, and detritus.

B Imported Soil: Soil that is transported to Project site for use.

C Manufactured Soil: Soil produced by blending soils, sand, stabilized organic soil amendments, and other materials to produce planting soil.

D Planting Soil: Existing, on-site soil; imported soil; or manufactured soil that has been modified as specified with soil amendments and perhaps fertilizers to produce a soil mixture best for plant growth.

E Subgrade: Surface or elevation of subsoil remaining after excavation is complete, or the top surface of a fill or backfill before planting soil is placed.

F Subsoil: Soil beneath the level of subgrade; soil beneath the topsoil layers of a naturally occurring soil profile, typified by less than 1 percent organic matter and few soil organisms.

G Surface Soil: Soil that is present at the top layer of the existing soil profile. In undisturbed areas, surface soil is typically called "topsoil"; but in disturbed areas such as urban environments, the surface soil can be subsoil.

H USCC: U.S. Composting Council.

Section 1.03 ACTION SUBMITTALS

A Product Data: Refer to Landscape Drawing Specifications for list of Submittals.

Section 1.04 INFORMATIONAL SUBMITTALS

A Field quality-control reports.

Section 1.05 QUALITY ASSURANCE

A Refer to Landscape Drawing Specifications for Quality Assurance requirements.

Part 2. PRODUCTS

Section 2.01 MATERIALS

A Refer to Landscape Plans and Specifications for list of materials.

Part 3. EXECUTION
Section 3.01 GENERAL

A Place planting soil and fertilizers according to requirements in other Specification Sections.

B Verify that no foreign or deleterious material or liquid such as paint, paint washout, concrete slurry, concrete layers or chunks, cement, plaster, oils, gasoline, diesel fuel, paint thinner, turpentine, tar, roofing compound, or acid has been deposited in planting soil.

Section 3.02 PREPARATION OF UNAMENDED, ON-SITE SOIL BEFORE AMENDING

A Unacceptable and Unsuitable Materials: Refer to Landscape Drawing Specifications for allowable tolerances. Clean soil of concrete slurry, concrete layers or chunks, cement, plaster, building debris, oils, gasoline, diesel fuel, paint thinner, turpentine, tar, roofing compound, acid, and other extraneous materials that are harmful to plant growth.

Section 3.03 PLACING AND MIXING PLANTING SOIL OVER EXPOSED SUBGRADE

A General: Apply and mix unamended soil with amendments on-site to produce required planting soil. Do not apply materials or till if existing soil or subgrade is frozen, muddy, or excessively wet.

B Subgrade Preparation: Till subgrade to a minimum depth identified in Landscape Drawing Specifications. Remove stones larger than 2 inches (50 mm) in any dimension and sticks, roots, rubbish, and other extraneous matter and legally dispose of them off Owner's property.

C Mixing: Spread unamended soil to total depth identified in Landscape Drawing, but not less than required to meet finish grades after mixing with amendments and natural settlement. Do not spread if soil or subgrade is frozen, muddy, or excessively wet.

(i) Amendments: Apply soil amendments and fertilizer, if required, evenly on surface, and thoroughly blend them with unamended soil to produce planting soil.

a. Mix fertilizer with planting soil no more than seven days before planting.

D Finish Grading: Grade planting soil to a smooth, uniform surface plane with loose, uniformly fine texture. Roll and rake, remove ridges, and fill depressions to meet finish grades.

Section 3.04 PLACING MANUFACTURED PLANTING SOIL OVER EXPOSED SUBGRADE

A General: Apply manufactured soil on-site in its final, blended condition. Do not apply materials or till if existing soil or subgrade is frozen, muddy, or excessively wet.

B Subgrade Preparation: Refer to Geological Evaluation and Landscape Drawings for thicknesses, sticks, roots, rubbish, and other extraneous matter and legally dispose of them off Owner's property.

C Application: Refer to Landscape Drawing Specifications for thickness, but not less than required to meet finish grades after natural settlement. Do not spread if soil or subgrade is frozen, muddy, or excessively wet.

D Finish Grading: Grade planting soil to a smooth, uniform surface plane with loose, uniformly fine texture. Roll and rake, remove ridges, and fill depressions to meet finish grades.

Section 3.05 APPLYING COMPOST TO SURFACE OF PLANTING SOIL

A Application: Refer to Landscape Specifications for depths to surface of in-place planting soil. Do not apply materials or till if existing soil or subgrade is frozen, muddy, or excessively wet.
B Finish Grading: Grade surface to a smooth, uniform surface plane with loose, uniformly fine texture. Roll and rake, remove ridges, and fill depressions to meet finish grades.

Section 3.06 FIELD QUALITY CONTROL

A Perform tests and inspections as outlined in the Architectural Drawing Specifications.

Section 3.07 PROTECTION AND CLEANING

A Protect areas of in-place soil from additional compaction, disturbance, and contamination. Prohibit the following practices within these areas except as required to perform planting operations:

(i) Storage of construction materials, debris, or excavated material.
(ii) Parking vehicles or equipment.
(iii) Vehicle traffic.
(iv) Foot traffic.
(v) Erection of sheds or structures.
(vi) Impoundment of water.
(vii) Excavation or other digging unless otherwise indicated.

B Remove surplus soil and waste material including excess subsoil, unsuitable materials, trash, and debris and legally dispose of them off Owner's property unless otherwise indicated.
SECTION 32 92 00
TURF AND GRASSES

Part 1. GENERAL

Section 1.01 SUMMARY

A Section includes:

(i) Seeding.

(ii) Sodding.

Section 1.02 DEFINITIONS

A Pesticide: A substance or mixture intended for preventing, destroying, repelling, or mitigating a pest. This includes insecticides, miticides, herbicides, fungicides, rodenticides, and molluscicides. It also includes substances or mixtures intended for use as a plant regulator, defoliant, or desiccant.

B Planting Soil: Existing, on-site soil; imported soil; or manufactured soil that has been modified with soil amendments and perhaps fertilizers to produce a soil mixture best for plant growth. See Landscape Drawing Specifications for planting soils.

Section 1.03 INFORMATIONAL SUBMITTALS

A Refer to Landscape Drawing Specifications for required list of submittals.

Section 1.04 QUALITY ASSURANCE

A Refer to Landscape Drawing Specifications for Quality Assurance requirements.

Section 1.05 DELIVERY, STORAGE, AND HANDLING

A Refer to Landscape Drawing Specifications for delivery storage and handling requirements.

Part 2. PRODUCTS

Section 2.01 Products

A Refer to Landscape Drawings and Specifications for list of products.

Part 3. EXECUTION

Section 3.01 TURF AREA PREPARATION

A General: Prepare planting area for soil placement and mix planting soil according to Landscape Drawing Specifications.

B Reduce elevation of planting soil to allow for soil thickness of sod.

C Moisten prepared area before planting if soil is dry. Water thoroughly and allow surface to dry before planting. Do not create muddy soil.
D Before planting, obtain Architect's acceptance of finish grading; restore planting areas if eroded or otherwise disturbed after finish grading.

Section 3.02 HYDROSEEDING

A Refer to Landscape Drawing Specifications for hydroseeding execution.

Section 3.03 SODDING

A Refer to Landscape Drawing Specifications for Sodding execution.

B Lay sod within 24 hours of harvesting. Do not lay sod if dormant or if ground is frozen or muddy.

C Lay sod to form a solid mass with tightly fitted joints. Butt ends and sides of sod; do not stretch or overlap. Stagger sod strips or pads to offset joints in adjacent courses. Avoid damage to soil or sod during installation. Tamp and roll lightly to ensure contact with soil, eliminate air pockets, and form a smooth surface. Work sifted soil or fine sand into minor cracks between pieces of sod; remove excess to avoid smothering sod and adjacent grass.

D Saturate sod with fine water spray within two hours of planting. During first week after planting, water daily or more frequently as necessary to maintain moist soil to a minimum depth of 1-1/2 inches (38 mm) below sod.

END OF SECTION 329200
SECTION 32 93 00
PLANTS

Part 1. GENERAL

Section 1.01 SUMMARY

A Section includes:

(i) Plants.

(ii) Tree-watering devices.

(iii) Landscape edgings.

Section 1.02 DEFINITIONS

A Backfill: The earth used to replace or the act of replacing earth in an excavation.

Section 1.03 SUBMITTALS

A Refer to Landscape Drawing Specifications for list of required submittals.

Section 1.04 QUALITY ASSURANCE

A Refer to Landscape Drawing Specifications for quality assurance requirements.

Section 1.05 DELIVERY, STORAGE, AND HANDLING

A Refer to Landscape Drawing Specifications for delivery, storage, and handling requirements.

Part 2. PRODUCTS

Section 2.01 MATERIALS AND PRODUCTS

A Refer to Landscape Drawing Specifications for list of products.

Part 3. EXECUTION

Section 3.01 PLANTING AREA ESTABLISHMENT

A General: Prepare planting area for soil placement and mix planting soil according to Landscape Drawing Specifications.

B Placing Planting Soil: Refer to Landscape Drawing Specifications for requirements.

C Before planting, obtain Architect's acceptance of finish grading; restore planting areas if eroded or otherwise disturbed after finish grading.

Section 3.02 EXCAVATION FOR TREES AND SHRUBS

A Planting Pits and Trenches: Excavate circular planting pits.
(i) Excavate planting pits with sides sloping inward at a 45-degree angle. Excavations with vertical sides are unacceptable. 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.

(ii) Excavate approximately three times as wide as ball diameter.

(iii) Excavate at least 12 inches (300 mm) wider than root spread and deep enough to accommodate vertical roots for bare-root stock.

(iv) Do not excavate deeper than depth of the root ball, measured from the root flare to the bottom of the root ball.

B Backfill Soil: Subsoil and topsoil removed from excavations may be used as backfill soil unless otherwise indicated.

Section 3.03 TREE, SHRUB, AND VINE PLANTING

A Inspection: At time of planting, verify that root flare is visible at top of root ball according to ANSI Z60.1. If root flare is not visible, remove soil in a level manner from the root ball to where the top-most root emerges from the trunk. After soil removal to expose the root flare, verify that root ball still meets size requirements.

B Roots: Remove stem girdling roots and kinked roots. Remove injured roots by cutting cleanly; do not break.

C Set each plant plumb and in center of planting pit or trench with root flare 1 inch (25 mm) above adjacent finish grades.

(i) Balled and Burlapped Stock: 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.

(ii) Balled and Potted and Container-Grown Stock: Carefully remove root ball from container without damaging root ball or plant.

(iii) 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.

(iv) Bare-Root Stock: Support stem of each plant and spread roots without tangling or turning toward surface. Plumb before backfilling, and maintain plumb while working. Carefully work backfill around roots by hand. Bring roots into close contact with the soil.

(v) 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.

(vi) Place planting tablets equally distributed around each planting pit when pit is approximately one-half filled. Place tablets beside the root ball about 1 inch (25 mm) from root tips; do not place tablets in bottom of the hole.

a. Bare-Root Stock: Place tablets beside soil-covered roots; do not place tablets touching the roots.

b. Quantity: As indicated on Landscape Drawing Specifications.

(vii) Continue backfilling process. Water again after placing and tamping final layer of soil.
D Slopes: When planting on slopes, set the plant so the root flare on the uphill side is flush with the surrounding soil on the slope; the edge of the root ball on the downhill side will be above the surrounding soil. Apply enough soil to cover the downhill side of the root ball.

Section 3.04 TREE, SHRUB, AND VINE PRUNING

A Remove only dead, dying, or broken branches. Do not prune for shape.

B Prune, thin, and shape trees, shrubs, and vines as directed by Architect.

C Prune, thin, and shape trees, shrubs, and vines according to standard professional horticultural and arboricultural practices. Unless otherwise indicated by Architect, do not cut tree leaders; remove only injured, dying, or dead branches from trees and shrubs; and prune to retain natural character.

D Do not apply pruning paint to wounds.

Section 3.05 PLANT MAINTENANCE

A Maintain plantings by pruning, cultivating, watering, weeding, fertilizing, mulching, restoring planting saucers, resetting to proper grades or vertical position, and performing other operations as required to establish healthy, viable plantings.

B Fill in, as necessary, soil subsidence that may occur because of settling or other processes. Replace mulch materials damaged or lost in areas of subsidence.

C Apply treatments as required to keep plant materials, planted areas, and soils free of pests and pathogens or disease. Use integrated pest management practices when possible to minimize use of pesticides and reduce hazards. Treatments include physical controls such as hosing off foliage, mechanical controls such as traps, and biological control agents.

D Apply pesticides and other chemical products and biological control agents according to authorities having jurisdiction and manufacturer's written recommendations. Coordinate applications with Owner's operations and others in proximity to the Work. Notify Owner before each application is performed.

E Protect plants from damage due to landscape operations and operations of other contractors and trades. Maintain protection during installation and maintenance periods. Treat, repair, or replace damaged plantings.

F At time of Substantial Completion, verify that tree-watering devices are in good working order and leave them in place. Replace improperly functioning devices.

Section 3.06 MAINTENANCE SERVICE

A Maintenance Service: Provide maintenance by skilled employees of landscape Installer. Maintain as required in "Plant Maintenance" Article. Begin maintenance immediately after plants are installed and continue until plantings are acceptably healthy and well established, but for not less than maintenance period below:

END OF SECTION 329300