KETCHIKAN CORRECTIONAL CENTER

ELEVATOR MODERNIZATION SPECIFICATIONS

NOVEMBER 21, 2018

ALASKA DEPARTMENT OF TRANSPORTATION
AND STATEWIDE PUBLIC FACILITIES

Contact:

Dena Strait,

Energy Programs Manager/Project Manager

Bettisworth North Architects and Planners

(907) 561-5780

BETTISWORTH NORTH

TABLE OF CONTENTS

DIVISION 26 – ELECTRICAL

SECTION 00 19 00 — RELATED WORK

PART 1 GENERAL

1.1 RELATED WORK

A. Hoistway and Pit:
1. Installation of guide rail brackets in concrete. (**Alternate New Car)**
2. Cutting and patching walls and floors. (**Alternate New Car)**
3. Opening in hoistway wall or pit wall for hydraulic piping. **(Alternate New Car)**
4. Remove front entrance wall including elevator entrance. Erect new front hoistway wall after elevator entrances are installed. **(Alternate New Car)**
5. Grout floor up to hoistway sills and around hoistway entrances. **(Alternate New Car)**
6. Pit access stationary ladder for each elevator extended 48” above access entry.
7. Structural support at pit floor for buffer impact loads, guide rail loads, and cylinder loads.
8. Waterproof pit.
9. Protect open hoistways and entrances during construction per OSHA Regulations and correctional facility guidelines.

B. Machine Room and Machinery Spaces:
1. Self-closing and locking access door.
2. Air conditioning and heating. Maintain minimum temperature of 55° F, maximum 90° F. Maintain maximum 80% relative humidity, non-condensing.
3. Paint walls and ceiling.
4. Class “ABC” fire extinguisher in each elevator machine room.
5. Fire sprinklers where required.

C. Electrical Service, Conductors, and Devices:
1. Lighting and GFCI convenience outlets in pit, machine room, and overhead machinery spaces. Provide one additional non-GFCI convenience outlet in pit for sump pump.
2. Three-phase mainline copper power feeder with true earthen grounding to terminals of each elevator controller in the machine room with protected, lockable “open” disconnecting means with auxiliary contacts to allow Elevator Contractor to electronically interlock battery power lowering unit.
3. Single-phase copper power feeder to elevator controller for car lighting and exhaust blower with individual protected, lockable “open” disconnecting means located in machine room.
4. Emergency telephone line to elevator control panel in elevator machine room.
5. Fire alarm initiating devices in each elevator lobby for elevator and machine room to initiate firefighters’ return feature. Device at top of hoistway if sprinklered. Provide alarm initiating signal wiring from hoistway or machine room connection point to elevator controller terminals. Device in machine room and at top of hoistway to provide signal for general alarm and discrete signal for Phase II firefighters’ operation.
6. Conduit from the hoistway of elevator to main control console. Coordinate size, number, and location of conduits with Elevator Contractor.
7. Means to automatically disconnect power to affected elevator pump unit and controller prior to activation of machine room fire sprinkler system and/or hoistway fire sprinkler system. Manual shut-off means shall be located outside bounds of machine room.
8. When sprinklers are provided in the hoistway all electrical equipment located less than 4'-0" above the pit floor shall be identified for use in wet locations. Exception: seismic protection devices.
9. Single-phase power feeders to machine room elevator monitoring panel/display unit with single-phase, protected, lockable “open” disconnecting means.
10. Single-phase power feeders to controller(s) for CCTV with lockable “open” disconnecting means.

D. Standby Power Provision:
   1. Standby power of normal voltage characteristics via normal electrical feeders to run elevator at full-contract car speed and capacity.
   2. Standby single-phase power to group controller, and each elevator controller for car lighting, exhaust blower, emergency signaling device.
   3. Standby power to machine room, and pit lighting.
   4. Standby power to machine room ventilation or air conditioning.
   5. Standby power to emergency communications devices.

END OF SECTION

SECTION 02 41 00

DEMOLITION

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Selective demolition of building elements for alteration purposes.

1.02 RELATED REQUIREMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

B. All demolition activities shall be coordinated with the Contracting Officer to ensure the integrety of the secure prison perimeter, including demolition, movement of demolition equipment, temporary storage of demolished materials, and access to the secure prison yard areas.

1.03 REFERENCE STANDARDS

A. 29 CFR 1926 - U.S. Occupational Safety and Health Standards; current edition.

PART 2 PRODUCTS -- NOT USED

PART 3 EXECUTION

3.01 GENERAL PROCEDURES AND PROJECT CONDITIONS

A. Comply with applicable codes and regulations for demolition operations and safety of adjacent structures and the public.
   1. Obtain required permits.
   2. Provide, erect, and maintain temporary barriers and security devices.
   3. Use physical barriers to prevent access to areas that could be hazardous to workers or the public.
   4. Conduct operations to minimize effects on and interference with adjacent structures and occupants.
   5. Do not close or obstruct roadways or sidewalks without permit.
   6. Conduct operations to minimize obstruction of public and private entrances and exits; do not obstruct required exits at any time; protect persons using entrances and exits from removal operations.

B. Do not begin removal until receipt of notification to proceed from Contracting Officer.

C. If hazardous materials are discovered during removal operations, stop work and notify Contracting Officer and Contracting Officer; hazardous materials include regulated asbestos containing materials, lead, PCB's, and mercury.

3.02 SELECTIVE DEMOLITION FOR ALTERATIONS

A. Drawings showing existing construction and utilities are based on casual field observation and existing record documents only.
   1. Verify that construction and utility arrangements are as indicated.
   2. Report discrepancies to Contracting Officer before disturbing existing installation.
   3. Beginning of demolition work constitutes acceptance of existing conditions that would be apparent upon examination prior to starting demolition.

B. Maintain weatherproof exterior building enclosure except for interruptions required for replacement or modifications; take care to prevent water and humidity damage.

C. Remove existing work as indicated and as required to accomplish new work.
   1. Remove items indicated on drawings.

D. Services (Including but not limited to HVAC, Plumbing, Electrical, and Telecommunications): Remove existing systems and equipment as indicated.
   1. Maintain existing active systems that are to remain in operation; maintain access to equipment and operational components.

2. Where existing active systems serve occupied facilities but are to be replaced with new services, maintain existing systems in service until new systems are complete and ready for service.
3. Verify that abandoned services serve only abandoned facilities before removal.
4. Remove abandoned pipe, ducts, conduits, and equipment; cap stub and tag with identification.
5. Obtain approval from KCC Staff before any services, either permantently or temporarily. Do not disconnect any services or systems that supply occupied areas, without prior authorization from KCC Staff.

E. Protect existing work to remain.
1. Prevent movement of structure; provide shoring and bracing if necessary.
2. Perform cutting to accomplish removals neatly and as specified for cutting new work.
3. Repair adjacent construction and finishes damaged during removal work.
4. Patch as specified for patching new work.

3.03 DEBRIS AND WASTE REMOVAL

A. Remove debris, junk, and trash from site.

B. Leave site in clean condition, ready for subsequent work.

C. Clean up spillage and wind-blown debris.

END OF SECTION

SECTION 07 84 00
FIRESTOPPING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Firestopping systems.

B. Firestopping of all joints and penetrations in fire resistance rated and smoke resistant assemblies, whether indicated on drawings or not, and other openings indicated.

1.02 RELATED REQUIREMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.03 REFERENCE STANDARDS

A. ASTM E119 - Standard Test Methods for Fire Tests of Building Construction and Materials; 2016a.

B. ASTM E814 - Standard Test Method for Fire Tests of Penetration Firestop Systems; 2013a (Reapproved 2017).

C. ITS (DIR) - Directory of Listed Products; current edition.

D. FM (AG) - FM Approval Guide; current edition.

E. UL 1479 - Standard for Fire Tests of Penetration Firestops; Current Edition, Including All Revisions.

F. UL (FRD) - Fire Resistance Directory; Current Edition.

1.04 SUBMITTALS

A. Schedule of Firestopping: List each type of penetration, fire rating of the penetrated assembly, and firestopping test or design number.

B. Product Data: Provide data on product characteristics, performance ratings, and limitations.

C. Manufacturer's Installation Instructions: Indicate preparation and installation instructions.

1.05 QUALITY ASSURANCE

A. Fire Testing: Provide firestopping assemblies of designs that provide the scheduled fire ratings when tested in accordance with methods indicated.

1. Listing in UL (FRD), FM (AG), or ITS (DIR) will be considered as constituting an acceptable test report.

1.06 FIELD CONDITIONS

A. Comply with firestopping manufacturer's recommendations for temperature and conditions during and after installation; maintain minimum temperature before, during, and for three days after installation of materials.

B. Provide ventilation in areas where solvent-cured materials are being installed.

PART 2 PRODUCTS

2.01 MANUFACTURERS

2.02 MATERIALS

A. Firestopping Materials: Any materials meeting requirements.

B. Primers, Sleeves, Forms, Insulation, Packing, Stuffing, and Accessories: Provide type of materials as required for tested firestopping assembly.

2.03 FIRESTOPPING ASSEMBLY REQUIREMENTS

A. Through Penetration Firestopping: Use system that has been tested according to ASTM E814 to have fire resistance F Rating equal to required fire rating of penetrated assembly.

2.04 FIRESTOPPING PENETRATIONS THROUGH CONCRETE AND CONCRETE MASONRY CONSTRUCTION

A. Penetrations Through Floors By:
   1. Uninsulated Metallic Pipe, Conduit, and Tubing:

B. Penetrations Through Walls By:
   1. Uninsulated Metallic Pipe, Conduit, and Tubing:
      a. 1 Hour Construction: UL System W-J-1067; Hilti FS-ONE MAX Intumescent Firestop Sealant.
   2. HVAC Ducts, Uninsulated:
   3. HVAC Ducts, Insulated:

2.05 FIRESTOPPING SYSTEMS

A. Firestopping: Any material meeting requirements.
   1. Fire Ratings: Use system that is listed by FM (AG), ITS (DIR), or UL (FRD) and tested in accordance with ASTM E814, ASTM E119, or UL 1479 with F Rating equal to fire rating of penetrated assembly and minimum T Rating Equal to F Rating and in compliance with other specified requirements.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify openings are ready to receive the work of this section.

3.02 PREPARATION

A. Clean substrate surfaces of dirt, dust, grease, oil, loose material, or other materials that could adversely affect bond of firestopping material.

B. Remove incompatible materials that could adversely affect bond.

C. Install backing materials to prevent liquid material from leakage.

3.03 INSTALLATION

A. Install materials in manner described in fire test report and in accordance with manufacturer's instructions, completely closing openings.

3.04 CLEANING

A. Clean adjacent surfaces of firestopping materials.

3.05 PROTECTION

A. Protect adjacent surfaces from damage by material installation.

END OF SECTION

SECTION 07 92 00

JOINT SEALANTS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Nonsag gunnable joint sealants.

B. Joint backings and accessories.

1.02 RELATED REQUIREMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

B. Section 07 84 00 - Firestopping: Firestopping sealants.

C. Section 23 31 00 - HVAC Ducts and Casings: Duct sealants.

1.03 REFERENCE STANDARDS

A. ASTM C834 - Standard Specification for Latex Sealants; 2017.

B. ASTM C920 - Standard Specification for Elastomeric Joint Sealants; 2018.

C. ASTM C1193 - Standard Guide for Use of Joint Sealants; 2016.

1.04 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Product Data for Sealants: Submit manufacturer's technical data sheets for each product to be used, that includes the following.

1. Physical characteristics, including movement capability, VOC content, hardness, cure time, and color availability.
2. List of backing materials approved for use with the specific product.
3. Substrates that product is known to satisfactorily adhere to and with which it is compatible.
4. Substrates the product should not be used on.

PART 2 PRODUCTS

2.01 JOINT SEALANT APPLICATIONS

A. Scope:

1. Exterior Joints: Seal open joints, whether or not the joint is indicated on drawings, unless specifically indicated not to be sealed. Exterior joints to be sealed include, but are not limited to, the following items.
   a. Wall expansion and control joints.
   b. Joints between door, window, and other frames and adjacent construction.
   c. Joints between different exposed materials.
   d. Openings below ledge angles in masonry.
   e. Other joints indicated below.
2. Interior Joints: Do not seal interior joints unless specifically indicated to be sealed. Interior joints to be sealed include, but are not limited to, the following items.
   a. Joints between door, window, and other frames and adjacent construction.
   b. Other joints indicated below.
3. Do not seal the following types of joints.
   a. Intentional weepholes in masonry.
   b. Joints indicated to be treated with manufactured expansion joint cover or some other type of sealing device.
   c. Joints where sealant is specified to be provided by manufacturer of product to be sealed.
   d. Joints where installation of sealant is specified in another section.
   e. Joints between suspended panel ceilings/grid and walls.

B. Exterior Joints: Use non-sag non-staining silicone sealant, unless otherwise indicated.

C. Interior Joints: Use non-sag polyurethane sealant, unless otherwise indicated.
   1. Wall and Ceiling Joints in Non-Wet Areas: Acrylic emulsion latex sealant.

2.02 JOINT SEALANTS - GENERAL

A. Sealants and Primers: Provide products with levels of volatile organic compound (VOC) content as indicated in Section 01 61 16.

2.03 NONSAG JOINT SEALANTS

A. Non-Staining Silicone Sealant: ASTM C920, Grade NS, Uses M and A; not expected to withstand continuous water immersion or traffic.
   1. Movement Capability: Plus and minus 50 percent, minimum.
   2. Dirt Pick-Up: Reduced dirt pick-up compared to other silicone sealants.

B. Polyurethane Sealant: ASTM C920, Grade NS, Uses M and A; single or multi-component; not expected to withstand continuous water immersion or traffic.
   1. Movement Capability: Plus and minus 25 percent, minimum.

C. Acrylic Emulsion Latex: Water-based; ASTM C834, single component, non-staining, non-bleeding, non-sagging; not intended for exterior use.

2.04 ACCESSORIES

A. Backer Rod: Cylindrical cellular foam rod with surface that sealant will not adhere to, compatible with specific sealant used, and recommended by backing and sealant manufacturers for specific application.
   1. Open Cell: 40 to 50 percent larger in diameter than joint width.

B. Backing Tape: Self-adhesive polyethylene tape with surface that sealant will not adhere to and recommended by tape and sealant manufacturers for specific application.

C. Masking Tape: Self-adhesive, nonabsorbent, non-staining, removable without adhesive residue, and compatible with surfaces adjacent to joints and sealants.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that joints are ready to receive work.

B. Verify that backing materials are compatible with sealants.

C. Verify that backer rods are of the correct size.

3.02 PREPARATION

A. Remove loose materials and foreign matter that could impair adhesion of sealant.

B. Clean joints, and prime as necessary, in accordance with manufacturer's instructions.

C. Perform preparation in accordance with manufacturer's instructions and ASTM C1193.

D. Mask elements and surfaces adjacent to joints from damage and disfigurement due to sealant work; be aware that sealant drips and smears may not be completely removable.

3.03 INSTALLATION

A. Perform work in accordance with sealant manufacturer's requirements for preparation of surfaces and material installation instructions.

B. Perform installation in accordance with ASTM C1193.

C. Install bond breaker backing tape where backer rod cannot be used.

D. Install sealant free of air pockets, foreign embedded matter, ridges, and sags, and without getting sealant on adjacent surfaces.

E. Do not install sealant when ambient temperature is outside manufacturer's recommended temperature range, or will be outside that range during the entire curing period, unless manufacturer's approval is obtained and instructions are followed.

F. Nonsag Sealants: Tool surface concave, unless otherwise indicated; remove masking tape immediately after tooling sealant surface.

END OF SECTION

SECTION 08 11 13
HOLLOW METAL DOORS AND FRAMES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Fire-rated hollow metal doors and frames.

1.02 RELATED REQUIREMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

B. Section 23 37 00: Louvers.

C. Section 09 91 23 - Interior Painting: Field painting.

1.03 ABBREVIATIONS AND ACRONYMS

A. ANSI - American National Standards Institute.

B. HMMA - Hollow Metal Manufacturers Association.

C. SDI - Steel Door Institute.

D. UL - Underwriters Laboratories.

1.04 REFERENCE STANDARDS

A. ANSI/SDI A250.4 - Test Procedure and Acceptance Criteria for Physical Endurance for Steel Doors, Frames and Frame Anchors; 2011.

B. ANSI/SDI A250.8 - Specifications for Standard Steel Doors and Frames (SDI-100); 2014.

C. ANSI/SDI A250.10 - Test Procedure and Acceptance Criteria for Prime Painted Steel Surfaces for Steel Doors and Frames; 2011.

D. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2017.

E. ASTM A1008/A1008M - Standard Specification for Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, Solution Hardened, and Bake Hardenable; 2016.

F. ASTM A1011/A1011M - Standard Specification for Steel, Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, and Ultra-High Strength; 2017.

G. NAAMM HMMA 840 - Guide Specifications for Installation and Storage of Hollow Metal Doors and Frames; 2007.

H. NFPA 80 - Standard for Fire Doors and Other Opening Protectives; 2016.

I. NFPA 252 - Standard Methods of Fire Tests of Door Assemblies; 2018.

J. UL (DIR) - Online Certifications Directory; Current Edition.

K. UL 10C - Standard for Positive Pressure Fire Tests of Door Assemblies; Current Edition, Including All Revisions.

1.05 SUBMITTALS

A. Product Data: Materials and details of design and construction, hardware locations, reinforcement type and locations, anchorage and fastening methods, and finishes; and one copy of referenced standards/guidelines.

B. Shop Drawings: Details of each opening, showing elevations, glazing, frame profiles, and any indicated finish requirements.

1.06 QUALITY ASSURANCE

A. Maintain at project site copies of reference standards relating to installation of products specified.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Comply with NAAMM HMMA 840 or ANSI/SDI A250.8 (SDI-100) in accordance with specified requirements.

B. Protect with resilient packaging; avoid humidity build-up under coverings; prevent corrosion and adverse effects on factory applied painted finish.

PART 2 PRODUCTS

2.01 DESIGN CRITERIA

A. Requirements for Hollow Metal Doors and Frames:
   1. Steel used for fabrication of doors and frames shall comply with one or more of the following requirements; Galvannealed steel conforming to ASTM A653/A653M, cold-rolled steel conforming to ASTM A1008/A1008M, or hot-rolled pickled and oiled (HRPO) steel conforming to ASTM A1011/A1011M, Commercial Steel (CS) Type B for each.

B. Combined Requirements: If a particular door and frame unit is indicated to comply with more than one type of requirement, comply with the specified requirements for each type; for instance, an exterior door that is also indicated as being sound-rated must comply with the requirements specified for exterior doors and for sound-rated doors; where two requirements conflict, comply with the most stringent.

2.02 HOLLOW METAL DOORS

A. Fire-Rated Doors:
   1. Based on SDI Standards: ANSI/SDI A250.8 (SDI-100).
      a. Level 2 - Heavy-duty.
      b. Physical Performance Level B, 500,000 cycles; in accordance with ANSI/SDI A250.4.
      c. Model 1 - Full Flush.
      d. Door Face Metal Thickness: 18 gage, 0.042 inch, minimum.
   2. Fire Rating: As indicated on Door Schedule, tested in accordance with UL 10C and NFPA 252 ("positive pressure fire tests").
   3. Provide units listed and labeled by UL (DIR).
      a. Attach fire rating label to each fire rated unit.
   4. Door Core Material: Manufacturers standard core material/construction in compliance with requirements.
   5. Door Thickness: 1-3/4 inch, nominal.

2.03 HOLLOW METAL FRAMES

A. Comply with standards and/or custom guidelines as indicated for corresponding door in accordance with applicable door frame requirements.

B. Door Frames, Fire-Rated: Fully welded, dimple frame at jambs for anchoring into existing cmu wall..
   1. Fire Rating: Same as door, labeled.

C. Provide mortar guard boxes for hardware cut-outs in frames to be installed in masonry or to be grouted.

D. Frames in Masonry Walls: Size to suit masonry coursing with head member 4 inch high to fill opening without cutting masonry units.

2.04 FINISHES

A. Primer: Rust-inhibiting, complying with ANSI/SDI A250.10, door manufacturer's standard.

2.05 ACCESSORIES

A. Louvers: Specified in Section 23 37 00.

B. Temporary Frame Spreaders: Provide for factory- or shop-assembled frames.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify existing conditions before starting work.

B. Verify that opening sizes and tolerances are acceptable.

C. Verify that finished walls are in plane to ensure proper door alignment.

3.02 PREPARATION

3.03 INSTALLATION

A. Install doors and frames in accordance with manufacturer's instructions and related requirements of specified door and frame standards or custom guidelines indicated.

B. Install fire rated units in accordance with NFPA 80.

C. Coordinate frame anchor placement with wall construction.

D. Install door hardware as specified on drawings.

E. Touch up damaged factory finishes.

3.04 ADJUSTING

A. Adjust for smooth and balanced door movement.

3.05 SCHEDULE

A. Refer to Door and Frame Schedule on the drawings.

END OF SECTION

SECTION 09 21 16
GYPSUM BOARD ASSEMBLIES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Metal stud wall framing.

B. Metal channel ceiling framing.

C. Gypsum wallboard.

D. Joint treatment and accessories.

1.02 RELATED REQUIREMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

B. Section 07 84 00 - Firestopping: Top-of-wall assemblies at fire rated walls.

1.03 REFERENCE STANDARDS

A. ASTM C475/C475M - Standard Specification for Joint Compound and Joint Tape for Finishing Gypsum Board; 2015.

B. ASTM C645 - Standard Specification for Nonstructural Steel Framing Members; 2014, with Editorial Revision (2015).

C. ASTM C754 - Standard Specification for Installation of Steel Framing Members to Receive Screw-Attached Gypsum Panel Products; 2017.

D. ASTM C840 - Standard Specification for Application and Finishing of Gypsum Board; 2017a.

E. ASTM C954 - Standard Specification for Steel Drill Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Steel Studs From 0.033 in. (0.84 mm) to 0.112 in. (2.84 mm) in Thickness; 2015.

F. ASTM C1002 - Standard Specification for Steel Self-Piercing Tapping Screws for Application of Gypsum Panel Products or Metal Plaster Bases to Wood Studs or Steel Studs; 2016.

G. ASTM C1047 - Standard Specification for Accessories For Gypsum Wallboard and Gypsum Veneer Base; 2014a.

H. ASTM C1396/C1396M - Standard Specification for Gypsum Board; 2017.

I. GA-216 - Application and Finishing of Gypsum Panel Products; 2016.

J. GA-600 - Fire Resistance Design Manual; 2015.

1.04 SUBMITTALS

A. Product Data: Provide data on metal framing, gypsum board, accessories, and joint finishing system.

PART 2 PRODUCTS

2.01 GYPSUM BOARD ASSEMBLIES

A. Provide completed assemblies complying with ASTM C840 and GA-216.

2.02 METAL FRAMING MATERIALS

A. Non-Loadbearing Framing System Components: ASTM C645; galvanized sheet steel, of size and properties necessary to comply with ASTM C754 for the spacing indicated, with maximum deflection of wall framing of L/120 at 5 psf.
   1. Studs: "C" shaped with flat or formed webs with knurled faces.
   2. Runners: U shaped, sized to match studs.
   3. Ceiling Channels: C-shaped.

B. Ceiling Hangers: Type and size as specified in ASTM C754 for spacing required.

2.03 BOARD MATERIALS

A. Gypsum Wallboard: Paper-faced gypsum panels as defined in ASTM C1396/C1396M; sizes to minimize joints in place; ends square cut.
   1. Application: Use for vertical surfaces and ceilings, unless otherwise indicated.
   2. At Assemblies Indicated with Fire-Rating: Use type required by indicated tested assembly; if no tested assembly is indicated, use Type X board, UL or WH listed.
   3. Thickness:
      a. Vertical Surfaces: 5/8 inch.
      b. Ceilings: 5/8 inch.

2.04 ACCESSORIES

A. Finishing Accessories: ASTM C1047, galvanized steel or rolled zinc, unless noted otherwise.
   1. Types: As detailed or required for finished appearance.

B. Joint Materials: ASTM C475/C475M and as recommended by gypsum board manufacturer for project conditions.
   1. Tape: 2 inch wide, creased paper tape for joints and corners, except as otherwise indicated.
   2. Ready-mixed vinyl-based joint compound.

C. Screws for Fastening of Gypsum Panel Products to Cold-Formed Steel Studs Less than 0.033 inch in Thickness and Wood Members: ASTM C1002; self-piercing tapping screws, corrosion resistant.

D. Screws for Fastening of Gypsum Panel Products to Steel Members from 0.033 to 0.112 inch in Thickness: ASTM C954; steel drill screws, corrosion resistant.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that project conditions are appropriate for work of this section to commence.

3.02 FRAMING INSTALLATION

A. Metal Framing: Install in accordance with ASTM C754 and manufacturer's instructions.

B. Suspended Ceilings and Soffits: Space framing and furring members as indicated.

C. Studs: Space studs at 16 inches on center.
   1. Extend partition framing to structure where indicated and to ceiling in other locations.
   2. Partitions Terminating at Ceiling: Attach ceiling runner securely to ceiling track in accordance with manufacturer's instructions.

D. Furring for Fire Ratings: Install as required for fire resistance ratings indicated and to GA-600 requirements.

3.03 BOARD INSTALLATION

A. Comply with ASTM C840, GA-216, and manufacturer's instructions. Install to minimize butt end joints, especially in highly visible locations.

3.04 INSTALLATION OF TRIM AND ACCESSORIES

A. Control Joints: Place control joints consistent with lines of building spaces and as indicated.

B. Corner Beads: Install at external corners, using longest practical lengths.

3.05 JOINT TREATMENT

A. Finish gypsum board in accordance with levels defined in ASTM C840, as follows:
   1. Level 3: In utility areas, behind cabinetry, and on backing board to receive tile finish.
   2. Level 1: Fire rated wall areas above finished ceilings, whether or not accessible in the completed construction.

B. Tape, fill, and sand exposed joints, edges, and corners to produce smooth surface ready to receive finishes.

1. Feather coats of joint compound so that camber is maximum 1/32 inch.

END OF SECTION

SECTION 09 91 23

INTERIOR PAINTING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Surface preparation.

B. Field application of paints, stains, and varnishes.

C. Scope: Finish interior surfaces exposed to view, unless fully factory-finished and unless otherwise indicated.
   1. Mechanical and Electrical:
      a. In finished areas, paint insulated and exposed pipes, conduit, boxes, insulated and exposed ducts, hangers, brackets, collars and supports, mechanical equipment, and electrical equipment, unless otherwise indicated.

D. Do Not Paint or Finish the Following Items:
   1. Items factory-finished unless otherwise indicated; materials and products having factory-applied primers are not considered factory finished.
   2. Items indicated to receive other finishes.
   3. Items indicated to remain unfinished.
   4. Fire rating labels, equipment serial number and capacity labels, bar code labels, and operating parts of equipment.
   5. Floors, unless specifically indicated.
   6. Concealed pipes, ducts, and conduits.

1.02 RELATED REQUIREMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.03 REFERENCE STANDARDS

A. ASTM D16 - Standard Terminology for Paint, Related Coatings, Materials, and Applications; 2016.

B. ASTM D4258 - Standard Practice for Surface Cleaning Concrete for Coating; 2005 (Reapproved 2017).

C. MPI (APL) - Master Painters Institute Approved Products List; Master Painters and Decorators Association; Current Edition.

D. MPI (APSM) - Master Painters Institute Architectural Painting Specification Manual; Current Edition.

E. SSPC-SP 1 - Solvent Cleaning; 2015, with Editorial Revision (2016).

1.04 SUBMITTALS

A.
   1. Product Data: Provide complete list of products to be used, with the following information for each:
      a. Manufacturer's name, product name and/or catalog number, and general product category (e.g. "alkyd enamel").
      b. MPI product number (e.g. MPI #47).
      c. Cross-reference to specified paint system(s) product is to be used in; include description of each system.
   2. Maintenance Materials: Furnish the following for Contracting Officer's use in maintenance of project.
      a. Extra Paint and Finish Materials: 1 gallon of each color; from the same product run, store where directed.
      b. Label each container with color in addition to the manufacturer's label.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Deliver products to site in sealed and labeled containers; inspect to verify acceptability.

B. Container Label: Include manufacturer's name, type of paint, brand name, lot number, brand code, coverage, surface preparation, drying time, cleanup requirements, color designation, and instructions for mixing and reducing.

C. Paint Materials: Store at minimum ambient temperature of 45 degrees F and a maximum of 90 degrees F, in ventilated area, and as required by manufacturer's instructions.

1.06 FIELD CONDITIONS

A. Do not apply materials when surface and ambient temperatures are outside the temperature ranges required by the paint product manufacturer.

B. Follow manufacturer's recommended procedures for producing best results, including testing of substrates, moisture in substrates, and humidity and temperature limitations.

C. Provide lighting level of 80 ft candles measured mid-height at substrate surface.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Provide paints and finishes used in any individual system from the same manufacturer; no exceptions.

B. Primer Sealers: Same manufacturer as top coats.

2.02 PAINTS AND FINISHES - GENERAL

A. Paints and Finishes: Ready mixed, unless intended to be a field-catalyzed paint.
   1. Provide paints and finishes of a soft paste consistency, capable of being readily and uniformly dispersed to a homogeneous coating, with good flow and brushing properties, and capable of drying or curing free of streaks or sags.
   2. Supply each paint material in quantity required to complete entire project's work from a single production run.
   3. Do not reduce, thin, or dilute paint or finishes or add materials unless such procedure is specifically described in manufacturer's product instructions.

2.03 PAINT SYSTEMS - INTERIOR

A. Paint I-TR-C - Transparent Finish on Concrete Floors.
   1. Sealer: Water Based for Concrete Floors; MPI #99.

B. Paint CI-OP-3L - Concrete/Masonry, Opaque, Latex, 3 Coat:
   1. One coat of block filler.
   2. Semi-gloss: Two coats of latex enamel; INT 4.2E.

C. Paint MI-OP-2L - Ferrous Metals, Primed, Latex, 2 Coat:
   1. Touch-up with latex primer.
   2. Semi-gloss: Two coats of latex enamel; INT 5.3M.

D. Paint GI-OP-3L - Gypsum Board/Plaster, Latex, 3 Coat:
   1. One coat of latex primer sealer.
   2. Semi-gloss: Two coats of latex enamel; INT 9.2B.

E. Paint FI-OP-3A - Fabrics/Insulation Jackets, Alkyd, 3 Coat:
   1. One coat of latex primer sealer.
   2. Flat: Two coats of alkyd enamel; INT 10.1A.

2.04 PRIMERS

A. Primers: Provide the following unless other primer is required or recommended by manufacturer of top coats.
   1. Interior/Exterior Latex Block Filler; MPI #4.
   2. Interior Latex Primer Sealer; MPI #50.

2.05 ACCESSORY MATERIALS

A. Accessory Materials: Provide primers, sealers, cleaning agents, cleaning cloths, sanding materials, and clean-up materials as required for final completion of painted surfaces.

B. Patching Material: Latex filler.

C. Fastener Head Cover Material: Latex filler.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that surfaces are ready to receive work as instructed by the product manufacturer.

B. Examine surfaces scheduled to be finished prior to commencement of work. Report any condition that may potentially effect proper application.

C. Test shop-applied primer for compatibility with subsequent cover materials.

D. Measure moisture content of surfaces using an electronic moisture meter. Do not apply finishes unless moisture content of surfaces are below the following maximums:
   1. Gypsum Wallboard: 12 percent.
   2. Masonry, Concrete, and Concrete Masonry Units : 12 percent.
   3. Concrete Floors and Traffic Surfaces: 8 percent.

3.02 PREPARATION

A. Clean surfaces thoroughly and correct defects prior to application.

B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

C. Remove or mask surface appurtenances, including electrical plates, hardware, light fixture trim, escutcheons, and fittings, prior to preparing surfaces or finishing.

D. Seal surfaces that might cause bleed through or staining of topcoat.

E. Masonry:
   1. Prepare surface as recommended by top coat manufacturer.

F. Concrete Floors and Traffic Surfaces: Remove contamination, acid etch, and rinse floors with clear water. Verify required acid-alkali balance is achieved. Allow to dry.

G. Ferrous Metal:
   1. Solvent clean according to SSPC-SP 1.
   2. Shop-Primed Surfaces: Sand and scrape to remove loose primer and rust. Feather edges to make touch-up patches inconspicuous. Clean surfaces with solvent. Prime bare steel surfaces. Re-prime entire shop-primed item.

H. Metal Doors to be Painted: Prime metal door top and bottom edge surfaces.

3.03 APPLICATION

A. Remove unfinished louvers, grilles, covers, and access panels on mechanical and electrical components and paint separately.

B. Apply products in accordance with manufacturer's written instructions and recommendations in "MPI Architectural Painting Specification Manual".

C. Where adjacent sealant is to be painted, do not apply finish coats until sealant is applied.

D. Do not apply finishes to surfaces that are not dry. Allow applied coats to dry before next coat is applied.

E. Apply each coat to uniform appearance in thicknesses specified by manufacturer.

F. Sand wood and metal surfaces lightly between coats to achieve required finish.

G. Vacuum clean surfaces of loose particles. Use tack cloth to remove dust and particles just prior to applying next coat.

H. Reinstall electrical cover plates, hardware, light fixture trim, escutcheons, and fittings removed prior to finishing.

3.04 CLEANING

A. Collect waste material that could constitute a fire hazard, place in closed metal containers, and remove daily from site.

3.05 PROTECTION

A. Protect finishes until completion of project.

B. Touch-up damaged finishes after Substantial Completion.

END OF SECTION

SECTION 142500

TABLE OF CONTENTS

SECTION 14 25 00
HYDRAULIC ELEVATOR MODERNIZATION

PART 1 GENERAL

1.1 WORK INCLUDED

A. One hydraulic passenger elevator.

B. All engineering, equipment, labor, and permits required to satisfactorily complete elevator modernization required by Contract Documents.

C. Applicable conditions of General, Special, and Supplemental Conditions, Division 1, and all sections listed in Contract Documents “Table of Contents.”

D. Preventive maintenance as described herein.

E. Additional equipment or finishes furnished under other sections, installed under this section:
1. Building announcement speakers

F. Cartage and Hoisting: All required staging, hoisting and movement to, on, and from the site including new equipment, reused equipment, or dismantling and removal of existing equipment.

G. Unless specifically identified as “Reuse,” “Retain,” or “Refurbish,” provide new equipment.

H. Hoistway, pit, and machine room barricades as required.

1.2 DEFINITIONS

A. Terms used are defined in the latest edition of the Safety Code for Elevators and Escalators, ASME A17.1.

B. Reference to a device or a part of the equipment applies to the number of devices or parts required to complete the installation.

C. Provisions of this specification are applicable to all elevators unless identified otherwise.

1.3 QUALITY ASSURANCE

A. Approved Contractors:
1. Hydraulic Elevator: CEMCOlift Elevator Systems, KONE, Minnesota Elevator Inc., Otis, Schindler, thyssenkrupp.
2. Car Enclosure: Eklund’s Inc., Gunderlin, Ltd., Hauenstein & Burmeister, KONE, Otis, Schindler, thyssenkrupp, Tyler.
3. Hoistway Entrance: Hauenstein & Burmeister, KONE, Otis, Schindler, thyssenkrupp, Tyler.
4. Alternate Contractors must receive approval of Owner at least 14 calendar days prior to bid date.

B. Compliance with Regulatory Agencies: Comply with most stringent applicable provisions of following codes, laws, and/or authorities, including revisions and changes in effect:
1. Safety Code for Elevators and Escalators, ASME A17.1
2. Guide for Inspection of Elevators, Escalators, and Moving Walks, ASME A17.2
3. Elevator and Escalator Electrical Equipment, ASME A17.5

4. National Electrical Code, NFPA 70
5. Americans with Disabilities Act, ADA
6. Local Fire Authority
7. Requirements of IBC, OSHPD, DSA, and all other codes, ordinances, and laws applicable within the governing jurisdiction
8. Life Safety Code, NFPA 101
9. Uniform Federal Accessibility Standard, UFAS

C. Warranty:
1. Material and workmanship of installation shall comply in every respect with Contract Documents. Correct defective material or workmanship which develops within one year from date of final acceptance of all work to satisfaction of Architect, Owner and Consultant at no additional cost, unless due to ordinary wear and tear, or improper use or care by Owner. Perform maintenance in accordance with terms and conditions indicated in the Preventive Maintenance Agreement.
2. Defective is defined to include, but not be limited to: operation or control system failures, car performance below required minimum, excessive wear, unusual deterioration, or aging of materials or finishes, unsafe conditions, the need for excessive maintenance, abnormal noise, or vibration, and similar unsatisfactory conditions.
3. Retained Equipment: All retained components, parts, and materials shall be cleaned, checked, modified, repaired or replaced, so each component and its parts are in like new operating condition. Retained equipment must be compatible for integration with new systems. All retained equipment shall be covered under the warranty provisions, of Articles 1.3 C. 1 and 2 above. No prorations of equipment or parts shall be allowed on preventive maintenance contract between the Contractor and Owner.
4. Make modifications, requirements, adjustments, and improvements to meet performance requirements herein.

1.4 PROJECT PROCEDURES

A. Staging Area: An equipment staging area will be available for use by Contractor. Contractor shall restrict usage to area designated and shall notify Owner/Property Management prior to storing of any large equipment which will impose heavy concentrated loading on floor area. Do not store such equipment until approval is received.

B. Occupancy and Work by Others:
1. Contractor expressly affirms Owner’s rights to let other contracts and employ other Contractors in connection with required work. Contractor will afford other Contractors and their workmen reasonable opportunity for introduction and storage of materials and equipment, for execution of their work and will properly connect and coordinate his work with theirs. Contractor will also incorporate comparable provisions in all its subcontracts.
2. Contractor declares that other Contractors employed by Owner on basis of separate contracts may proceed at such times as necessary to install items of work required by Owner.
3. Contractor declares that it will cooperate with other Contractors employed by Owner and, in addition to other coordination and expediting efforts, will coordinate their work by written notices regarding necessity of such work to be done on or before certain dates.
4. Contractor declares that it is responsible for review, stamped, and signed approval of all shop drawings for required work.
5. Contractor hereby declares that content of foregoing paragraphs and influence they may have on project:
    a. Shall not cause a change in stipulated Contract Sum
    b. Shall not cause a change in Construction Time Schedule

1.5 DOCUMENT AND SITE VERIFICATION

A. In order to discover and resolve conflicts or lack of definition which might create problems, Contractor must review Contract Documents and site conditions for compatibility with its product prior to submittal of quotation. Review existing structural, electrical provisions, and mechanical provisions for compatibility with Contractor's products. Owner will not pay for change to structural, mechanical, electrical, or other systems required to accommodate Contractor's equipment.

1.6 SUBMITTALS

A. Within 60 calendar days after award of contract and before beginning equipment fabrication, submit shop drawings, and required material samples for review. Allow 30 days for response to initial submittal.
   1. Scaled or Fully Dimensioned Layout: Plan of pit, hoistway, and machine room indicating equipment arrangement, elevation section of hoistway, details of car enclosures, hoistway entrances, and car/hall signal fixtures.
   2. Design Information: Indicate equipment lists, reactions, and design information on layouts.
   3. Power Confirmation Information: Design for existing conditions.
   4. Fixtures: Cuts, samples, or shop drawings.
   5. Finish Material: Submit 3" x 12" samples of actual finished material for review of color, pattern, and texture. Compliance with other requirements is the exclusive responsibility of the Contractor. Include, if requested, signal fixtures, lights, graphics, Braille plates, and detail of mounting provisions.
   6. Design Information: Provide calculations verifying the following:
      a. Adequacy of existing electrical provisions.
      b. Machine room heat emissions in B.T.U.
      c. Adequacy of existing car platform structure for intended loading.
      d. Adequacy of plunger wall thickness for intended loading.
   7. Written Maintenance Control Program (MCP) specifically designed for the equipment included under this contract. Include any unique or product specific procedures or methods required to inspect or test the equipment. In addition, identify weekly, bi-weekly, monthly, quarterly, and annual maintenance procedures, including statutory and other required equipment tests.

B. Submittal review shall not be construed as an indication that submittal is correct or suitable, or that the work represented by submittal complies with the Contract Documents. Compliance with Contract Documents, code requirements, dimensions, fit, and interface with other work is Contractor's responsibility.

C. Acknowledge and/or respond to review comments within 14 calendar days of return. Promptly incorporate required changes due to inaccurate data or incomplete definition so that delivery and installation schedules are not affected. Identify and cloud drawing revisions, including Contractor elective revisions on each re-submittal. Contractor's revision response time is not justification for equipment delivery or installation delay.

1.7 PERMIT, TEST AND INSPECTION

A. Obtain and pay for permit, license, and inspection fee necessary to complete installation.

B. Perform test required by governing authority in accordance with procedure described in ASME A17.2 Guide for Inspection of Elevators, Escalators, and Moving Walks in the presence of Authorized Representative.

C. Supply personnel and equipment for test and final review by Consultant, as required in Part 3.

1.8 MAINTENANCE

A. Interim: Furnish preventive maintenance service on elevators described herein for a period from notice to proceed, verbal or written, until each unit is removed from building service for modernization. In addition, furnish interim preventive maintenance on completed units until the modernization of each group of elevators is complete and one-year warranty maintenance, defined in Item 1.8 B. below, is commenced. Cost of interim maintenance shall not be included as part of modernization quotation. Indicate costs on a per-unit basis for interim maintenance. Costs for interim maintenance shall be paid by Owner separately and monthly based upon the number of units in service. Perform interim maintenance based upon terms and conditions of preventive maintenance agreement.

B. Warranty Maintenance:
1. Provide preventive maintenance and 24-hour emergency callback service for one year commencing on date of final acceptance by Owner. Systematically examine, adjust, clean, and lubricate all equipment. Repair or replace defective parts using parts produced by the Contractor of installed equipment. Maintain elevator machine room, hoistway, and pit in clean condition.
2. Use competent personnel, acceptable to the Owner, supervised and employed by Contractor.
3. The warranty maintenance period specified in Item 1.8, A. above shall be extended one month for each three-month period in which equipment related failures average more than .25 per unit per month.
4. Owner retains the option to delete cost of warranty maintenance from new equipment contract and remit twelve equal installments directly to Contractor during period in which maintenance is being performed.

C. Preventive Maintenance: Quote monthly cost for five-year Preventive Maintenance Agreement commencing upon completion of the warranty period specified in Item 1.8, A. above. Submit quote based upon terms and conditions of the Preventive Maintenance Agreement. Base quotation on present labor and material cost. Price adjustment will be made at Agreement commencement date and thereafter as provided in Agreement.

D. Use competent personnel, acceptable to the Owner, employed and supervised by Contractor.

PART 2 PRODUCTS

2.1 SUMMARY

A. One Passenger Elevator: Unless specifically identified as “retain existing,” provide new equipment.

Car 1	Existing Equipment	Disposition
Capacity:	2,500 lbs.	2,500 lbs.
Class Loading:	Passenger Class A	Retain existing
Contract Speed:	125 fpm	125 fpm
Machine:	Hydraulic pump	New submersible pump unit
Machine Location:	Adjacent	Retain existing

Car 1	Existing Equipment	Disposition
Supervisory Control:	Relay logic	Microprocessor-based system
Operational Control:	Selective collective	Selective collective microprocessor-based system
Motor Control:	Single speed AC with Wye Delta start	Single speed AC with Electronic soft start
Power Characteristics:	Field verify	Retain existing
Stops and Openings:	2, both front	Retain existing
Floors Served:	Front: 1, 2	Front: Retain existing
Travel:	Field Verify	Retain existing
Platform Size:	Field verify	Retain existing
Minimum Clear Inside Car:	Field verify	Retain Existing
Entrance Size:	36” wide x 84” high	Retain Existing
Entrance Type:	Single-speed side-opening	Retain existing
Door Operator:	Medium-speed heavy-duty	Medium-speed heavy-duty with 1½ fps minimum opening speed
Door Protection:	Infrared full screen device	Infrared full screen device with differential timing, nudging, and interrupted beam time
Hydraulic Type:	Holeless direct plunger	Retain Existing
Guide Rails:	Planed steel tees	Retain existing
Buffers:	Spring	Retain existing
Car Enclosure:		Retain existing
		Battery powered emergency car lighting. provide separate constant pressure test button in car service compartment.
Signal Fixtures:		LED illumination. Contractor’s, vandal resistant assembly
Hall and Car Pushbutton Stations:		Single hall pushbutton riser Single car operating panel
		Vandal resistant car and hall pushbuttons
Car Position Indicators:		Single digital with car direction arrows

Car 1	Existing Equipment	Disposition
		Security control panel
	In Car Lanterns:	All car entrance columns with volume adjustable electronic chime or tone. Sound twice for down direction. Vandal resistant assembly
Communication System:		Intercom with distress signal
		Self-dialing, vandal resistant, push to call, two-way communication system with recall, tracking, and voiceless communication
Fixture Submittal:		Submit brochure depicting contractor's proposed designs with bid
Additional Features:		Car top inspection station
		Car solid slide type guides
		Firefighters' service, Phases I and II, including alternate floor return
		Standby power transfer (automatic to main floor) with manual override in firefighters' control panel
		Stationary car return panel arranged for surface applied car operating panel
		Hoistway access switches, top and bottom floors
		Hoistway door unlocking device, all floors
		Platform isolation
		Jack to platen connections
		Independent service feature
		Card reader provisions
		Security control panel with remote wiring
		Hydraulic pump unit and controller sound isolation
		Tamper resistant fasteners for all fastenings exposed to the public
		One year warranty maintenance with 24-hour call-back service

Car 1	Existing Equipment	Disposition
		Retain sill support angles
		Seismic safety valve
		Signage engraving filled with black paint or approved etching process
		No visible company name or logo
		Wiring diagrams, operating instructions, and parts ordering information
		System diagnostic means and instructions
		Non-proprietary control system and diagnostics provisions

2.2 ALTERNATE (**PROVIDE NEW ELEVATOR**)

A. Elevator System, General: Manufacturer's standard elevator systems. Unless otherwise indicated, manufacturer's standard components shall be used, as included in standard elevator systems and as required for complete system.

B. Passenger Elevator Description:

1. Capacity: 2,500 lbs.
2. Class of Loading: Class A
3. Contract Speed: 125 fpm
4. Machine: Hydraulic Pump
5. Machine Location: Adjacent
6. Operational Control: Selective collective microprocessor-based
7. Motor Control: Single speed AC with electronic soft start
8. Power Characteristics: 480 Volts, 3 Phase, 60 Hertz
9. Stops and Openings: 2, all front
10. Floors Served: Front: 2
11. Travel: Field measure
12. Platform Size: 7'-2" wide x 5'-3" deep
13. Minimum Clear Inside Car: 6'-8" wide x 4'-9" deep x 7'-6" high
14. Entrance Size: 3'-6" wide x 7'-0" high
15. Entrance Type: Single-speed side-opening
16. Door Operator: Medium-speed heavy-duty with 2.0 fps minimum opening speed.
17. Door Protection: Infrared full screen device with differential timing, nudging, and interrupted beam time
18. Hydraulic Type: Dual jack holeless
19. Guide Rails: Planed steel tees
20. Buffers: Spring
21. Car Enclosure:
    a. As specified, stationary returns car station.
    b. Steel shell with rigidized interior finishes.

22. Signal Fixtures: LED illumination. Contractor's design, vandal resistant assembly.
    a. Hall and Car Pushbutton Stations:
        1) Single hall pushbutton riser.
        2) Single car operating panel.
        3) Vandal resistant car and hall pushbuttons.
    b. Car Position Indicators:
        1) Digital in car station with car direction arrows.
        2) Firefighters' control panel.
    c. Car Direction Lanterns: All car entrance columns with volume adjustable electronic chime or tone. Sound twice for down direction, vandal resistant assembly.
23. Communication System:
    a. Intercom with distress signal
    b. Self-dialing, vandal resistant, push to call, two-way communication system with recall, tracking, and voiceless communication
24. Additional Features:
    a. Hoistway access switches, top and bottom floors.
    b. Hoistway door unlocking device at all floors.
    c. Security provisions.
    d. Security control panel, remote conduit, and wiring.
    e. Seismic devices and operation.
    f. Provide pit access ladder.
    g. System diagnostic means and instructions.
    h. Platform isolation, jack to platen connections.
    i. Hydraulic pump unit and controller sound isolation.

2.3 MATERIALS

A. Site Condition Inspection
1. Prior to beginning installation of equipment, examine hoistway and machine room areas. Verify no irregularities exist which affect execution of work specified.
2. Do not proceed with installation until work in place conforms to project requirements.

B. Product Delivery, Storage, and Handling
1. Deliver material in Contractor's original, unopened protective packaging.
2. Store material in original protective packaging. Prevent soiling, physical damage, or moisture damage.
3. Protect equipment and exposed finishes from damage and stains during transportation, erection, and construction.
4. Allocate available site storage areas and coordinate their use with Owner and other Contractors.
5. Provide suitable temporary weather-tight storage facilities as may be required for materials which will be stored in the open.

C. Installation Requirements
1. Install all equipment in accordance with Contractor's instructions, referenced codes, specification, and approved submittals.
2. Install machine room equipment with clearances in accordance with referenced codes and specification.
3. Install all equipment so it may be easily removed for maintenance and repair.
4. Install all equipment for ease of maintenance.
5. Install all equipment to afford maximum accessibility, safety, and continuity of operation.
6. Remove oil, grease, scale, and other foreign matter from the following equipment and apply one coat of field-applied machinery enamel.
    a. All exposed equipment and metal work installed as part of this work which does not have architectural finish.

b. Machine room equipment, hoistway equipment including guide rail brackets and pit equipment.
c. Hoistway equipment including guide rails, guide rail brackets, and pit equipment.
d. Neatly touch up damaged factory-painted surfaces with original paint color. Protect machine-finish surfaces against corrosion.

D. Manufacturer's Nameplates
1. Manufacturer's name plates and other identifying markings shall not be affixed on surfaces exposed to public view. This requirement does not apply to Underwriter's Laboratories and code required labels.
2. Each major component of mechanical and electrical equipment shall have identification plate with the Manufacturer's name, address, model number, rating, and any other information required by governing codes.

E. Colors of Factory-Finished Equipment
1. All colors will be selected from the Manufacturer's standard range unless custom colors are specified herein.
2. Submit samples of all standard colors available and/or specified custom colors for review and approval.
3. Submit samples of all specified architectural metals specified for review and approval.

F. Materials and Finishes
1. Steel:
a. Sheet Steel (Furniture Steel for Exposed Work): Stretcher-leveled, cold-rolled, commercial quality carbon steel, complying with ASTM A366, matte finish.
b. Sheet Steel (for Unexposed Work): Hot-rolled, commercial quality carbon steel, pickled and oiled, complying with ASTM A568/A568M-03.
c. Structural Steel Shapes and Plates: ASTM A36.
d. Stainless Steel: Type 302 or 304 complying with ASTM A240, with standard tempers and hardness required for fabrication, strength and durability. Apply mechanical finish on fabricated work in the locations shown or specified, Federal Standard and NAAMM nomenclature, with texture and reflectivity required to match Architect's sample. Protect with adhesive paper covering.
1) No. 4 Satin: Directional polish finish. Graining directions as shown or, if not shown, in longest dimension.
2) No. 8 Mirror: Reflective polish finish with no visible graining.
3) Textured: 5WL as manufactured by Rigidized Metals or approved equal with .050 inches mean pattern depth with bright directional polish (satin finish).
4) Burnished: Non-directional, random abrasion pattern.
2. Aluminum: Extrusions per ASTM B221; sheet and plate per ASTM B209.
3. Plastic Laminate: ASTM E84 Class A and NEMA LD3.1, Fire-Rated Grade (GP-50), Type 7, 0.050" ±.005" thick, color and texture as follows:
a. Exposed Surfaces: Color and texture selected by Architect.
b. Concealed Surfaces: Contractor's standard color and finish.
4. Fire-Retardant Treated Particle Board Panels: Minimum 3/4" thick backup for natural finished wood and plastic laminate veneered panels, edged and faced as shown, provided with suitable anti-warp backing; meet ASTM E84 Class "I" rating with a flame-spread rating of 25 or less, registered with local authorities for elevator finish materials.
5. Paint: Clean exposed metal parts and assemblies of oil, grease, scale, and other foreign matter and factory paint one shop coat of standard rust-resistant primer. After erection, provide one finish coat of industrial enamel paint. Galvanized metal need not be painted.
6. Prime Finish: Clean all metal surfaces receiving a baked enamel paint finish of oil, grease, and scale. Apply one coat of rust-resistant primer followed by a filler coat over uneven surfaces. Sand smooth and apply final coat of primer.
7. Baked Enamel Finish: Prime finish per above. Unless specified "prime finish" only, apply and bake three additional coats of enamel in the selected solid color.

8. Entrance: Clean all surfaces of dirt and grease.
9. Entrance Support Equipment within Hoistway: Include strut angles, headers, sill support angles, fascia, hanger covers, etc. Clean, and check for corrosive activity. Replace components that exhibit severe deterioration. Tighten all fastenings.

2.4 CAR PERFORMANCE

A. Car Speed: ± 10% of contract speed under any loading condition.

B. Car Capacity: Safely lower, stop and hold 125% of rated load.

C. Car Stopping Zone: ±1/4" under any loading condition.

D. Door Opening Time: Seconds time in seconds from start of opening to fully open.
1. Car: 2.8 seconds
2. ALT NEW: Car: 3.1 seconds.

E. Door Closing Time: Seconds time in seconds from start of closing to fully closed.
1. Car: 3.4 seconds.
2. ALT NEW Car: 4.0 seconds.

F. Car Floor-to-Floor Performance Time: Seconds in time seconds from start of doors closing until doors are 3/4 open for center-opening doors or 1/2 open for side-opening doors and car is level and stopped at next successive floor under any loading condition or travel direction. Typical floor height: 12’-0”.
1. Car: 14.5 seconds.
2. ALT NEW Car: 15.5 seconds.

G. Pressure: Fluid system components shall be designed and factory tested for 500 p.s.i. Maximum operating pressure shall be 400 p.s.i.

H. Car Ride Quality:
1. Horizontal and vertical acceleration within car during all riding and door operating conditions. Not more than 20 mg peak to peak (adjacent peaks) in the 1-10 Hz range.
2. Acceleration and Deceleration: Smooth constant and not less than 3 feet/second^2 with an initial ramp between 0.5 and 0.75 second.
3. Sustained Jerk: Not more than 6 feet/second^3.
4. Measurement Standards: Measure and evaluate ride quality consistent with ISO 18738, using low pass cutoff frequency of 10 Hz and A95 peak-to-peak average calculations.

I. Noise and Vibration Control
1. Airborne Noise: Measured noise level of elevator equipment and its operation shall not exceed 60 dBA inside car under any condition including door operation and car ventilation exhaust blower on its highest speed. Limit noise level in the machine room relating to elevator equipment and its operation to no more than 80 dBA. All dBA readings to be taken 3'-0" off the floor and 3'-0" from the equipment using the “A” weighted scale.
2. Vibration Control: All elevator equipment provided under this contract, including power unit, controller, oil supply lines, and their support shall be mechanically isolated from the building structure and electrically isolated from the building power supply and to each other to minimize the possibility of objectionable noise and vibrations being transmitted to occupied areas of the building.

2.5 OPERATION

A. Selective Collective Microprocessor-Based:
   1. Operate car without attendant from pushbuttons in car and located at each floor. When car is available, automatically start car and dispatch it to floor corresponding to registered car or hall call. Once car starts, respond to registered calls in direction of travel and in the order the floors are reached.
   2. Do not reverse car direction until all car calls have been answered, or until all hall calls ahead of car and corresponding to the direction of car travel have been answered.
   3. Slow car and stop automatically at floors corresponding to registered calls, in the order in which they are approached in either direction of travel. As slowdown is initiated for a hall call, automatically cancel hall call. Cancel car calls in the same manner. Hold car at arrival floor an adjustable time interval to allow passenger transfer.
   4. Answer calls corresponding to direction in which car is traveling unless call in the opposite direction is highest (or lowest) call registered.
   5. Illuminate appropriate pushbutton to indicate call registration. Extinguish light when call is answered.

B. Other Items:
   1. Low Oil Control: In the event oil level is insufficient for travel to the top floor, provide controls to return elevator to the main level and park until oil is added.
   2. Independent Service: Provide controls for operation from the pushbuttons only. Close doors by constant pressure on desired destination floor button or door close button. Open doors automatically upon arrival at selected floor.

C. Firefighters' Service: Provide equipment and operation in accordance with code requirements.

D. Automatic Car Stopping Zone: Stop car within 1/4" above or below the landing sill. Maintain stopping zone regardless of load in car, direction of travel, distance between landings.

E. Motion Control: AC type with unit valve suitable for operation specified and capable of providing smooth, comfortable car acceleration and retardation. Limit the difference in car speed between full load and no load to not more than ±10% of the contract speed.

F. Door Operation: Automatically open doors when car arrives at main floor. At expiration of normal dwell time, close doors.

G. Standby Lighting and Alarm: Car mounted battery unit with solid-state charger to operate alarm bell and car emergency lighting. Battery to be rechargeable with minimum five-year life expectancy. Include required transformer. Provide constant pressure test button in service compartment of car operating panel.

H. Standby Power Operation: Upon loss of normal power, adequate standby power will be supplied via building electrical feeders to run car at contract car speed and capacity.
   1. Provide "STANDBY POWER" indicator lights in lobby. Indicator light illuminates when car is, to operate on standby power.
   2. Successive Starting: When normal power is restored or there has been a power interruption, car shall restart.

I. Security System: Provide means to limit access to each building floor as follows:
   1. Individual floor lockout means in security control panel to prevent registration of car calls to any selected secure floor.
   2. Arrange system so that independent service overrides security system.
   3. Arrange system so that firefighters' service overrides security system.
   4. Actuate hall lantern each time car arrives at main lobby during secure mode operation.

2.6 MACHINE ROOM EQUIPMENT

A. Arrange equipment in existing machine room spaces.

B. Pump Unit: Assembled unit consisting of positive displacement pump, induction motor, master-type control valves combining safety features, holding, direction, bypass, stopping, manual lowering functions, shut off valve, oil reservoir with protected vent opening, oil level gauge, outlet strainer, drip pan, muffler, all mounted on isolating pads. Provide oil thermal unit and oil temperature thermostat to maintain oil at operating temperature. Design unit for 80 up starts/hour.

C. Landing Systems: Solid-state, magnetic, or optical type.

D. Controller: UL/CSA labeled.
   1. Compartment: Securely mount all assemblies, power supplies, chassis switches, relays, etc., on a substantial, self-supporting steel frame. Completely enclose equipment with covers. Provide means to prevent overheating.
   2. Relay Design: Magnet operated with contacts of design and material to insure maximum conductivity, long life, and reliable operation without overheating or excessive wear. Provide wiping action and means to prevent sticking due to fusion. Contacts carrying high inductive currents shall be provided with arc deflectors or suppressors.
   3. Microprocessor-Related Hardware
      a. Provide built-in noise suppression devices which provide a high level of noise immunity on all solid-state hardware and devices.
      b. Provide power supplies with noise suppression devices.
      c. Isolate inputs from external devices, such as pushbuttons, with opto-isolation modules.
      d. Design control circuits with one leg of power supply grounded.
      e. Safety circuits shall not be affected by accidental grounding of any part of the system.
      f. System shall automatically restart when power is restored.
      g. System memory shall be retained in the event of power failure or disturbance.
      h. Equipment shall be provided with Electro Magnetic Interference (EMI) shielding within FCC guidelines.
   4. Wiring: CSA labeled copper for factory wiring. Neatly route all wiring interconnections and securely attach wiring connections to studs or terminals.
   5. Permanently mark components, relays, fuses, PC boards, etc., with symbols shown on wiring diagrams.

E. Muffler: Provide in discharge oil line near pump unit. Design shall dampen and absorb pulsation and noise in the flow of hydraulic fluid.

F. Piping and Oil: Provide piping, connections, and oil for the system. Buried piping shall be secondarily contained with watertight Schedule 40 PVC sleeves between elevator machine room and pit. A minimum of two sound isolation couplings shall be provided between the pump unit and oil line and the oil line and jack unit. Provide isolated pipe stands or hangers as required.

G. Shutoff Valve: Manual valve in line adjacent to pump unit. Provide second valve in pit adjacent to jack unit.

H. Pressure Switch: Provide oil pressure sensitive switch in line to automatically close and prevent loss of oil in cylinder upon loss of pressure in oil supply line.

2.7 HOISTWAY EQUIPMENT **BASE BID**

A. Guide Rails: Retain main guide rails in place.
   1. Clean rails and brackets. Remove rust.
   2. Check all rail and bracket fastenings and tighten.
   3. Realign rails as required to provide smooth car ride.

B. Buffers: Retain existing.
   1. Rebuild as required and paint.

C. Hydraulic Jack Assembly: Retain existing.
   1. Cylinders: Retain existing.
   2. Plungers: Retain existing.

D. Jack Support and Fluid Shut-Off Valves: Retain existing steel pit channels to support jack assembly and transmit loads to building structure. Provide manual on/off valves in oil lines adjacent to pump unit and jack units in pit adjacent to jack units.

E. Overspeed Valves: Provide a pressure sensitive, mechanically-actuated seismic safety valve, conforming to ASME A17.1, 3.19.4.7. Connect valve directly to jack assembly inlet.

F. Terminal Stopping: Provide normal and final devices.

G. Electrical Wiring and Wiring Connections:
   1. Conductors and Connections:
      a. Copper throughout with individual wires coded and connections on identified studs or terminal blocks.
      b. Use no splices or similar connections in wiring except at terminal blocks, control compartments, or junction boxes.
      c. Provide 10% spare conductors throughout.
      d. Run spare wires from car connection points to individual elevator controllers in the machine room.
      e. Provide four pair of spare shielded communication wires in addition to those required to connect specified items.
      f. Tag spares in machine room.
   2. Conduit:
      a. Painted or galvanized steel conduit, EMT, or duct.
      b. Minimum Conduit Size: 1/2".
      c. Flexible heavy-duty service cord may be used between fixed car wiring and car door switches for door protective devices.
   3. Traveling Cables:
      a. Flame and moisture-resistant outer cover.
      b. Prevent traveling cable from rubbing or chafing against hoistway or equipment within hoistway.
      c. Provide five pair of shielded wires and two RG-6/U type coaxial cables.
      d. Provide two pair 14-gauge wire.
   4. Auxiliary Wiring: Connect fire alarm initiating devices, emergency two-way communication system, paging speaker, intercom, in each car controller in machine room.

H. Entrance Equipment: Retain existing. Refurbish/replace and adjust assemblies to ensure smooth and quiet mechanical open and close of doors.
   1. Door Hangers and Rollers: Replace as required.
   2. Door Track: Refurbish and/or replace as required.
   3. Door Interlocks: Refurbish and/or replace as required.
   4. Door Closers: Refurbish and/or replace as required

I. Hoistway Door Unlocking Device: Retain existing.

J. Hoistway Access Switches: Mount in entrance frame side jamb at top and bottom floors. Provide switch with faceplate.

K. Floor Numbers: Stencil paint 4" high floor designations in contrasting color on inside face of hoistway doors or hoistway fascia in location visible from within car.

2.8 HOISTWAY EQUIPMENT **ALT NEW CAR**

A. Guide Rails: Planed steel T-sections for car of suitable size and weight for the application, including seismic reactions, including brackets for attachment to building structure. No additional structural points of rail attachment, other than those shown on the Contract Documents, will be provided.

B. Buffers: Spring type with blocking and support channels.

C. Hydraulic Jack Assembly:
   1. Cylinders: Seamless steel pipe. Design head to receive unit-type packing and provide means to collect oil at cylinder head and return automatically to oil reservoir.
   2. Plungers: Multi stage. Polished seamless steel tubing or pipe. Coordinate installation at the jobsite. Join sections by internal threaded couplings. Multiple section jack units shall be factory polished while assembled and marked for proper future reassembly. Isolate plunger from car frames.
   3. Provide dual jack holeless application.

D. Jack Support and Fluid Shut-Off Valves: Provide steel pit channels to support jack assembly and transmit loads to building structure. Provide intermediate stabilizers as required. Provide manual on/off valves in oil lines adjacent to pump unit and jack units in pit adjacent to jack units.

E. Overspeed Valves: Provide a pressure sensitive, mechanically-actuated seismic safety valve, conforming to ASME A17.1, 3.19.4.7. Connect valve directly to jack assembly inlet.

F. Terminal Stopping: Provide normal and final devices.

G. Electrical Wiring and Wiring Connections:
   1. Conductors and Connections:
      a. Copper throughout with individual wires coded and connections on identified studs or terminal blocks.
      b. Use no splices or similar connections in wiring except at terminal blocks, control compartments, or junction boxes.
      c. Provide 10% spare conductors throughout.
      d. Run spare wires from car connection points to individual elevator controllers in the machine room.
      e. Provide four pair of spare shielded communication wires in addition to those required to connect specified items.
      f. Tag spares in machine room.
   2. Conduit:
      a. Painted or galvanized steel conduit, EMT, or duct.
      b. Minimum Conduit Size: 1/2".
      c. Flexible heavy-duty service cord may be used between fixed car wiring and car door switches for door protective devices.
   3. Traveling Cables:
      a. Flame and moisture-resistant outer cover.

b. Prevent traveling cable from rubbing or chafing against hoistway or equipment within hoistway.
c. Provide five pair of shielded wires and two RG-6/U type coaxial cables.
d. Provide two pair 14-gauge wire.

4. Auxiliary Wiring: Connect fire alarm initiating devices, emergency two-way communication system, paging speaker, intercom, in each car controller in machine room.

H. Entrance Equipment:
1. Door Hangers: Two-point hanger roller with neoprene roller surface and suspension with eccentric upthrust roller adjustment.
2. Door Tracks: Bar or formed, cold-drawn removable steel tracks with smooth roller contact surface.
3. Door Interlocks: Operable without retiring cam. Paint interlock box flat black.
4. Door Closers: Spring, spirator, or jamb/strut mounted counterweight type. Design and adjust to insure smooth, quiet mechanical close of doors.

I. Hoistway Door Unlocking Device: Provide unlocking device with escutcheon in door panel at all floors, with finish to match adjacent surface.

J. Hoistway Access Switches: Mount in entrance frame side jamb at top and bottom floors. Provide switch with faceplate.

K. Floor Numbers: Stencil paint 4" high floor designations in contrasting color on inside face of hoistway doors or hoistway fascia in location visible from within car.

2.9 HOISTWAY ENTRANCES **BASE BID**

A. Frames: Retain existing.

B. Door Panels: Retain existing. Provide new door gibs with fire tabs at all floors. Minimum two gibs per panel, one at leading edge, and one at trailing edge of each panel.

C. Sight Guards: Retain existing.

D. Sills: Retain existing. Clean and polish. Check and tighten all fastenings.

E. Sill Supports: Retain existing. Check and tighten all fastenings.

F. Fascia, Toe Guards, and Hanger Covers: Retain existing. Provide as required where damaged or missing. Check and tighten all fastenings.

G. Struts and Headers: Retain existing. Check and tighten all fastenings.

2.10 HOISTWAY ENTRANCES **ALT NEW CAR**

A. Frames: 14 gauge hollow metal at all floors. Bolted and lapped head to jamb assembly. Clad frames with stainless steel. Provide Arabic floor designation/Braille plates, centered at 60" above finished floor, on both side jambs of all entrances. Provide plates at main egress landing with “Star” designation. Provide cast floor designation/Braille plates as manufactured by SCS, Vision Mark, or Entrada.

B. Door Panels: 16 gauge steel, sandwich construction without binder angles. Provide a minimum of two gibs per panel, one at leading and one at trailing edge with gibs in the sill groove entire length of door travel. Construct door panels with interlocking, stiffening ribs. Stainless steel

metal cladding shall wrap around leading and trailing edge of panel and return a minimum of 1/2" on rear side of leading edge of panel.

C. Sight Guards: 14 gauge, same material and finish as hoistway entrance door panels. Construct without sharp edges.

D. Sills: Extruded aluminum.

E. Sill Supports: Structural or formed steel designed to support door sill based upon car loading classification. Mount to eliminate need for grout under the sill.

F. Fascia, Toe Guards and Hanger Covers: 14 gauge furniture steel with Contractor's standard finish. Provide hoistway width fascia, toe guards, and hanger covers and provide car door interlock to prevent opening of car doors outside the unlocking zone per ASME A17.1, Rule 2, 14.4.2.3.4.

G. Struts and Headers: Provide for vertical support of entrances and related material. Provide door open bumpers on entrances equipped with vertical struts.

H. Finish of Frames and Doors: Stainless steel.

2.11 CAR EQUIPMENT **BASE BID**

A. Frame: Retain Existing. Check and tighten all fastenings.

B. Platform: Retain existing. Reinforce if required. Check and tighten all fastenings.

C. Platform Apron: Retain existing. Check and tighten al fastenings. Replace damaged or missing sections.

D. Guide Shoes: Retain existing. Check and tighten all fastenings. Replace worn inserts.

E. Finish Floor Covering: Retain existing.

F. Sills: Retain existing. Clean and polish. Check and tighten all fastenings.

G. Doors: Retain existing. Retrofit dual gibs, one at trailing edge and one at leading edge of each panel.

H. Door Hangers: Retain existing hanger. Replace rollers clean or replace upthrust roller. Check and tighten all fastenings.

I. Door Track: Retain existing. Clean and sand for smooth, quiet operation. Check and tighten all fastenings.

J. Door Header: Retain existing. Check and tighten all fastenings.

K. Door Electrical Contact: Prohibit car operation unless car door is closed.

L. Door Clutch: Heavy-duty clutch, linkage arms, drive blocks and pickup rollers or cams to provide positive, smooth, quiet door operation. Design clutch so car doors can be closed, while hoistway doors remain open.

M. Restricted Opening Device: Provide car-door interlock per code to prevent opening of car doors outside unlocking zone.

N. Door Operator:
   1. Medium-speed heavy-duty door operator capable of opening doors at no less than 1½ fps. Accomplish reversal in no more than 2½" of door movement. Provide solid-state door control with closed loop circuitry to constantly monitor and automatically adjust door operation based upon velocity, position, and motor current. . Provide a minimum of four controller-activated motion profiles, per floor, per door, to maintain consistent, smooth, and quiet door operation at all floors, regardless of door weight or varying air pressure.
   2. Acceptable closed-loop door operators:
      a. KONE: Renova 2.0
      b. Otis: AT 400
      c. Schindler QKS: 15 Heavy Duty
      d. thyssenkrupp: HD-05
      e. G.A.L.: MOVFR, MOVFE

O. Door Control Device:
   1. Infrared Reopening Device:
      a. Black, fully enclosed device with full screen infrared matrix or multiple beams extending vertically along leading edge of each door panel to minimum height of 7'-0" above finished floor. Device shall prevent doors from closing and reverse doors at normal opening speed if beams are obstructed while doors are closing, except during nudging operation. In event of device failure, provide for automatic shutdown of car at floor level with doors open.
      b. Acceptable Infrared Reopening Device:
         1) Cegard/MAX-154 by CEDES
         2) Gatekeeper by Adams
         3) Lambda II by Otis
         4) Magic Edge by Tri-Tronics
         5) Microlite by thyssenkrupp
         6) Microscan E by T.L. Jones
         7) Pana40 Plus by Janus
   2. Nudging Operation: After beams of door control device are obstructed for a predetermined time interval (minimum 20.0-25.0 seconds), warning signal shall sound and doors shall attempt to close with a maximum of 2.5 foot pounds kinetic energy. Activation of the door open button shall override nudging operation and reopen doors.
   3. Interrupted Beam Time: When beams are interrupted during initial door opening, hold door open a minimum of 3.0 seconds. When beams are interrupted after the initial 3.0 second hold open time, reduce time doors remain open to an adjustable time of approximately 1.0-1.5 seconds after beams are reestablished.
   4. Differential Door Time: Provide separately adjustable timers to vary time that doors remain open after stopping in response to calls.
      a. Car Call: Hold open time adjustable between 3.0 and 5.0 seconds.
      b. Hall Call: Hold open time adjustable between 5.0 and 8.0 seconds. Use hall call time when car responds to coincidental calls.

P. Car Operating Panel:
   1. One car operating panel with faceplate, consisting of a metal box containing vandal resistant operating fixtures, mounted behind the car stationary front return panel. Faceplate shall be hinged and constructed of stainless steel, satin finish.
   2. Suitably identify floor buttons, alarm button, door open button, door close button, and emergency push-to-call button with SCS, Visionmark, or Entrada cast tactile symbols surface mounted. Configure plates per local building code accessibility standards including Braille. Locate operating controls no higher than 48" above the car floor; no lower than 35" for emergency push-to-call button and alarm button.
   3. Provide minimum 3/4" diameter raised or flush floor pushbuttons which illuminate to indicate call registration.
   4. Provide alarm button to ring bell located on car. Illuminate button when actuated.

5. Provide keyed stop switch at bottom of car operating panel in locked car service compartment. Mark device to indicate “run” and “stop” positions.
6. Provide “door open” button to stop and reopen doors or hold doors in open position.
7. Provide “door close” button to activate door close cycle. Cycle shall not begin until normal door dwell time for a car or hall call has expired, except firefighters’ operation.
8. Provide locked panel including Phase II fire switch, call cancel button, door open, door close, switch, stop switch, light jewel, per code.
9. Earthquake indicator light jewel and audible signal required on Seismic Zone 2 or greater.
10. Provide lockable service compartment with recessed flush door. Door material and finish shall match car return panel or car operating panel faceplate.
11. Include the following controls in lockable service cabinet with function and operating positions identified by permanent signage or engraved legend:
    a. Inspection switch.
    b. Light switch.
    c. Three-position exhaust blower switch.
    d. Independent service switch.
    e. Constant pressure test button for battery pack emergency lighting.
    f. 120-volt, AC, GFCI protected electrical convenience outlet.
    g. Card reader override switch.
    h. Stop switch.
    i. Switch to select either floor voice annunciation, floor passing tone, or chime.
12. Provide black paint filled (except as noted), engraved, or approved etched signage as follows with approved size and font:
    a. Phase II firefighters’ operating instructions on inside face of firefighters’ compartment door. Engrave filled red firefighters’ operation on outside face of compartment door.
    b. Car number on main car operating panel.
    c. Car capacity in pounds on main car operating panel.

Q. Car Top Control Station: Mount to provide safe access and utilization while standing in an upright position on car top.

R. Work Light and Duplex Plug Receptacle: GFCI protected outlet at top of car. Include on/off switch and lamp guard.

S. Communication System: “Push to Call,” two-way communication instrument in car with automatic dialing, tracking, and recall features with shielded wiring to car controller in machine room.
1. “Push to Call” button or adjacent light jewel shall illuminate and flash when call is acknowledged. Button shall match car operating panel pushbutton design. Provide uppercase “PUSH TO CALL,” “HELP ON THE WAY” engraved signage adjacent to button.
2. Provide “Push to Call” button tactile symbol, engraved signage, and Braille adjacent to button mounted integral with car front return panel.

2.12 CAR EQUIPMENT **ALT NEW CAR**

A. Frame: Welded or bolted, rolled or formed steel channel construction to meet load classification specified.

B. Platform: Isolated type, constructed of steel, or steel and wood which is fireproofed on underside. Design and construct to accommodate load classification requirements. Provide Class “A” construction for passenger elevator.

C. Platform Apron: Provide new extended platform apron per code. Minimum 14 gauge steel, reinforced and braced to car platform Contractor’s standard finish.

D. Guide Shoes: Roller type with three or more spring dampened, sound-deadening rollers per shoe.

E. Finish Floor Covering: Supplied and installed by building contractor.

F. Sills: One-piece aluminum extrusion sill.

G. Doors: Provide as specified for hoistway entrance doors.

H. Door Hangers: Two-point hanger roller with neoprene roller surface and suspension with eccentric upthrust roller adjustment.

I. Door Track: Bar or formed, cold-drawn removable steel track with smooth roller contact surface.

J. Door Header: Construct of minimum 12 gauge steel, shape to provide stiffening flanges.

K. Door Electrical Contact: Prohibit car operation unless car door is closed.

L. Door Clutch: Heavy-duty clutch, linkage arms, drive blocks and pickup rollers or cams to provide positive, smooth, quiet door operation. Design clutch so car doors can be closed, while hoistway doors remain open.

M. Restricted Opening Device: Provide car-door interlock per code to prevent opening of car doors outside unlocking zone.

N. Door Operator:
   1. Medium-speed heavy-duty door operator capable of opening doors at no less than 1½ fps. Accomplish reversal in no more than 2½" of door movement. Provide solid-state door control with closed loop circuitry to constantly monitor and automatically adjust door operation based upon velocity, position, and motor current. . Provide a minimum of four controller-activated motion profiles, per floor, per door, to maintain consistent, smooth, and quiet door operation at all floors, regardless of door weight or varying air pressure.
   2. Acceptable closed-loop door operators:
      a. KONE: Renova 2.0
      b. Otis: AT 400
      c. Schindler QKS: 15 Heavy Duty
      d. thyssenkrupp: HD-05
      e. G.A.L.: MOVFR, MOVFE

O. Door Control Device:
   1. Infrared Reopening Device:
      a. Black, fully enclosed device with full screen infrared matrix or multiple beams extending vertically along leading edge of each door panel to minimum height of 7'-0" above finished floor. Device shall prevent doors from closing and reverse doors at normal opening speed if beams are obstructed while doors are closing, except during nudging operation. In event of device failure, provide for automatic shutdown of car at floor level with doors open.
      b. Acceptable Infrared Reopening Device:
         1) Cegard/MAX-154 by CEDES
         2) Gatekeeper by Adams
         3) Lambda II by Otis
         4) Magic Edge by Tri-Tronics
         5) Microlite by thyssenkrupp
         6) Microscan E by T.L. Jones
         7) Pana40 Plus by Janus

2. Nudging Operation: After beams of door control device are obstructed for a predetermined time interval (minimum 20.0-25.0 seconds), warning signal shall sound and doors shall attempt to close with a maximum of 2.5 foot pounds kinetic energy. Activation of the door open button shall override nudging operation and reopen doors.
3. Interrupted Beam Time: When beams are interrupted during initial door opening, hold door open a minimum of 3.0 seconds. When beams are interrupted after the initial 3.0 second hold open time, reduce time doors remain open to an adjustable time of approximately 1.0-1.5 seconds after beams are reestablished.
4. Differential Door Time: Provide separately adjustable timers to vary time that doors remain open after stopping in response to calls.
    a. Car Call: Hold open time adjustable between 3.0 and 5.0 seconds.
    b. Hall Call: Hold open time adjustable between 5.0 and 8.0 seconds. Use hall call time when car responds to coincidental calls.

P. Car Operating Panel:
1. One car operating panel with faceplate, consisting of a metal box containing vandal resistant operating fixtures, mounted behind the car stationary front return panel. Faceplate shall be hinged and constructed of stainless steel, satin finish.
2. Suitably identify floor buttons, alarm button, door open button, door close button, and emergency push-to-call button with SCS, Visionmark, or Entrada cast tactile symbols surface mounted. Configure plates per local building code accessibility standards including Braille. Locate operating controls no higher than 48" above the car floor; no lower than 35" for emergency push-to-call button and alarm button.
3. Provide minimum 3/4" diameter raised or flush floor pushbuttons which illuminate to indicate call registration.
4. Provide alarm button to ring bell located on car. Illuminate button when actuated.
5. Provide keyed stop switch at bottom of car operating panel in locked car service compartment. Mark device to indicate “run” and “stop” positions.
6. Provide “door open” button to stop and reopen doors or hold doors in open position.
7. Provide “door close” button to activate door close cycle. Cycle shall not begin until normal door dwell time for a car or hall call has expired, except firefighters’ operation.
8. Provide locked panel including Phase II fire switch, call cancel button, door open, door close, switch, stop switch, light jewel, per code.
9. Earthquake indicator light jewel and audible signal required on Seismic Zone 2 or greater.
10. Provide lockable service compartment with recessed flush door. Door material and finish shall match car return panel or car operating panel faceplate.
11. Include the following controls in lockable service cabinet with function and operating positions identified by permanent signage or engraved legend:
    a. Inspection switch.
    b. Light switch.
    c. Three-position exhaust blower switch.
    d. Independent service switch.
    e. Constant pressure test button for battery pack emergency lighting.
    f. 120-volt, AC, GFCI protected electrical convenience outlet.
    g. Card reader override switch.
    h. Stop switch.
    i. Switch to select either floor voice annunciation, floor passing tone, or chime.
12. Provide black paint filled (except as noted), engraved, or approved etched signage as follows with approved size and font:
    a. Phase II firefighters’ operating instructions on inside face of firefighters’ compartment door. Engrave filled red firefighters’ operation on outside face of compartment door.
    b. Car number on main car operating panel.
    c. Car capacity in pounds on main car operating panel .

Q. Car Top Control Station: Mount to provide safe access and utilization while standing in an upright position on car top.

R. Work Light and Duplex Plug Receptacle: GFCI protected outlet at top of car. Include on/off switch and lamp guard.

S. Communication System: “Push to Call,” two-way communication instrument in car with automatic dialing, tracking, and recall features with shielded wiring to car controller in machine room.
   1. “Push to Call” button or adjacent light jewel shall illuminate and flash when call is acknowledged. Button shall match car operating panel pushbutton design. Provide uppercase “PUSH TO CALL,” “HELP ON THE WAY” engraved signage adjacent to button.
   2. Provide “Push to Call” button tactile symbol, engraved signage, and Braille adjacent to button mounted integral with car front return panel.

2.13 CAR ENCLOSURE **BASE BID**

A. Retain existing. Modify as required for application of new signal and pushbutton fixtures. Check and tighten all fasteners.

2.14 CAR ENCLOSURE **ALT NEW CAR**

A. Provide complete as specified herein. Provide the following features.
   1. Shell: Reinforced 14 gauge furniture steel formed panels with baked enamel interior finish as selected. Apply sound-deadening mastic to exterior.
   2. Canopy: Reinforced 12 gauge furniture steel formed panels with lockable, hinged emergency exit. Interior finish white reflective baked enamel.
   3. Front Return Panels and Integral Entrance Columns: Reinforced 14 gauge satin finish stainless steel. Swing entire unit on a minimum of three substantial pivot points for service access to car operating panels. Locate pivot points to provide full swing of front return panel without interference with side wall finish or handrail. Secure in closed position with concealed three-point latch. Provide service compartment with recessed flush cover and cutouts for operating switches, etc.
   4. Front Return Panels: Reinforced 14 gauge stainless steel, textured finish as specified in Item 2.2.
   5. Entrance Columns: Reinforced 14 gauge satin finish stainless steel.
   6. Transom: Reinforced 14 gauge satin finish stainless steel full width of enclosure.
   7. Car Door Panels: Reinforced minimum 16 gauge satin finish stainless steel. Same construction as hoistway door panels. Architectural metal cladding shall wrap around leading and trailing edge of panel and return a minimum of 1/2" on rear side of leading edge of panel.
   8. Base: Stainless steel with concealed ventilation cutouts.
   9. Interior Wall Finish: Satin finish stainless steel.
   10. Ventilation: Morrison Products, Inc. two-speed model exhaust blower mounted to car canopy on isolated rubber grommets.
   11. Lighting: Provide recessed fluorescent fixtures with wiring and hookup. Coordinate with emergency lighting requirements.
   12. Handrails: Minimum 1¼" diameter stainless steel tubular grab bar across rear and side walls.

B. Provide complete as specified herein. Provide the following features.
   1. Shell: Reinforced 14 gauge textured stainless steel formed panels as specified in Item 2.2. Apply sound deadening mastic to exterior.
   2. Canopy: Reinforced 12 gauge furniture steel formed panels with lockable hinged emergency exit. Interior finish white reflective baked enamel.

3. Front Return Panels: Reinforced 14 gauge stainless steel, textured finish as specified in Item 2.2.
4. Entrance Columns and Transom: Reinforced 14 gauge satin finish stainless steel.
5. Car Door Panels: Reinforced minimum 16 gauge stainless steel textured finish as specified in Item 2.2. Same construction as hoistway door panels. Architectural metal cladding shall wrap around leading and trailing edge of panel and return a minimum of 1/2" on rear side of leading edge of panels.
6. Ventilation: Morrison Products, Inc. two-speed exhaust blower Model OE mounted to car canopy on isolating rubber grommets. Provide with a diffuser and grille. Exhaust blower shall meet requirements of Item 2.3, H.
7. Lighting: Fluorescent fixture flush mounted in ceiling with protective diffuser and steel guard over fixtures on car top.
8. Handrails: Minimum 1¼" diameter stainless steel tubular grab bar across rear and side walls.

2.15 HALL CONTROL STATIONS

A. Pushbuttons: Provide 1 riser with flush mounted faceplates. Include pushbuttons for each direction of travel which illuminate to indicate call registration. Include approved engraved message and pictorial representation prohibiting use of elevator during fire or other emergency situation as part of faceplate. Pushbutton design shall match car operating panel pushbuttons.

2.16 SIGNALS

A. Car Direction Lanterns: Provide flush-mounted car lantern in all car entrance columns. Illuminate up or down LED lights and sound electronic tone once for up and twice for down direction travel as doors open. Sound tone once for up direction and twice for down direction. Sound level shall be adjustable from 0-80 dBA measured at 5'-0" in front of hall control station and 3'-0" off floor. Provide adjustable car door dwell time to comply with ADA requirements relative to hall call notification time. Car direction lenses shall be arrow shaped with faceplates. Lenses shall be minimum 2½" in their smallest dimension. Provide vandal resistant lantern and light assemblies consisting of series of dots or lines for maximum visibility.

B. Car Position Indicator: Alpha-numeric digital indicator containing floor designations and direction arrows a minimum of 1/2" high to indicate floor served and direction of car travel. Locate fixture in car operating panel. When a car leaves or passes a floor, illuminate indication representing position of car in hoistway. Illuminate proper direction arrow to indicate direction of travel.

C. Faceplate Material and Finish: Satin finish stainless steel, all fixtures.

D. Floor Passing Tone: Provide an audible tone of no less than 20 decibels and frequency of no higher than 1500 Hz, to sound as the car passes or stops at a floor served.

E. Firefighters' Key Box: Flush-mounted box with lockable hinged cover. Engrave instructions for use on cover per Local Fire Authority requirements. Locate in security control center.

F. Security Office Control: Allow car and hall call disabling feature utilizing card reader features.

2.17 SEISMIC OPERATIONS AND EQUIPMENT

A. Provide design, components, and operation per governing code oil line seismic valve.

PART 3 EXECUTION

3.1 SITE CONDITION INSPECTION

A. Prior to beginning installation of equipment, examine hoistway and machine room areas. Verify no irregularities exist which affect execution of work specified.

B. Do not proceed with installation until work in place conforms to project requirements.

3.2 PRODUCT DELIVERY, STORAGE, AND HANDLING

A. Deliver material in Contractor’s original, unopened protective packaging.

B. Store material in original protective packaging. Prevent soiling, physical damage, or moisture damage.

C. Protect equipment and exposed finishes from damage and stains during transportation, erection, and construction.

3.3 INSTALLATION

A. Install all equipment in accordance with Contractor’s instructions, referenced codes, specification, and approved submittals.

B. Install machine room equipment with clearances in accordance with referenced codes and specification.

C. Install all equipment so it may be easily removed for maintenance and repair.

D. Install all equipment for ease of maintenance.

E. Install all equipment to afford maximum accessibility, safety, and continuity of operation.

F. Remove oil, grease, scale, and other foreign matter from the following equipment and apply one coat of field-applied machinery enamel.
   1. All exposed equipment and metal work installed as part of this work which does not have architectural finish.
   2. Machine room equipment, hoistway equipment including guide rails, guide rail brackets, and pit equipment.
   3. Neatly touch up damaged factory-painted surfaces with original paint color. Protect machine-finish surfaces against corrosion.

3.4 FIELD QUALITY CONTROL

A. Work at jobsite will be checked during course of installation. Full cooperation with reviewing personnel is mandatory. Accomplish corrective work required prior to performing further installation.

B. Have Code Authority acceptance inspection performed and complete corrective work.

3.5 ADJUSTMENTS

A. Install hydraulic jack assembly and guide rails plumb and align vertically with tolerance of 1/16" in 100'-0". Secure guide rail joints without gaps and file any irregularities to a smooth surface.

B. Static balance car to equalize pressure of guide shoes on guide rails.

C. Lubricate all equipment in accordance with Contractor's instructions.

D. Adjust motors, valves, controllers, leveling switches, limit switches, stopping switches, door operators, interlocks, and safety devices to achieve required performance levels.

3.6 CLEANUP

A. Keep work areas orderly and free from debris during progress of project. Remove packaging materials on a daily basis.

B. Remove all loose materials and filings resulting from work.

C. Clean machine room equipment and floor.

D. Clean hoistways, car, car enclosure, entrances, operating and signal fixtures.

3.7 ACCEPTANCE REVIEW AND TESTS

A. Review procedure shall apply for individual elevators, portions of groups of elevators and completed groups of elevators accepted on an interim basis, or elevators and groups of elevators completed, accepted, and placed in operation.

B. Contractor shall perform review and evaluation of all aspects of its work prior to requesting Consultant's final review. Work shall be considered ready for Consultant's final contract compliance review when all Contractor's tests are complete and all elements of work or a designated portion thereof are in place and elevator or group of elevators are deemed ready for service as intended.

C. Furnish labor, materials, and equipment necessary for Consultant's review. Notify Consultant five working days in advance when ready for final review of elevator or group of elevators.

D. Consultant's written list of observed deficiencies of materials, equipment, and operating systems will be submitted to Contractor for corrective action. Consultant's review shall include as a minimum:
   1. Workmanship and equipment compliance with Contract Documents.
   2. Contract speed, capacity, floor-to-floor, and door performance comply with Contract Documents.
   3. Performance of following is satisfactory:
      a. Starting, accelerating, running
      b. Decelerating and stopping accuracy
      c. Door operation and closing force
      d. Equipment noise levels
      e. Signal fixture utility
      f. Overall ride quality
      g. Performance of door control devices
      h. Operations of emergency two-way communication device
      i. Operations of firefighters' service
      j. Operations of seismic devices
      k. Operations of special security features and flor lock-off provisions
   4. Test Results:
      a. In all test conditions, obtain specified contract speed, performance times, stopping accuracy without re-leveling, and ride quality to satisfaction of Owner and Consultant. Tests shall be conducted under both no load and full load condition.

b. Temperature rise in motor windings limited to 50° Celsius above ambient. A full-capacity one-hour running test, stopping at each floor for ten seconds in up and down directions, may be required.

E. Performance Guarantee: Should Consultant's review identify defects, poor workmanship, variance or noncompliance with requirements of specified codes and/or ordinances, or variance or noncompliance with the requirements of Contract Documents, Contractor shall complete corrective work in an expedient manner to satisfaction of Owner and Consultant at no cost as follows:
1. Replace equipment that does not meet code or Contract Document requirements.
2. Perform work and furnish labor, materials, and equipment necessary to meet specified operation and performance.
3. Perform retesting required by Governing Code Authority, Owner, and Consultant.

F. A follow-up final contract compliance review shall be performed by Consultant after notification by Contractor that all deficiencies have been corrected. Provide Consultant with copies of the initial deficiency report marked to indicate items which Contractor considers complete. If additional reviews are required due to Contractor's gross non-compliance with initial and follow-up deficiency reports, consultant shall bill Contractor at normal billing rates plus expenses, and Contractor acknowledges it will pay for additional compliance reviews.

3.8 OWNER'S INFORMATION

A. Provide three sets of neatly bound written information necessary for proper maintenance and adjustment of equipment within 30 days following final acceptance. Final retention will be withheld until data is received by Owner and reviewed by Consultant. Include the following as minimums:
1. Straight-line wiring diagrams of "as-installed" elevator circuits with index of location and function of components. Mount one set wiring diagrams on panels, racked, or similarly protected, in elevator machine room. Provide remaining set rolled and in a protective drawing tube. Maintain all drawing sets with addition of all subsequent changes. These diagrams are Owner's property. A legend sheet shall be furnished with each set of drawings to provide the following information:
   a. Name and symbol of each relay, switch, or other apparatus.
   b. Location on drawings, drawing sheet number and area, and location of all contacts.
   c. Location of apparatus, whether on controller or on car.
2. Written Maintenance Control Program (MCP) specifically designed for the equipment included under this contract. Include any unique or product specific procedures or methods required to inspect or test the equipment. In addition, identify weekly, bi-weekly, monthly, quarterly, and annual maintenance procedures, including statutory and other required equipment tests.
3. Printed instructions explaining all operating features.
4. Complete software documentation for all installed equipment.
5. Lubrication instructions, including recommended grade of lubricants.
6. Parts catalogs listing all replaceable parts including Contractor's identifying numbers and ordering instructions.
7. Four sets of keys for all switches and control features properly tagged and marked.
8. Diagnostic test devices together with all supporting information necessary for interpretation of test data, troubleshooting of elevator system, and performance of routine safety tests.
9. The elevator installation shall be a design which can be maintained by any licensed elevator maintenance company employing journeymen mechanics, without the need to

purchase or lease additional diagnostic devices, special tools, or instructions from the original equipment Contractor.

a. Provide onsite capability to diagnose faults to the level of individual circuit boards and individual discrete components for the solid state elevator controller.
b. Provide a separate, detachable device, as required, to the Owner as part of this installation if the equipment for fault diagnosis is not completely self-contained within the controller. Such device shall be in possession of and become property of the Owner.
c. Installed equipment not meeting this requirement shall be removed and replaced with conforming equipment at no cost to the Owner.

10. Provide upgrades and/or revisions of software during the progress of the work, warranty period and the term of the ongoing maintenance agreement between the Owner and Contractor.

B. Preventive Maintenance Contract: Furnish properly executed contract for continuing, preventive maintenance.

C. Acceptance of such records by Owner/Consultant shall not be a waiver of any Contractor deviation from Contract Documents or shop drawings or in any way relieve Contractor from his responsibility to perform work in accordance with Contract Documents.

END OF SECTION

SECTION 22 05 00

COMMON WORK RESULTS FOR PLUMBING

PART 1 GENERAL

1.01 SCOPE

A. All provisions of the Contract including the General and Supplementary Conditions and the General Requirements apply to this work.

1.02 WORK INCLUDED

A. The work to be included in these and all other plumbing subsections shall consist of providing, installing, adjusting and setting into proper operation complete and workable systems for all items shown on the drawings, described in the specifications or reasonably implied. This shall include the planning and supervision to coordinate the work with other crafts and to maintain a proper time schedule for delivery of materials and installation of the work.

B. Division 01 of the specifications is to be specifically included as well as all related drawings.

1.03 RELATED WORK

A. Related Work Specified Elsewhere:

1. Heating, Ventilating and Air Conditioning (HVAC) Specifications: Division 23.
2. Electrical Specifications: Division 26.

B. Unless otherwise indicated on the electrical drawings or the electrical schedules, provide all plumbing equipment motors, motor starters, thermal overload switches, control relays, time clocks, thermostats, motor operated valves, float controls, damper motors, electric switches, electrical components, wiring and any other miscellaneous Division 22 controls. Disconnect switches are included in the electrical work, unless specifically called out on mechanical plans.

C. Carefully coordinate all work with the electrical work shown and specified elsewhere.

1.04 REFERENCED CODES - LATEST ADOPTED EDITION

A. NFPA 70 National Electrical Code (NEC).

B. IMC International Mechanical Code.

C. UPC Uniform Plumbing Code.

D. IECC International Energy Conservation Code.

E. IFC International Fire Code.

F. IBC International Building Code.

1.05 PROJECT RECORD DRAWINGS

A. In addition to other requirements of Division 01, mark up a clean set of drawings as the work progresses to show the dimensioned location and routing of all mechanical work which will become permanently concealed. Show routing of work in concealed blind spaces within the building. Show exact dimensions of buried piping off of columns or exterior walls.

B. Maintain record documents at job site in a clean, dry and legible condition. Keep record documents available for inspection by the Project Manager.

C. Show the location of all valves and their appropriate tag identification.

D. At completion of project, deliver these drawings to the Architect and obtain a written receipt.

1.06 SUBMITTALS

A. See General Conditions and the General Requirements in Division 01 regarding submittals.

B. Submit by specification section complete and all at one time; partial submittals will not be considered. Submittals shall be provided in electronic PDF Format. The data in the electronic file shall be arranged and indexed under basic categories in order of the Specification Sections. An index shall be included with bookmarks and identifying tabs between sections and references to sections of specifications

C. Catalog sheets shall be complete and the item or model to be used shall be clearly marked, and identified as to which item in the specifications or on the drawings is being submitted and with drawing fixture number where applicable.

D. Only submit on items specifically required by each specification section. If a submittal has not been requested, it will not be reviewed.

1.07 OPERATING AND MAINTENANCE MANUALS

A. Submit maintenance manuals to the Engineer covering all equipment, fixtures, devices, etc. installed by the Contractor.

B. The operation and maintenance manuals shall be submitted by specification section complete and all at one time; partial operations and maintenance manual submittals will not be considered. The Operation and maintenance manuals shall be provided in electronic PDF Format. The data in the electronic file shall be arranged and indexed under basic categories. An index shall be included with bookmarks and identifying tabs between sections and references to sections of specifications. The manual shall contain, but not limited to, the following types of information:

1. Cover sheet with name, address, telephone number of Contractor, General Contractor and major equipment suppliers.
2. Catalog cuts of Elevator Shaft Sump Pump and associated controller.
3. Manufacturer's maintenance and overhaul instruction booklets including exploded views.
4. Identification numbers of all parts and nearest sources for obtaining parts and services.
5. Written summary of instructions to Owner.
6. All manufacturers' warranties and guarantees.
7. Contractors Warranty Letter.

1.08 HANDLING

A. See General Conditions and the General Requirements in Division 01 regarding material handling.

B. Deliver packaged materials to job site in unbroken packages with manufacturer's label, and store to facilitate inspection and installation sequence. All items must be labeled and identified as to make, size and quality.

1.09 SUBSTITUTIONS

A. See General Conditions and the General Requirements in Division 01 for substitution request procedures.

B. In accordance with the General Conditions and the General Requirements in Division 01, Substitution and Product Options, all substitute items must fit in the available space, and be of equal or better quality including efficiency performance, size, and weight, and must be compatible with existing equipment. The Architect/Engineer shall be the final authority regarding acceptability of substitutes.

1.10 DIMENSIONS

A. Before ordering any material or doing any work, the Contractor shall verify all dimensions, including elevations, and shall be responsible for the correctness of the same. No extra charge or compensation will be allowed on account of differences between actual dimensions and measurements indicated on the drawings.

B. Any differences, which may be found, shall be submitted to the Architect/Engineer for consideration before proceeding with the work.

1.11 MANUFACTURER'S DIRECTIONS

A. All manufactured articles shall be applied, installed and handled as recommended by the manufacturer, unless specifically called out otherwise. Advise the Architect/Engineer of any such conflicts before installation.

1.12 PERMITS, FEES, ETC.

A. The Contractor under each Division of these specifications shall arrange for a permit from the local authority. The Contractor shall pay for any inspection fees or other fees and charges required by ordinance, law, codes and these specifications.

1.13 TESTING

A. The Contractor under each section shall at his own expenses perform the various tests as specified and required by the Architect and as required by applicable code, the State and local authorities. The Contractor shall furnish all fuel and materials necessary for making tests.

1.14 TERMINOLOGY

A. Whenever the words "furnish", "provide", "furnish and install", "provide and install", and/or similar phrases occur, it is the intent that the materials and equipment described be furnished, installed and connected under this Division of the Specifications, complete for operation unless specifically noted to the contrary.

B. Where a material is described in detail, listed by catalogue number or otherwise called for, it shall be the Contractor's responsibility to furnish and install the material.

C. The use of the word "shall" conveys a mandatory condition to the contract.

D. "This section" refers to the section in which the statement occurs.

E. "The project" includes all work in progress during the construction period.

F. In describing the various items of equipment, in general, each item will be described singularly, even though there may be a multiplicity of identical or similar items.

1.15 SCHEDULE OF WORK

A. The work under the various sections must be expedited and close coordination will be required in executing the work. The various trades shall perform their portion of the work at such times as directed so as to meeting scheduled completion dates, and to avoid delaying any other trade. The Architect will set up completion dates. Each contractor shall cooperate in establishing these times and locations and shall process his work so as to ensure the proper execution of it.

1.16 COOPERATION AND CLEANING UP

A. The contractor for the work under each section of the specifications shall coordinate his work with the work described in all other sections of the specifications to the end that, as a whole, the job shall be a finished one of its kind, and shall carry on his work in such a manner that none of the work under any section of these specifications shall be handicapped, hindered or delayed at any time.

B. At all times during the progress of the work, the Contractor shall keep the premises clean and free of unnecessary materials and debris. The Contractor shall, on direction at any time from the Architect, clear any designated areas or area of materials and debris. On completion of any portion of the work, the Contractor shall remove from the premises all tools and machinery and all debris occasioned by the work, leaving the premises free of all obstructions and hindrances.

1.17 WARRANTY

A. Unless a longer warranty is hereinafter called for, all work, materials and equipment items shall be warrantied for a period of one year after acceptance by the Owner. All defects in labor and materials occurring during this period, as determined by the Architect/Engineer, shall be repaired and/or replaced to the complete satisfaction of the Architect/Engineer. Guarantee shall be in accordance with Division 01.

1.18 COMPLETION REQUIREMENTS

A. In accordance with the General Conditions and the General Requirements in Division 01, Project Closeout; before acceptance and final payment, the Contractor shall furnish:

1. Accurate project record drawings, shown in red ink on prints, showing all changes from the original plans made during installation of the work.
2. Contractors One Year Warranty.
3. All Manufacturers' Guarantees.
4. Operation and Maintenance Manuals.

1.19 INSPECTION OF SITE - REMODEL PROJECTS

A. The accompanying plans do not indicate completely the existing plumbing and mechanical installations. The bidders for the work under these sections of the specifications shall inspect the existing installations and thoroughly acquaint themselves with conditions to be met and the work to be accomplished in removing and modifying the existing work, and in installing the new work in the present building and underground serving to and from that structure. Failure to comply with this shall not constitute grounds for any additional payments in connection with removing or modifying any part of the existing installations and/or installing any new work.

1.20 RELOCATION OF EXISTING INSTALLATIONS

A. There are portions of the existing plumbing, mechanical and electrical systems, which shall remain in use to serve the finished building in conjunction with the indicated new installations. By actual examination at the site, each bidder shall determine those portions of the remaining present installations, which must be relocated to avoid interference with the installations of new work of his particular trade and that of all other trades. All such existing installations, which interfere with new installations, shall be relocated by the Contractor.

1.21 SALVAGE MATERIALS

A. The Contractor shall remove existing fixtures, equipment and other items associated with the plumbing systems where no longer required for the project. Where such items are exposed to view or uncovered by any cutting or removal of general construction and has no continuing function (as determined by the Architect/Engineer), they shall be removed.

B. All items or materials removed from the project shall be made available for the Owner's inspection. The Owner retains the option to claim any item or material. Contractor shall deliver any claimed item or material in good condition to the place designated by the Owner. All items not claimed become the property of the contractor and shall be removed from the site.

PART 2 PRODUCTS

2.01 MATERIALS

A. All equipment shall be regularly cataloged items of the manufacturer and shall be supplied as a complete unit in accordance with the manufacturer's standard specifications along with any optional items required for proper installation unless otherwise noted. Maintain manufacturer's identification, model number, etc. on all equipment at all times.

B. Where more than one of an item is to be provided, all of the items shall be identical manufacture, make, model, color, etc.

2.02 RESTRICTED MATERIALS

A. No materials containing asbestos in any form shall be allowed.

B. No solder or flux containing lead shall be used on this project.

C. Where materials or equipment provided by this Contractor are found to contain restricted materials, such items shall be removed and replaced with non-restricted materials items. Entire cost of restricted materials removal and disposal and cost of installing new items shall be the responsibility of the Contractor for those restricted materials containing items installed by the Contractor.

2.03 ELECTRICAL MOTORS

A. Motors: Furnish electric motors designed for the specific application and duty applied, and to deliver rated horsepower without exceeding temperature ratings when operated on power systems with a combined variation in voltage and frequency not more than + 10% of rated voltage. Motors for pumps and fans shall be selected to be non-overloading.

B. Verify from the drawings and specifications the available electrical supply characteristics and furnish equipment that will perform satisfactorily under the conditions shown and specified.

C. Size motors for 1.15 service factor and not to exceed 40º C temperature rise above ambient.

D. Fractional horsepower motors to have self-resetting thermal overload switch.

E. Provide NEMA Premium Efficiency, motors for all three phase motors one horsepower and larger. Standard efficiency motors will not be acceptable.

2.04 IDENTIFICATION FOR PLUMBING EQUIPMENT

A. Plastic Nameplates: Laminated plastic with engraved letters, minimum 1-1/2 inches diameter.

PART 3 EXECUTION

3.01 DRAWINGS

A. The drawings are partly diagrammatic, not necessarily showing all offsets or exact locations of piping and ducts, unless specifically dimensioned. The contractor shall provide all materials and labor necessary for a complete and operable system. Complete details of the building which affect the mechanical installation may not be shown. For additional details, see Architectural, and Electrical Drawings. Coordinate work under this section with that of all related trades.

3.02 INSTALLATION

A. All work shall comply with the latest adopted applicable codes and ordinances including, but not limited to, the IMC, UPC, IBC, NEC, NFPA, IECC, IFGC and IFC Standards; all local and state amendments to all codes and standards.

B. Obtain and pay for all inspection fees, connection charges and permits as a part of the Contract.

C. Compliance with codes and ordinances shall be at the Contractor's expense.

3.03 MEASUREMENTS

A. Verify all measurements on the job site.

3.04 OPERATING INSTRUCTIONS

A. Before the facility is turned over to the Owner, instruct the Owner or Owner's personnel in the operation, care and maintenance of all systems and equipment under the jurisdiction of the Plumbing Division. These instructions shall also be included in a written summary in the Operating Maintenance Manuals.

B. The Operation and Maintenance Manuals shall be utilized for the basis of the instruction. Provide a minimum of one hours of onsite instruction to the owner designated personnel.

C. When required by individual specification sections provide additional training on plumbing systems and equipment as indicated in the respective specification section.

D. Provide schedule for training activities for review prior to start of training.

3.05 SYSTEM ADJUSTING

A. Test sump pump system for proper operation and oil detection.

3.06 CUTTING, FITTING, REPAIRING, PATCHING AND FINISHING

A. Arrange and pay for all cutting, fitting, repairing, patching and finishing of work by other trades where it is necessary to disturb such work to permit installation of mechanical work. Perform work only with craftsmen skilled in their respective trades.

B. Cut all holes neatly and as small as possible. Perform cutting in a manner so as not to floors. Drill holes required to be cut in floors without breaking out around holes.

3.07 IDENTIFICATION

A. Label sump pump with heat resistant laminated plastic labels.

3.08 INSTALLATION OF EQUIPMENT

A. Install Sump pump and controls in accordance with manufacturer's recommendations and approved submittals.

END OF SECTION 22 05 00

SECTION 22 05 05
SELECTIVE DEMOLITION FOR PLUMBING

PART 1 GENERAL

1.01 DESCRIPTION

A. Work specified in this Section includes the demolition, removal, and disposition of certain mechanical work.

B. Drawings, the provisions of the Agreement, and Administrative Specification Sections apply to all work of this Section.

PART 2 PRODUCTS (Not Used)

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. Notify the Architect in writing of conditions detrimental to the proper and timely completion of the work.

B. Do not begin installation until all unsatisfactory conditions are resolved. Beginning work constitutes acceptance of conditions as satisfactory.

3.02 DEMOLITION, REMOVAL AND DISPOSITION

A. Saw-cut concrete as shown or required.

B. Piping and Floor Drain To Be Removed: Remove piping and floor drain as indicated on the Drawings.

C. Piping Removed: Drawings do not show all existing piping which is to be removed. Unless indicated otherwise, where existing equipment has been removed, or its use replaced by new equipment, remove connecting piping back to the branch in the main so that there will be no dead ends or unused pipe lines in mechanical spaces at completion.

D. Materials To Owner and re-use of materials: As indicated on the Drawings.

E. Materials To Contractor: Materials shown or specified to be removed, other than the materials indicated to be turned over to Owner.

F. Protect any active piping and/or wiring encountered; remove, plug or cap utilities to be abandoned. Notify the Architect of utilities encountered whose service is not known.

G. Debris Removal: Existing materials removed and not reinstalled or turned over to the Owner shall be immediately removed from the site and disposed of by the Contractor.

H. Repairs: Any portion of the facility damaged, cut back or made inoperable by this Contractor shall be repaired with similar materials as the existing structure and/or damaged item as instructed by the Architect.

END OF SECTION 22 05 05

SECTION 22 30 00
PLUMBING EQUIPMENT

PART 1 GENERAL

1.01 WORK INCLUDED

A. Elevator Shaft Sump Pump.

1.02 RELATED WORK

A. Section 22 05 00 – Common Work Results for Plumbing.

1.03 QUALITY ASSURANCE

A. Provide pumps with manufacturer's name, model number, and rating/capacity identified.

1. Underwriters Laboratories (UL).

B. Ensure pumps operate at specified system fluid temperatures without vapor binding and cavitation, are non-overloading in parallel or individual operation, operate within 25 percent of midpoint of published maximum efficiency curve.

1.04 SUBMITTALS

A. Submit product data under provisions of Division 01.

B. Indicate pump type, capacity, materials of construction, power requirements, and affected adjacent construction.

C. Submit certified pump curves showing pump performance characteristics with pump and system operating point plotted. Include NPSH curve when applicable.

D. Submit manufacturer's installation instructions under provisions of Division 01.

1.05 OPERATION AND MAINTENANCE DATA

A. Submit operation and maintenance data under provisions of Division 01.

B. Include operation, maintenance, and inspection data, replacement part numbers and availability, and service depot location and telephone number.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Deliver and store products to site under provisions of Division 01.

1.07 WARRANTY

A. Provide manufacturer's warranty under provisions of Division 01.

PART 2 PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS – ELEVATOR SHAFT SUMP

A. Liberty.

B. Zoeller.

C. Xylem.

D. Substitutions: Under provisions of Division 01.

2.02 ELEVATOR SHAFT SUMP PUMP

A. Operating Conditions: The manual pump is connected to a control which has the ability to prevent oil from being pumped from the elevator sump. This same control unit will activate an alarm when an oil "film" is detected or when a high water condition exits. The system will continue to monitor and remove water from the vault even if an oil condition is detected.

B. Construction: The centrifugal sump pump shall be constructed of class 25 cast iron. The motor housing shall be oil filled to dissipate heat. All mating parts shall be machined and sealed with a Buna-N o-ring. All fasteners exposed to the liquid shall be stainless steel. The motor shall be protected on the top side with sealed cord entry plate with molded pins to conduct electricity eliminating the ability of water to enter internally through the cord. The motor shall be protected on the lower side with a unitized ceramic/carbon seal with stainless steel housings and spring

or engineered double lip seal with stainless steel springs. The pump shall be furnished with stainless steel handle.

C. Electrical Power Cord: The submersible pump shall be supplied with a 25 feet of multiconductor power cord. It shall be cord type YELLOW UL 16-3 SJEOOW 300V 105°C, capable of continued exposure to the pumped liquid. The power cord shall be sized for the rated full load amps of the pump in accordance with the National Electric Code. The power cable shall not enter the motor housing directly but will conduct electricity to the motor by means of a water tight compression fitting cord plate assembly, with molded pins to conduct electricity. This will eliminate the ability of water to enter internally through the cord, by means of a damaged or wicking cord.

D. Motors: Single phase motors shall be oil filled, permanent split capacitor, Class B insulated NEMA B design, rated for continuous duty. At maximum load the winding temperature shall not exceed 130 degrees C unsubmerged. The pump motor shall have an integral thermal overload switch in the windings for protecting the motor. The capacitor circuit shall be mounted internally in the pump.

E. Bearings and Shaft: An upper sleeve and lower ball bearing shall be required. The lower ball bearing shall be a single ball / race type bearing. Both bearings shall be permanently lubricated by the oil, which fills the motor housing. The motor shaft shall be made of 300 or 400 series stainless steel.

F. Seals: The pump shall have a unitized carbon / ceramic seal with stainless steel housings and spring, or engineered double lip seal with stainless steel springs. The motor plate / housing interface shall be sealed with a Buna-N o-ring.

G. Impeller: The impeller shall be vortex style made of an engineered polymer, with pump out vanes on the back shroud to keep debris away from the seal area. It shall be threaded to the motor shaft.

H. Controls: The control unit has three probes and a float ball switch. The pump will activate when the middle probe contacts water, and will remain on until the first, longest probe no longer is in contact with water. A high water alarm is activated when third or shortest probe contacts water. The system will ignore a small film of oil, however larger volumes of oil will be detected when the alarm probe does not detect water and the float ball activates. The system will continue to operates, removing water not oil from the sump even when oil has been detected.

I. Paint: The exterior of the casting shall be protected with powder coat paint.

J. Testing: The pump shall have a ground continuity check and the motor chamber shall be Hi-potted to test for electrical integrity, moisture content and insulation defects. The motor and volute housing shall be pressurized, and an air leak decay test is performed to ensure integrity of the motor housing. The pump shall be run, voltage current monitored, and the tester checks for noise or other malfunction.

PART 3 EXECUTION

3.01 INSTALLATION

A. Install elevator shaft sump pump and controls in accordance with manufacturer's instructions.

B. Provide line sized ball valve and line sized swing check valve on discharge.

END OF SECTION 22 30 00

SECTION 23 05 00

COMMON WORK RESULTS FOR HVAC

PART 1 GENERAL

1.01 SCOPE

A. All provisions of the Contract including the General and Supplementary Conditions and the General Requirements apply to this work.

1.02 WORK INCLUDED

A. The work to be included in these and all other mechanical subsections shall consist of providing, installing, adjusting and setting into proper operation complete and workable systems for all items shown on the drawings, described in the specifications or reasonably implied. This shall include the planning and supervision to coordinate the work with other crafts and to maintain a proper time schedule for delivery of materials and installation of the work.

B. Division 01 of the specifications is to be specifically included as well as all related drawings.

1.03 RELATED WORK

A. Related Work Specified Elsewhere:

1. Electrical Specifications: Division 26.

B. Unless otherwise indicated on the electrical drawings or the electrical schedules, provide all mechanical equipment motors, motor starters, thermal overload switches, control relays, thermostats, motor operated valves, float controls, damper motors, electric switches, electrical components, wiring and any other miscellaneous Division 23 controls. Disconnect switches are included in the electrical work, unless specifically called out on mechanical plans.

C. Carefully coordinate all work with the electrical work shown and specified elsewhere.

1.04 REFERENCED CODES - LATEST ADOPTED EDITION

A. NFPA 70 National Electrical Code (NEC).

B. IMC International Mechanical Code.

C. IECC International Energy Conservation Code.

D. IFC International Fire Code.

E. IBC International Building Code.

1.05 PROJECT RECORD DRAWINGS

A. In addition to other requirements of Division 01, mark up a clean set of drawings as the work progresses to show the dimensioned location and routing of all mechanical work which will become permanently concealed. Show routing of work in concealed blind spaces within the building. Show exact dimensions of buried piping off of columns or exterior walls.

B. Maintain record documents at job site in a clean, dry and legible condition. Keep record documents available for inspection by the Project Manager.

C. Show the location of all valves and their appropriate tag identification.

D. At completion of project, deliver these drawings to the [Owner]Architect and obtain a written receipt.

1.06 SUBMITTALS

A. See General Conditions and the General Requirements in Division 01 regarding submittals.

B. Submit by specification section complete and all at one time; partial submittals will not be considered. Submittals shall be provided in electronic PDF Format. The data in the electronic file shall be arranged and indexed under basic categories in order of the Specification Sections. An index shall be included with bookmarks and identifying tabs between sections and references to sections of specifications.

C. Catalog sheets shall be complete and the item or model to be used shall be clearly marked, and identified as to which item in the specifications or on the drawings is being submitted and with drawing fixture number where applicable.

D. Only submit on items specifically required by each specification section. If a submittal has not been requested, it will not be reviewed.

E. Submit product data for:

1. Hangers and Supports for HVAC Piping and Equipment.
2. Vibration and Seismic controls for HVAC Piping, Ductwork and Equipment.
3. Identification for HVAC Piping, Ductwork and Equipment.]

1.07 OPERATING AND MAINTENANCE MANUALS

A. Submit maintenance manuals to the Engineer covering all equipment, devices, etc. installed by the Contractor.

B. The operation and maintenance manuals shall be submitted by specification section complete and all at one time; partial operations and maintenance manual submittals will not be considered. The Operation and maintenance manuals shall be provided in electronic PDF Format. The data in the electronic file shall be arranged and indexed under basic categories. An index shall be included with bookmarks and identifying tabs between sections and references to sections of specifications. The manual shall contain, but not limited to, the following types of information:

1. Cover sheet with name, address, telephone number of Contractor, General Contractor and major equipment suppliers.
2. Catalog cuts of all equipment, etc. installed (Marked to identify the specific items used).
3. Manufacturer's maintenance and overhaul instruction booklets including exploded views.
4. Identification numbers of all parts and nearest sources for obtaining parts and services.
5. Reduced scale drawings of the control system and a verbal description of how these controls operate.
6. A copy of the final test and balance report.
7. Written summary of instructions to Owner.
8. All manufacturers' warranties and guarantees.
9. Contractors Warranty Letter.

C. A periodic maintenance form that includes all of the equipment shall be provided with the maintenance manual. The form shall list each piece of equipment and how often maintenance is required (daily, weekly, monthly, annually). Opposite each task shall be squares for check-off for a full year (initials) to verify that the tasks are being done.

1.08 HANDLING

A. See General Conditions and the General Requirements in Division 01 regarding material handling.

B. Deliver packaged materials to job site in unbroken packages with manufacturer's label, and store to facilitate inspection and installation sequence. All items must be labeled and identified as to make, size and quality.

1.09 SUBSTITUTIONS

A. See General Conditions and the General Requirements in Division 01 for substitution request procedures.

B. In accordance with the General Conditions and the General Requirements in Division 01, Substitution and Product Options, all substitute items must fit in the available space, and be of equal or better quality including efficiency performance, size, and weight, and must be compatible with existing equipment. The Architect/Engineer shall be the final authority regarding acceptability of substitutes.

1.10 DIMENSIONS

A. Before ordering any material or doing any work, the Contractor shall verify all dimensions, including elevations, and shall be responsible for the correctness of the same. No extra charge or compensation will be allowed on account of differences between actual dimensions and measurements indicated on the drawings.

B. Any differences, which may be found, shall be submitted to the Architect/Engineer for consideration before proceeding with the work.

1.11 MANUFACTURER'S DIRECTIONS

A. All manufactured articles shall be applied, installed and handled as recommended by the manufacturer, unless specifically called out otherwise. Advise the Architect/Engineer of any such conflicts before installation.

1.12 PERMITS, FEES, ETC.

A. The Contractor under each Division of these specifications shall arrange for a permit from the local authority. The Contractor shall pay for any inspection fees or other fees and charges required by ordinance, law, codes and these specifications.

1.13 TESTING

A. The Contractor under each section shall at his own expenses perform the various tests as specified and required by the Architect and as required by applicable code, the State and local authorities. The Contractor shall furnish all fuel and materials necessary for making tests.

1.14 TERMINOLOGY

A. Whenever the words "furnish", "provide", "furnish and install", "provide and install", and/or similar phrases occur, it is the intent that the materials and equipment described be furnished, installed and connected under this Division of the Specifications, complete for operation unless specifically noted to the contrary.

B. Where a material is described in detail, listed by catalogue number or otherwise called for, it shall be the Contractor's responsibility to furnish and install the material.

C. The use of the word "shall" conveys a mandatory condition to the contract.

D. "This section" refers to the section in which the statement occurs.

E. "The project" includes all work in progress during the construction period.

F. In describing the various items of equipment, in general, each item will be described singularly, even though there may be a multiplicity of identical or similar items.

1.15 SCHEDULE OF WORK

A. The work under the various sections must be expedited and close coordination will be required in executing the work. The various trades shall perform their portion of the work at such times as directed so as to meeting scheduled completion dates, and to avoid delaying any other trade. The Architect will set up completion dates. Each contractor shall cooperate in establishing these times and locations and shall process his work so as to ensure the proper execution of it.

1.16 COOPERATION AND CLEANING UP

A. The contractor for the work under each section of the specifications shall coordinate his work with the work described in all other sections of the specifications to the end that, as a whole, the job shall be a finished one of its kind, and shall carry on his work in such a manner that none of the work under any section of these specifications shall be handicapped, hindered or delayed at any time.

B. At all times during the progress of the work, the Contractor shall keep the premises clean and free of unnecessary materials and debris. The Contractor shall, on direction at any time from the Architect, clear any designated areas or area of materials and debris. On completion of any portion of the work, the Contractor shall remove from the premises all tools and machinery and all debris occasioned by the work, leaving the premises free of all obstructions and hindrances.

1.17 WARRANTY

A. Unless a longer warranty is hereinafter called for, all work, materials and equipment items shall be warrantied for a period of one year after acceptance by the Owner. All defects in labor and materials occurring during this period, as determined by the Architect/Engineer, shall be repaired and/or replaced to the complete satisfaction of the Architect/Engineer. Guarantee shall be in accordance with Division 01.

1.18 COMPLETION REQUIREMENTS

A. In accordance with the General Conditions and the General Requirements in Division 01, Project Closeout; before acceptance and final payment, the Contractor shall furnish:

1. Accurate project record drawings, shown in red ink on prints, showing all changes from the original plans made during installation of the work.
2. Contractors One Year Warranty.
3. All Manufacturers' Guarantees.
4. Test and Balance Reports.
5. Operation and Maintenance Manuals.

1.19 INSPECTION OF SITE - REMODEL PROJECTS

A. The accompanying plans do not indicate completely the existing plumbing and mechanical installations. The bidders for the work under these sections of the specifications shall inspect the existing installations and thoroughly acquaint themselves with conditions to be met and the work to be accomplished in removing and modifying the existing work, and in installing the new work in the present building and underground serving to and from that structure. Failure to comply with this shall not constitute grounds for any additional payments in connection with removing or modifying any part of the existing installations and/or installing any new work.

1.20 RELOCATION OF EXISTING INSTALLATIONS

A. There are portions of the existing plumbing, mechanical and electrical systems, which shall remain in use to serve the finished building in conjunction with the indicated new installations. By actual examination at the site, each bidder shall determine those portions of the remaining present installations, which must be relocated to avoid interference with the installations of new work of his particular trade and that of all other trades. All such existing installations, which interfere with new installations, shall be relocated by the Contractor.

1.21 SALVAGE MATERIALS

A. The Contractor shall remove existing equipment, duct, grilles and other items associated with the mechanical systems where no longer required for the project. Where such items are exposed to view or uncovered by any cutting or removal of general construction and has no continuing function (as determined by the Architect/Engineer), they shall be removed.

B. All items or materials removed from the project shall be made available for the Owner's inspection. The Owner retains the option to claim any item or material. Contractor shall deliver any claimed item or material in good condition to the place designated by the Owner. All items not claimed become the property of the contractor and shall be removed from the site.

PART 2 PRODUCTS

2.01 MATERIALS

A. All equipment shall be regularly cataloged items of the manufacturer and shall be supplied as a complete unit in accordance with the manufacturer's standard specifications along with any optional items required for proper installation unless otherwise noted. Maintain manufacturer's identification, model number, etc. on all equipment at all times.

B. Where more than one of an item is to be provided, all of the items shall be identical manufacture, make, model, color, etc.

2.02 RESTRICTED MATERIALS

A. No materials containing asbestos in any form shall be allowed.

B. No solder or flux containing lead shall be used on this project.

C. Where materials or equipment provided by this Contractor are found to contain restricted materials, such items shall be removed and replaced with non-restricted materials items. Entire cost of restricted materials removal and disposal and cost of installing new items shall be the responsibility of the Contractor for those restricted materials containing items installed by the Contractor.

2.03 ELECTRICAL MOTORS

A. Motors: Furnish electric motors designed for the specific application and duty applied, and to deliver rated horsepower without exceeding temperature ratings when operated on power systems with a combined variation in voltage and frequency not more than + 10% of rated voltage. Motors for pumps and fans shall be selected to be non-overloading.

B. Verify from the drawings and specifications the available electrical supply characteristics and furnish equipment that will perform satisfactorily under the conditions shown and specified.

C. All motors for use with equipment with variable frequency drives shall be inverter ready motors. Verify compatibility and sizing of motor with variable frequency drive.

D. Size motors for 1.15 service factor and not to exceed 40º C temperature rise above ambient.

E. Fractional horsepower motors to have self-resetting thermal overload switch.

F. Provide Premium Efficiency, motors for all three phase motors one horsepower and larger. Standard efficiency motors will not be acceptable.

2.04 IDENTIFICATION FOR HVAC EQUIPMENT

A. Plastic Nameplates: Laminated plastic with engraved letters.

B. Plastic Tags: Laminated plastic with engraved letters, minimum 1-1/2 inches diameter.

2.05 SUPPORTS

A. Acceptable Manufacturers:

1. B-Line Systems, Inc.
2. PHD Manufacturing, Inc.
3. Michigan Hanger Company.

2.06 HANGER RODS

A. Steel Hanger Rods: Threaded both ends, or continuous threaded.

2.07 ANCHOR BOLTS

A. Anchor (Expansion) Bolts: Shall be carbon steel to ASTM A 307; nut shall conform to ASTM A194; shall be drilled-in type. Design values for shear and tension shall be not more than 80 percent of the allowable load.

2.08 FLASHING

A. Metal Flashing: 26-gauge minimum galvanized steel.

B. Metal Counter Flashing: 22 gauge minimum galvanized steel.

C. Caps: Steel, 22-gauge minimum; 16 gauge at fire resistant elements.

2.09 SLEEVES

A. Sleeves for Pipes Through Non-fire Rated Floors: Form with 18 gauge galvanized steel for 4 inch diameter and larger, 22 gauge up to 3" diameter.

B. Sleeves for Pipes Through Non-fire Rated Beams, Walls, Footings, and Potentially Wet Floors: Form with steel pipe or 18 gauge galvanized steel for 4 inch diameter and larger, 22 gauge up to 3" diameter.

C. Sleeves for Pipes Through Fire Rated and Fire Resistive Floors and Walls, and Fireproofing: UL listed caulking system.

D. Fire Stopping Insulation: Mineral fiber type, non- combustible.

E. Caulk: Fire stop sealant in compliance with ASTM E814, UL 1479 and Division 07.

F. Mechanical Sleeve Seals: Modular mechanical type, consisting of interlocking synthetic rubber links shaped to continuously fill annular space between object and sleeve, connected with bolts and pressure plates causing rubber sealing elements to expand when tightened, providing watertight seal and electrical insulation.

2.10 FORMED STEEL CHANNEL

A. Manufacturers:

1. Allied Tube & Conduit Corp.
2. B-Line Systems.
3. Unistrut Corp.
4. Subsitutions under provisions of Division 01.

B. Product Description: Galvanized 12 gauge (2.8 mm) thick steel. With holes 1-1/2 inches (38 mm) on center.

2.11 FAN ISOLATION

A. Provide spring type isolators for Exhaust Fan EF-1.

B. Spring isolators shall be free standing and laterally stable without any housing and complete with a molded neoprene cup or ¼ inch neoprene acoustical friction pad between the baseplate and the support. All mountings shall have leveling bolts that must be rigidly bolted to the equipment. Spring diameters shall be not less than 0.8 of the compressed height of the spring at rated load. Springs shall have a minimum additional travel to solid equal to 50% of the rated deflection.

2.12 VENTILATING SYSTEMS FLEXIBLE CONNECTIONS

A. Fabricate of neoprene coated flameproof fabric a minimum of 2" wide [3" wide for fan connectors] tightly crimped into metal edging strip and attach to ducting and equipment by screws or bolts at 6" intervals. DuroDyne Dynalon treated duct material, or equal. Durolon or equal for outdoor or high pressure applications.

2.13 LIMITS OF VIBRATION

A. For fan-motor units in which the impeller is supported by the motor shaft, the motor and impeller shall be dynamically balanced as an integral unit.

PART 3 EXECUTION

3.01 DRAWINGS

A. The drawings are partly diagrammatic, not necessarily showing all offsets or exact locations of piping and ducts, unless specifically dimensioned. The contractor shall provide all materials and labor necessary for a complete and operable system. Complete details of the building which affect the mechanical installation may not be shown. For additional details, see Architectural, and Electrical Drawings. Coordinate work under this section with that of all related trades.

3.02 INSTALLATION

A. All work shall comply with the latest adopted applicable codes and ordinances including, but not limited to, the IMC, UPC, IBC, NFPA, IECC, IFGC and IFC Standards; all local and state amendments to all codes and standards.

B. Obtain and pay for all inspection fees, connection charges and permits as a part of the Contract.

C. Compliance with codes and ordinances shall be at the Contractor's expense.

D. Install in accordance with manufacturer's instructions.

3.03 MEASUREMENTS

A. Verify all measurements on the job site.

B. Locate all equipment on the centers of walls, openings, spaces, etc., unless specified otherwise.

C. Check all piping, ducts, etc. to clear openings.

3.04 OPERATING INSTRUCTIONS

A. Before the facility is turned over to the Owner, instruct the Owner or Owner's personnel in the operation, care and maintenance of all systems and equipment under the jurisdiction of the Mechanical Division. These instructions shall also be included in a written summary in the Operating Maintenance Manuals.

B. The Operation and Maintenance Manuals shall be utilized for the basis of the instruction. Provide one hour of on-site instruction to the owner designated personnel.

C. Provide schedule for training activities for review prior to start of training.

3.05 SYSTEM ADJUSTING

A. Each part of each system shall be adjusted and readjusted as necessary to ensure proper functioning of all controls, proper air distribution, elimination of drafts, noise and vibration.

B. Balance the exhaust the fan for volume quantities indicated in accordance with National Environmental Balancing Bureau (NEBB) Recommended Procedures. Provide balancing log to the Engineer before substantial completion.

3.06 CUTTING, FITTING, REPAIRING, PATCHING AND FINISHING

A. Arrange and pay for all cutting, fitting, repairing, patching and finishing of work by other trades where it is necessary to disturb such work to permit installation of mechanical work. Perform work only with craftsmen skilled in their respective trades.

B. Cut all holes neatly and as small as possible to admit work. Include cutting where sleeves or openings have been omitted. Perform cutting in a manner so as not to weaken walls, partitions or floors. Drill holes required to be cut in floors without breaking out around holes.

3.07 IDENTIFICATION

A. Label all equipment with heat resistant laminated plastic labels having engraved lettering ½" high. Seton engraved Seton-Ply nameplates or equal.

3.08 FLASHING

A. Provide flexible flashing and metal counter-flashing where ductwork penetrate exterior wall.

3.09 SLEEVES

A. Size sleeves large enough to allow for movement due to expansion and contraction.

B. Where ductwork penetrates walls, install sleeve, close off space between pipe or duct and adjacent work with fire stopping insulation and caulk seal. Use fire rated caulking where fire rated walls are penetrated. Provide close fitting metal collar or escutcheon covers at both sides of penetration.

3.10 SCOPE OF VIBRATION ISOLATION WORK

A. The exhaust fan shall be isolated to eliminate the transmission of objectionable noise and vibration from the structure.

B. The exhaust fan shall be carefully checked upon delivery for proper mechanical performance, which shall include proper noise and vibration operation.

C. All installed rotating equipment with excessive noise and/or vibration, which cannot be corrected in place, shall be replaced at no cost to Owner.

3.11 GENERAL PROCEDURES – VIBRATION ISOLATION

A. Select isolators in accordance with the manufacturer's recommendations.

B. Install isolators so they can be easily removed for replacement.

C. Mount all equipment absolutely level.

D. Install all isolators per manufacturer's instructions.

E. Install vibration isolators for mechanical motor driven equipment.

3.12 INSTALLATION OF EQUIPMENT

A. Unless otherwise indicated, mount all equipment and install in accordance with manufacturer's recommendations and approved submittals.

B. Maintain manufacture recommended minimum clearances for access and maintenance.

C. Where equipment is to be anchored to structure, furnish and locate necessary anchoring and vibration isolation devices.

D. Furnish all structural steel, such as angles, channels, beams, etc. required to support all piping, ductwork, equipment and accessories installed under this Division. Use structural supports suitable for equipment specified or as indicated. In all cases, support design will be based upon data contained in manufacturer's catalog.

E. Openings: Arrange for necessary openings in buildings to allow for admittance and reasonable maintenance or replacement of all equipment furnished under this Contract.

F. Access Doors: Provide as necessary for reasonable maintenance of all equipment, controls, etc.

END OF SECTION 23 05 00

SECTION 23 05 05

SELECTIVE DEMOLITION FOR HEATING, VENTILATING, AND AIR CONDITIONING (HVAC)

PART 1 GENERAL

1.01 DESCRIPTION

A. Work specified in this Section includes the demolition, removal, and disposition of certain mechanical work.

B. Drawings, the provisions of the Agreement, and Administrative Specification Sections apply to all work of this Section.

PART 2 PRODUCTS (Not Used)

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. Notify the Architect in writing of conditions detrimental to the proper and timely completion of the work.

B. Do not begin installation until all unsatisfactory conditions are resolved. Beginning work constitutes acceptance of conditions as satisfactory.

3.02 DEMOLITION, REMOVAL AND DISPOSITION

A. Saw-cut block walls as shown or required.

B. Ductwork, And Equipment To Be Removed: Remove all ductwork, and equipment as indicated on the Drawings.

C. Materials To Owner and re-use of materials: As indicated on the Drawings.

D. Materials To Contractor: Materials shown or specified to be removed, other than the materials indicated to be turned over to Owner.

E. Protect any active piping and/or wiring encountered; remove, plug or cap utilities to be abandoned. Notify the Architect of utilities encountered whose service is not known.

F. Debris Removal: Existing materials removed and not reinstalled or turned over to the Owner shall be immediately removed from the site and disposed of by the Contractor.

G. Repairs: Any portion of the facility damaged, cut back or made inoperable by this Contractor shall be repaired with similar materials as the existing structure and/or damaged item as instructed by the Architect.

END OF SECTION 23 05 05

SECTION 23 07 00
HVAC INSULATION

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Ductwork Insulation.

B. Jackets and Accessories.

1.02 RELATED WORK

A. Section 23 05 00 – Common Work Results for HVAC Systems.

B. Section 23 31 00 – HVAC Ducts and Casings.

1.03 REFERENCES

A. ASTM C195 - Mineral Fiber Thermal Insulating Cement.

B. ASTM C518 - Standard Test Method for Steady-State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus.

C. ANSI/ASTM C552 - Cellular Glass Thermal Insulation.

D. ASTM C612 - Mineral Fiber Block and Board Thermal Insulation.

E. ASTM C449 - Mineral Fiber Hydraulic-setting Thermal Insulating and Finishing Cement.

F. ASTM E84 - Surface Burning Characteristics of Building Materials.

G. ASTM E96 – Standard Test Methods for Water Vapor Transmission of Materials.

H. NFPA 255 - Surface Burning Characteristics of Building Materials.

I. UL 723 - Surface Burning Characteristics of Building Materials.

1.04 SUBMITTALS

A. Submit product data under provisions of Division 01.

B. Include product description, thickness for each service, and locations.

C. Submit manufacturer's installation instructions.

1.05 QUALITY ASSURANCE

A. Applicator: Company specializing in piping insulation application with three years minimum experience.

B. Materials: Flame spread/smoke developed rating of 25/50 in accordance with UL 723, ASTM E84, or NFPA 255.

C. Factory fabricated fitting covers manufactured in accordance with ASTM C450.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Division 01 - Product Requirements: Requirements for transporting, handling, storing, and protecting products.

B. Accept materials on site in original factory packaging, labeled with manufacturer's identification, including product density and thickness.

C. Shipment of materials from manufacturer to installation location shall be in weather tight transportation.

D. Protect from weather and construction traffic, dirt, water, chemical, and damage, by storing in original packaging.

1.07 ENVIRONMENTAL REQUIREMENTS

A. Maintain ambient temperatures and conditions required by manufacturers of adhesive, mastics, and insulation cements.

1.08 FIELD MEASURMENTS

A. Verify field measurements prior to fabrication.

1.09 WARRANTY

A. Division 01- Execution and Closeout Requirements: Product warranties and product bonds.

PART 2 PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

A. Certain-Teed.

B. Johns Manville.

C. Knauf.

D. Substitutions: Under provisions of Division 01.

2.02 INSULATION - DUCTWORK

A. Type A: Exterior FSK Rigid Fiber Board Duct Insulation; ASTM C612, 'k' value of 0.23 at 75° F, 3.0 lb./cu. ft. density. 0.00035 inch foil scrim facing. Johns Manville "814 Spin-Glas" or equal.

2.03 FIELD APPLIED EQUIPMENT AND DUCTWORK JACKETS

A. Re-Wettable Canvas Jacketing: , Fiberglass cloth made from texturized yarns, impregnated throughout with an inorganic fire retardant asbestos free adhesive; 20x14 thread count, 14.5 oz./sq.yd, 0.04 inch thickness, 1,000º F upper temperature limit; GLT Products "Style 1989" or approved equal.

2.04 INSULATION ACCESSORIES

A. Adhesives: Waterproof and fire-retardant type.

B. Lagging Adhesive: Fire resistive to NFPA 255.

C. Impale Anchors: Galvanized steel, 12 gauge, self-adhesive pad.

D. Joint Tape: Glass fiber cloth, open mesh.

E. FSK Joint Tape; ASTM C1136 Foil-Scrim-Kraft (FSK) lamination coated with solvent acrylic pressure sensitive adhesive; capable of adhering to fibrous and sheet metal surfaces; tri-directionally reinforced 2x3 squares per inch fiberglass scrim; 9.5 mils thick, -40 to 240º F service temperatures; Venture Tape "1525CW" or approved equal.

F. Tie Wire: Annealed steel, 16 gauge.

PART 3 EXECUTION

3.01 PREPARATION

A. Install materials after ductwork has been tested and approved.

B. Clean surfaces for adhesives.

C. Prepare surfaces in accordance with manufacturer's recommendations.

3.02 INSTALLATION – DUCTWORK INSULATION

A. Install materials in accordance with manufacturer's instructions.

B. Exterior Insulation (Type A) Application:

1. Secure insulation with vapor barrier with wires and seal jacket joints with vapor barrier adhesive or tape to match jacket.

C. Where canvas jacketing is indicated, apply mastic in sufficient thickness to completely cover the texture of the canvas material.

3.03 SCHEDULE - DUCTWORK

DUCTWORK	TYPE	INSULATION THICKNESS	FINISH
Exhaust & Relief Ducts Within 5 ft. of Exterior Openings	A	1" Rigid	CANVAS

END OF SECTION 23 07 00

SECTION 23 09 93
SEQUENCE OF OPERATIONS FOR HVAC CONTROLS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Elevator Machine Room Exhaust Fan.

B. Elevator Shaft Sump Pump.

1.02 RELATED SECTIONS

A. Section 22 05 00 - Common Work Results for Plumbing.

B. Section 23 05 00 - Common Work Results for HVAC.

1.03 SYSTEM DESCRIPTION

A. This Section defines the manner and method by which controls function. Requirements for each type of control system operation are specified. Equipment, devices, and system components required for control systems are specified in other Sections.

1.04 SUBMITTALS

A. Submit under provisions of Division 01.

B. Submit diagrams indicating mechanical system controlled and control system components. Label with settings, adjustable range of control and limits. Include written description of control sequence.

1.05 PROJECT RECORD DOCUMENTS

A. Submit documents under provisions of Division 01.

PART 2 PRODUCTS - Not Used

PART 3 EXECUTION

3.01 ELEVATOR MACHINE ROOM EXHAUST FAN

A. Alarms:

1. None

B. Automated Control:

1. The elevator machine room exhaust fan shall be cycled on and off by means of a space mounted cooling thermostat initially set to 80° F. (Adjustable).

C. Thermostat

1. Line voltage, snap acting, cooling only; Honeywell Model T4051B or approved equal

3.02 ELEVATOR SHAFT SUMP PUMP

A. Alarms:

1. High level.
2. Oil Detection.

B. Automated Control:

1. On water rise, level reaches pump “start” probe to start the pump. Pump will remain on until level is below “off” probe. The “off” probe senses air or oil and turns the pump off so the oil layer will not be pumped out of the sump. If the liquid level reaches alarm probe and mechanical float, the system will differentiate between water and oil and activate the remote alarm.

END OF SECTION 23 09 93

SECTION 23 31 00

HVAC DUCTS AND CASINGS

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes:

1. Duct Materials.
2. Ductwork Fabrication.

1.02 RELATED SECTIONS

A. Section 23 05 00 - Hangers and Supports for HVAC Piping and Equipment: Product requirements for hangers, supports and sleeves for placement by this section.

B. Section 23 07 00 – HVAC Insulation: Product requirements for duct liners for placement by this section.

C. Section 23 33 00 - Air Duct Accessories: Product requirements for duct accessories for placement by this section.

1.03 REFERENCES

A. ASTM A36/A36M - Standard Specification for Carbon Structural Steel.

B. ASTM A90/A90M - Standard Test Method for Weight Mass of Coating on Iron and Steel Articles with Zinc or Zinc-Alloy Coatings.

C. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.

D. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials.

E. NFPA 90A - Standard for the Installation of Air Conditioning and Ventilating Systems.

F. SMACNA - HVAC Duct Construction Standard - Metal and Flexible.

1.04 DEFINITIONS

A. Duct Sizes: Inside clear dimensions. For lined ducts, maintain sizes inside lining.

B. Low Pressure: Three pressure classifications: ½ inch WG positive or negative static pressure and velocities less than 2,000 fpm; 1 inch WG positive or negative static pressure and velocities less than 2,500 fpm and 2 inch WG positive or negative static pressure and velocities less than 2,500 fpm.

1.05 PERFORMANCE REQUIREMENTS

A. Variation of duct configuration or sizes other than those of equivalent or lower loss coefficient is not permitted except by written permission.

1.06 SUBMITTALS

A. See General Conditions and the General Requirements in Division 01 regarding submittals.

1.07 CLOSEOUT SUBMITTALS

A. Division 01 - Execution and Closeout Requirements: Closeout procedures.

1.08 QUALITY ASSURANCE

A. Perform Work in accordance with SMACNA - HVAC Duct Construction Standards - Metal and flexible.

1.09 QUALIFICATIONS

A. Installer: Company specializing in performing Work of this section with minimum three years' experience.

1.10 ENVIRONMENTAL REQUIREMENTS

A. Division 01 - Product Requirements.

B. Do not install duct sealant when temperatures are less than those recommended by sealant manufacturers.

C. Maintain temperatures during and after installation of duct sealant.

1.11 FIELD MEASUREMENTS

A. Verify field measurements prior to fabrication.

1.12 WARRANTY

A. Division 01 - Execution and Closeout Requirements: Product warranties and product bonds.

PART 2 PRODUCTS

2.01 DUCT MATERIALS

A. Galvanized Steel Ducts: ASTM A653/A653M galvanized steel sheet, lock-forming quality, having G90 zinc coating of in conformance with ASTM A90/A90M.

B. Fasteners: Galvanized sheet metal screws.

C. Hanger Rod: ASTM A36/A36M; steel; threaded both ends, threaded one end, or continuously threaded.

2.02 LOW PRESSURE DUCTWORK FABRICATION

A. Fabricate and support rectangular ducts in accordance with SMACNA HVAC Duct Construction Standards - Metal and Flexible and ASHRAE handbooks, except as indicated. Provide duct material, gages, reinforcing, and sealing for operating pressures indicated.

B. Where rectangular elbows are used, provide airfoil turning vanes.

C. Increase duct sizes gradually, not exceeding 15 degrees divergence wherever possible; maximum 30° divergence upstream of equipment and 45°convergence downstream.

D. Provide easements where low pressure ductwork conflicts with piping and structure. Where easements exceed 10 percent duct area, split into two ducts maintaining original duct area.

E. Use double nuts and lock washers on threaded rod supports.

PART 3 EXECUTION

3.01 EXAMINATION

A. Division 01 - Administrative Requirements: Coordination and project conditions.

B. Verify sizes of equipment connections before fabricating transitions.

3.02 INSTALLATION

A. Install and seal ducts in accordance with SMACNA HVAC Duct Construction Standards - Metal and Flexible.

B. During construction, install temporary closures of metal or taped polyethylene on open ductwork to prevent construction dust from entering ductwork system.

C. Install duct hangers and supports in accordance with Section 23 05 00.

D. Use double nuts and lock washers on threaded rod supports.

END OF SECTION 23 31 00

SECTION 23 33 00
AIR DUCT ACCESSORIES

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes:
   1. Fire Dampers.
   2. Duct Access Doors.
   3. Turning Vanes.

1.02 RELATED SECTIONS

A. Section 23 31 00 - HVAC Ducts and Casings.

1.03 REFERENCES

A. AMCA 500 - Test Methods for Louvers, Dampers, and Shutters.

B. NFPA 90A - Standard for the Installation of Air Conditioning and Ventilating Systems.

C. SMACNA - HVAC Duct Construction Standard - Metal and Flexible.

D. UL 555 - Standard for Safety for Fire Dampers.

1.04 SUBMITTALS

A. Division 01 - Submittal Procedures: Submittal procedures.

B. Product Data: Submit data for shop fabricated assemblies and hardware used.

C. Product Data: For fire dampers:
   1. Include UL ratings, dynamic ratings, leakage, pressure drop and maximum pressure data.
   2. Indicate materials, construction, dimensions, and installation details.
   3. Damper pressure drop ratings based on tests and procedures performed in accordance with AMCA 500.

D. Manufacturer's Installation Instructions: Submit for Fire Dampers.

1.05 CLOSEOUT SUBMITTALS

A. Division 01 - Execution and Closeout Requirements: Closeout procedures.

B. Project Record Documents: Record actual locations of access doors.

C. Operation and Maintenance Data: Submit for Fire Dampers.

1.06 QUALITY ASSURANCE

A. Dampers tested, rated and labeled in accordance with the latest UL requirements.

B. Damper pressure drop ratings based on tests and procedures performed in accordance with AMCA 500.

1.07 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum three years' experience.

1.08 DELIVERY, STORAGE, AND HANDLING

A. Division 01 - Product Requirements: Product storage and handling requirements.

1.09 WARRANTY

A. Division 01 - Execution and Closeout Requirements: Product warranties and product bonds.

1.10 EXTRA MATERIALS

A. Division 01 - Execution and Closeout Requirements: Spare parts and maintenance products.

B. Furnish two of each size and type of fusible link.

1.11 COMPLETION REQUIREMENTS

A. In accordance with the General Conditions and the General Requirements in Division 01, Project Closeout; before acceptance and final payment, the Contractor shall furnish:

1. Accurate project record drawings, shown in red ink on prints, showing all changes from the original plans made during installation of the work.
2. Contractors One Year Warranty.
3. All Manufacturers' Guarantees.
4. Operation and Maintenance Manuals.

PART 2 PRODUCTS

2.01 ACCEPTIBLE MANUFACURES - FIRE DAMPERS

A. Ruskin.

B. Greenheck.

C. Nailor.

D. Substitutions: Division 01 - Product Requirements.

2.02 FIRE DAMPERS

A. Fire Rating: UL 555 classified and labeled as a 1-1/2 hour fire damper.

B. Air Flow Rating: UL approved for dual directional air flow.

C. Frame: 5 inches x minimum 16 gage roll formed, galvanized steel hat-shaped channel, reinforced at corners. Structurally equivalent to 13 gage U-channel.

D. Blades:

1. Style: Single skin with 3 longitudinal grooves.
2. Action: Parallel, spring closure upon fusible link release.
3. Orientation: Horizontal.
4. Material: Minimum 16 gage thickness, galvanized steel.
5. Width: Maximum 6 inches.

E. Bearings: Self-lubricating stainless steel sleeve, turning in extruded hole in frame.

F. Linkage: Concealed in frame.

G. Axles: Minimum 1/2 inch (13 mm) diameter plated steel, hex-shaped, mechanically attached to blade.

H. Mounting: Horizontal.

I. Temperature Release Device: Fusible link, 165° F.

J. Finish: Mill galvanized.

K. Assembly: Factory assemble damper and accessories and furnish as a single unit conforming to UL 555.

2.03 ACCEPTABLE MANUFACTURERS – ACCESS DOOR

A. Duro-Dyne.

B. Ruskin.

C. Nailor.

D. Substitutions: Division 01 - Product Requirements.

2.04 ACCESS DOORS

A. Fabricate in accordance with SMACNA HVAC Duct Construction Standards and as indicated.

B. Review locations prior to fabrication.

C. Fabricate rigid and close-fitting doors of galvanized steel with sealing gaskets and quick fastening locking devices. For insulated ductwork, install minimum one inch thick insulation with sheet metal cover.

D. Access doors smaller than 12 inches square may be secured with sash locks.

E. Provide two hinges and two sash locks for sizes up to 18 inches square, three hinges and two compression latches with outside and inside handles for sizes up to 24 x 48 inches. Provide an additional hinge for larger sizes.

F. Access doors with sheet metal screw fasteners are not acceptable.

2.05 ACCEPTABLE MANUFACTURERS - FLEXIBLE DUCT CONNECTIONS & TURNING VANES

A. Duro-Dyne.

B. Substitutions: Division 01 - Product Requirements.

2.06 FLEXIBLE DUCT CONNECTIONS

A. Fabricate in accordance with SMACNA HVAC Duct Construction Standards, and as indicated.

B. UL listed fire-retardant neoprene coated woven glass fiber fabric to NFPA 90A, minimum density 20 oz. per sq. yd., approximately 3 inches wide, crimped into metal edging strip.

C. Leaded vinyl sheet, minimum 0.55 inch thick, 0.87 lbs. per sq. ft., 10 dB attenuation in 10 to 10,000 Hz range.

2.07 TURNING VANES

A. Single Width: Single galvanized turning vane with 2 inch radius and minimum 1" trailing straight leg.

PART 3 EXECUTION

3.01 EXAMINATION

A. Division 01 - Administrative Requirements: Coordination and project conditions.

B. Verify rated walls are ready for fire damper installation.

C. Verify ducts and equipment installations are ready for accessories.

3.02 INSTALLATION.

A. Install in accordance with NFPA 90A, and follow SMACNA HVAC Duct Construction Standards - Metal and Flexible.

B. Access Doors: Install access doors as indicated.

C. Access Door Sizes: Install minimum 8 x 8 inch size for hand access.

D. Install fire dampers locations as indicated on drawings. Install with required perimeter mounting angles, sleeves, breakaway duct connections, corrosion resistant springs, bearings, bushings and hinges.

1. Install dampers square and free from racking with blades running horizontally.
2. Do not compress or stretch damper frame into duct or opening.
3. Handle damper using sleeve or frame. Do not lift damper using blades, actuator, or jack shaft.

3.03 DEMONSTRATION

A. Demonstrate re-setting of fire dampers to Owner's representative.

END OF SECTION 23 33 00

SECTION 23 34 23
HVAC FANS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Direct Driven Backward Inclined Centrifugal Inline Fans

1.02 RELATED WORK

A. Section 23 07 00 – HVAC Insulation.

B. Section 23 31 00 – HVAC Ducts and Casing.

C. Section 23 33 00 – Air Duct Accessories.

1.03 REFERENCES

A. AMCA 99 - Standards Handbook.

B. NEMA MG 1 - Motors and Generators.

C. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum).

1.04 QUALITY ASSURANCE

A. Performance Ratings: Conform to AMCA 210 and bear AMCA Certified Rating Seal.

B. Sound Ratings: AMCA 301, tested to AMCA 300, and bear AMCA Certified Sound Rating Seal.

1.05 SUBMITTALS

A. Submit product data under provisions of the Division 01.

B. Provide product data on centrifugal fans and accessories as required for the work.

C. Provide fan curves with specified operating point clearly plotted.

1.06 OPERATION AND MAINTENANCE DATA

A. Submit operation and maintenance data under provisions of Division 01.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Deliver products to site under provisions of Division 01.

B. Store and protect products under provisions of Division 01.

C. Protect motors, shafts, and bearings from weather and construction dust.

PART 2 PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

A. Greenheck.

B. Cook.

C. Acme.

D. Substitutions: Under provisions of the Supplementary Conditions.

2.02 DIRECT DRIVEN BACKWARD INCLINED CENTRIFUGAL INLINE FANS

A. General Description:

1. Base fan performance at standard conditions (density 0.075 Lb/ft3)
2. Performance capabilities up to 5,000 cubic feet per minute (cfm) and static pressure to 1.75 inches of water gauge
3. Fans are available in thirteen sizes with nominal wheel diameters ranging from 8 inches through 16 inches (60 - 160 unit sizes)
4. Normal operating temperature up to 130 Fahrenheit (54.4 Celsius)
5. Applications include: intake, exhaust, return, or make-up air systems

6. Each fan shall bear a permanently affixed manufacture's engraved metal nameplate containing the model number and individual serial number

B. Wheel:
   1. Non-overloading, backward inclined centrifugal wheel
   2. Constructed of aluminum
   3. Statically and dynamically balanced in accordance to AMCA Standard 204-05
   4. The wheel cone and fan inlet will be matched and shall have precise running tolerances for maximum performance and operating efficiency
   5. Single thickness blades are securely riveted or welded to a heavy gauge back plate and wheel cone

C. Motors:
   1. Electronically Commutated Motor
   2. Motor enclosure: Open drip proof
   3. Motor to be a DC electronic commutation type motor (ECM) specifically designed for fan applications. AC induction type motors are not acceptable. Examples of unacceptable motors are: Shaded Pole, Permanent Split Capacitor (PSC), Split Phase, Capacitor Start and 3 phase induction type motors
   4. Motors are permanently lubricated, heavy duty ball bearing type to match with the fan load and pre-wired to the specific voltage and phase
   5. Internal motor circuitry to convert AC power supplied to the fan to DC power to operate the motor
   6. Motor shall be speed controllable down to 20% of full speed (80% turndown). Speed shall be controlled by either a potentiometer dial mounted at the motor or by a 0-10 VDC signal
   7. Motor shall be a minimum of 85% efficient at all speeds

D. Housing/Cabinet Construction:
   1. Square design constructed of heavy gauge galvanized steel and shall include square duct mounting collars
   2. Housing and bearing supports shall be constructed of heavy gauge bolted and welded steel construction to prevent vibration and to rigidly support the shaft and bearing assembly.
   3. Galvanized Construction material

E. Housing Supports and Drive Frame:
   1. Housing supports are constructed of structural steel with formed flanges
   2. Drive frame is welded steel which supports the motor

F. Disconnect Switches:
   1. NEMA rated: NEMA 1: indoor application no water. Factory standard.
   2. Positive electrical shut-off
   3. Wired from fan motor to junction box

G. Duct Collars:
   1. Square design to provide a large discharge area
   2. Inlet and discharge collars provide easy duct connection

H. Access Panel:
   1. Two sided access panels, permit easy access to all internal components
   2. Located perpendicular to the motor mounting panel

PART 3 EXECUTION

3.01 INSTALLATION

A. Install fans in accordance with the contractor documents and the manufacturer's instructions.

END OF SECTION 23 34 23

SECTION 23 37 00
AIR OUTLETS AND INLETS

PART 1 GENERAL

1.01 WORK INCLUDED

A. Steel Return Grilles

B. Steel Fire Rated Door Grilles.

1.02 REFERENCES

A. ARI 650 - Air Outlets and Inlets.

B. ASHRAE 70 - Method of Testing for Rating the Air Flow Performance of Outlets and Inlets.

C. SMACNA - HVAC Duct Construction Standard.

1.03 SUBMITTALS

A. Submit product data under provisions of Division 01.

PART 2 PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

A. Titus.

B. Nailor.

C. Price

D. Substitutions: Under provisions of Division 01.

2.02 STEEL RETURN GRILLES

A. Steel return grilles shall incorporate 3/4 inch fixed deflection blades shall be available parallel to the long dimension of the grille. Construction shall be of steel with a 1-1/4 inch wide border on all sides. Screw holes shall be countersunk. Corners shall be welded with full penetration resistance welds. Blades shall be firmly held in place by mullions from behind the grille and fixed to the grille by welding in place. Blade deflection angle shall be at 35°.

B. The grille finish shall be white. The finish shall be an anodic acrylic paint, baked at 315° F for 30 minutes. The pencil hardness must be HB to H. The paint must pass a 100-hour ASTM B117 Corrosive Environments Salt Spray Test without creepage, blistering or deterioration of film. The paint must pass a 250-hour ASTM D870 Water Immersion Test. The paint must also pass the ASTM D2794 Reverse Impact Cracking Test with a 50-inch pound force applied.

C. The manufacturer shall provide published performance data for the grille. The grille shall be tested in accordance with ANSI/ASHRAE Standard 70-1991.

D. The steel fire rated door grille shall be listed by Underwriters Laboratories for use in hollow metal and composite type fire doors with up to a 1-1/2 hour. rating. Suitable for doors 1 3/4" thick.

E. Material: 18 gauge cold rolled steel frame and blades.

F. Closing Assembly: 160°F (71°C) UL listed fusible link with stainless steel operating spring and dead lock bar.

PART 3 EXECUTION

3.01 INSTALLATION

A. Install grilles in accordance with manufacturers' instructions.

END OF SECTION 23 37 00

SECTION 26 05 00
COMMON WORK RESULTS FOR ELECTRICAL

PART 1 GENERAL

1.01 SECTION INCLUDES

A. General Requirements specifically applicable to Division 26, in addition to Division 01 provisions.

B. The electrical system equipment and installation shall comply with all provisions and requirements of this specification, as well as any and all applicable national, state and local codes and standards.

1.02 WORK SEQUENCE

A. Construct Work in sequence under provisions of Division 01.

1.03 COORDINATION

A. Coordinate the Work specified in this Division under provisions of Division 01.

B. Prepare drawings showing proposed rearrangement of Work to meet job conditions, including changes to Work specified under other Sections. Obtain permission of Architect prior to proceeding.

1.04 REFERENCES

A. ANSI/NFPA 70 - National Electrical Code, latest adopted edition including all state and local amendments.

B. NECA - Standard of Installation.

C. NETA ATS – Acceptance Testing Specifications for Electrical Power Distribution Equipment and Systems.

D. Electrical Reference Symbols: The Electrical "Legend" on drawings is standardized version for this project. All symbols shown may not be used on drawings. Use legend as reference for symbols used on plans.

E. Electrical Drawings: Drawings are diagrammatic; complimentary to the Architectural drawings; not intended to show all features of work. Install material not dimensioned on drawings in a manner to provide a symmetrical appearance. Do not scale drawings for exact equipment locations. Review Architectural and Mechanical Drawings and adjust work to conform to conditions shown thereon. Field verification of dimensions, locations and levels is directed.

1.05 REGULATORY REQUIREMENTS

A. Conform to ANSI/NFPA 70.

B. Conform to the latest adopted edition of the International Building Code and the International Fire Code including all state and local amendments thereto.

C. Obtain electrical permits, plan review, and inspections from authority having jurisdiction.

1.06 SUBMITTALS

A. Submit inspection and permit certificates under provisions of Division 01.

B. Include certificate of final inspection and acceptance from authority having jurisdiction.

C. Submittal review is for general design and arrangement only and does not relieve the Contractor from any requirements of Contract Documents. Submittal not checked for quantity, dimension, fit or proper operation. Where deviations of substitute product or system performance have not been specifically noted in the submittal by the Contractor, provisions of a complete and satisfactory working installation is the sole responsibility of the Contractor.

D. In addition to requirements referenced in Division 01, the following is required for work provided under this division of the specification.

1. Provide material and equipment submittals containing complete listings of material and equipment shown on Electrical Drawings and specified herein. Separate from work furnished under other divisions.
2. Submittals shall be provided in PDF format with each section indexed in the PDF document. Submittals for Division 26 shall be complete and submitted at one time. Unless given prior approval, partial submittals will be returned unreviewed.
3. Clearly identify all material and equipment by item, name or designation used on drawings and in specifications.
4. Submit only pages which are pertinent; mark catalog sheets to identify pertinent products, referenced to Specification Section and Article number. Show reference standards, performance characteristics, and capacities; wiring diagrams and controls; component parts; finishes; dimensions; and required clearances.
5. Modify manufacturer's standard schematic drawings and diagrams to supplement standard information and to provide information specifically applicable to the work. Delete information not applicable.
6. Review submittals prior to transmittal; determine and verify field measurements, field construction criteria, manufacturer's catalog numbers, and conformance of submittal with requirements of Contract Documents.
7. Coordinate submittals with requirements of work and of Contract Documents.
8. Certify in writing that the submitted shop drawings and product data are in compliance with requirements of Contract Documents. Notify Architect/Engineer in writing at time of submittal, of any deviations from requirements of Contract Documents.
9. Do not fabricate products or begin work which requires submittals until return of submittal with Architect/Engineer acceptance.
10. Equipment scheduled by manufacturer's name and catalog designations, manufacturer's published data and/or specification for that item, in effect on bid date, are considered part of this specification. Approval of other manufacturer's item proposed is contingent upon compliance therewith.

1.07 SUBSTITUTIONS

A. In accordance with the General Conditions and the General Requirements, Substitution and Product Options, all substitute items must fit in the available space, and be of equal or better quality including efficiency performance, size, and weight, and must be compatible with existing equipment.

1.08 PROJECT RECORD DRAWINGS

A. Maintain project record drawings in accordance with Division 01.

B. In addition to the other requirements, mark up a clean set of drawings as the work progresses to show the dimensioned location and routing of all electrical work which will become permanently concealed. Show routing of work in permanently concealed blind spaces within the building. Show complete routing and sizing of any significant revisions to the systems shown.

C. Record drawing field mark-ups shall be maintained on-site and shall be available for examination of the Owner’s Representative at all times.

1.09 DEMONSTRATION OF ELECTRICAL SYSTEMS

A. During substantial completion inspection:

1. Conduct operating test for approval under provisions of Division 01.
2. Demonstrate installation to operate satisfactorily in accordance with requirements of Contract Documents.
3. Should any portion of installation fail to meet requirements of Contract Documents, repair or replace items failing to meet requirements until items can be demonstrated to comply.
4. Have instruments available for measuring light intensities, voltage and current values, and for demonstration of continuity, grounds, or open circuit conditions.
5. Provide personnel to assist in taking measurements and making tests.

1.10 WARRANTY

A. In addition to the requirements of Division 01, or as specified in other sections. Warrant all materials, installation and workmanship for one (1) year from date of acceptance.

B. Copies of manufacturer product warranties for all equipment shall be included in the operation and installation manuals.

PART 2 PRODUCTS

2.01 MATERIALS AND EQUIPMENT

A. All Materials and Equipment shall be new.

B. All Materials and Equipment shall be listed by Underwriter's Laboratories or equivalent third party listing agency for the use intended.

C. Materials and Equipment shall be acceptable to the authority having jurisdiction as suitable for the use intended when installed per listing and labeling instructions.

D. No materials or equipment containing asbestos in any form shall be used. Where materials or equipment provided by this Contractor are found to contain asbestos such items shall be removed and replaced with non-asbestos containing materials and equipment at no cost to the Owner.

E. In describing the various items of equipment, in general, each item will be described singularly, even though there may be numerous similar items.

PART 3 EXECUTION

3.01 WORKMANSHIP

A. Install Work using procedures defined in NECA Standard of Installation and/or the manufacturer's installation instructions.

3.02 PENETRATIONS OF FIRE BARRIERS

A. All holes or voids created to extend electrical systems through fire rated floors, walls or ceiling shall be sealed with an asbestos-free intumescent fire stopping material capable of expanding 8 to 10 times when exposed to temperatures 250ºF or higher.

B. Materials shall be suitable for the fire stopping of penetrations made by steel, glass, plastic and shall be capable of maintaining an effective barrier against flame, smoke and gases in compliance with the requirements of ASTM E814 and UL 1479.

C. The rating of the fire stops shall be the same as the time-rated floor, wall or ceiling assembly.

D. Install fire stopping materials in accordance with the manufacturer's instructions.

END OF SECTION 26 05 00

SECTION 26 05 05
SELECTIVE DEMOLITION FOR ELECTRICAL

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Electrical Demolition.

PART 2 PRODUCTS

2.01 MATERIALS AND EQUIPMENT

A. Materials and equipment for patching and extending work: As specified in individual Sections.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify field measurements and circuiting arrangements are as shown on Drawings.

B. Verify that abandoned wiring and equipment serve only abandoned facilities.

C. Demolition Drawings are based on a non-destructive walkthrough and existing record documents. Report discrepancies to Architect/Engineer before disturbing existing installation.

D. Beginning of demolition means installer accepts existing conditions.

3.02 PREPARATION

A. Provide temporary wiring and connections to maintain existing systems in service during construction. When work must be performed on energized equipment or circuits, use personnel experienced in such operations.

3.03 DEMOLITION AND EXTENSION OF EXISTING ELECTRICAL WORK

A. Demolish and extend existing electrical work under provisions of Division 01, Division 02, and this Division.

B. Remove, relocate, and extend existing installations to accommodate new construction.

C. Remove abandoned wiring to source of supply.

D. Remove exposed abandoned conduit, including abandoned conduit above accessible ceiling finishes. Cut conduit flush with walls and floors, and patch surfaces.

E. Where abandoned conduit is installed below existing slab not scheduled for demolition, remove the conductors, cut conduit flush with floor, and patch surface.

F. Disconnect abandoned outlets and remove devices. Remove abandoned outlets if conduit servicing them is abandoned and removed. Provide blank cover for abandoned outlets which are not removed.

G. Disconnect and remove electrical devices and equipment serving utilization equipment that has been removed.

H. Disconnect and remove abandoned luminaires. Remove brackets, stems, hangers, and other accessories.

I. Repair adjacent construction and finishes damaged during demolition and extension work. T-bar ceiling tiles damaged under normal construction conditions or having voids where junction boxes were removed shall be replaced by the Contractor.

J. Maintain access to existing electrical installations which remain active.

K. Extend existing installations using materials and methods as specified.

L. Where materials or equipment are to be turned over to Owner or reused and installed by the Contractor, it shall be the Contractor's responsibility to maintain condition of materials and equipment equal to the existing condition of the equipment before the work began. Repair or replace damaged materials or equipment at no additional cost to the Owner.

3.04 CLEANING AND REPAIR

A. Clean and repair existing materials and equipment which remain or are to be reused.

3.05 INSTALLATION

A. Install relocated materials and equipment under the provisions of Division 01.

3.06 DISPOSAL

A. Dispose of all hazardous waste in accordance with all local, State and Federal requirements.

END OF SECTION 26 05 05

SECTION 26 05 19

LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Building Wire.

B. Cable.

C. Wiring Connections and Terminations.

1.02 RELATED SECTIONS

A. Section 26 01 26 – Maintenance Testing of Electrical Systems.

B. Section 26 05 53 – Identification for Electrical Systems.

1.03 REFERENCES

A. Federal Specification FS-A-A59544 – Cable and Wire, Electrical (Power, Fixed Installation).

B. Federal Specification FS-J-C-30B – Cable Assembly, Power, Electrical.

C. ANSI/NEMA WC 70-2009 – Power Cables Rated 2000 Volts or Less for the Distribution of Electrical Energy.

D. NETA ATS – Acceptance testing specifications for Electrical Power Distribution and Systems.

E. NFPA 70 – National Electrical Code.

F. UL 83 – Thermoplastic Insulated Wire and Cable.

G. UL 1424 – Standard for Cables for Power-Limited Fire Alarm.

H. UL 1479 – Standard for Fire Tests of Through Wall Penetration Fire Stops.

I. UL 1581 – Reference Standard for Electrical Wires, Cables and Flexible Cords.

1.04 SUBMITTALS

A. Submittals are not requested for this section.

1.05 QUALITY ASSURANCE

A. Provide wiring materials located in plenums with peak optical density not greater than 0.5, average optical density not greater than 0.15, and flame spread not greater than 5 feet (1.5m) when tested in accordance with NFPA 262.

PART 2 PRODUCTS

2.01 BUILDING WIRE

A. Thermoplastic-insulated Building Wire: NEMA WC 70.

B. Branch Circuits Larger Than 6 AWG: Copper, stranded conductor, 600 volt insulation, THW, THHN/THWN or XHHW-2 as indicated.

C. Feeders and Branch Circuits 6 AWG and Smaller: Copper conductor, 600 volt insulation, THHN/THWN or XHHW-2. 6 and 8 AWG, stranded conductor; smaller than 8 AWG, solid or stranded conductor.

D. Branch Circuit Wire Color Code:

1. Color code wires by line or phase as follows:

   a. Black, red, blue and white for 120/208V systems.

2. For conductors 6 AWG and smaller, insulation shall be colored. For conductors 4 AWG and larger, identify with colored phase tape at all terminals, splices, and boxes.

3. Grounding conductors 6 AWG and smaller shall have green colored insulation. For 4 AWG and larger, use green tape at both ends and at all other visible points in between, including pull and junction boxes.

E. Control Circuits: Copper, stranded conductor 600 volt insulation, THHN/THNN or XHHW-2.

2.02 REMOTE CONTROL AND SIGNAL CABLE

A. Control Cable for Class 1 Remote Control and Signal Circuits: Copper conductor, 600 volt insulation, rated 90º C, individual conductors twisted together, shielded, and covered with an overall PVC jacket; UL listed.

B. Control Cable for Class 2 or Class 3 Remote Control and Signal Circuits: Copper conductor, 300 volt insulation, rated 90º C, individual conductors twisted together, shielded or unshielded (as required), and covered with a PVC jacket; UL listed.

C. Plenum Cable for Class 2 or Class 3 Remote Control and Signal Circuits: Copper conductor, 300 volt insulation, rated 90º C, individual conductors twisted together, shielded or unshielded (as required), and covered with a nonmetallic jacket; UL listed for use in air handling ducts, hollow spaces used as ducts, and plenums.

2.03 WIRING CONNECTIONS AND TERMINATIONS

A. For conductors 8 AWG and smaller:

1. Dry interior areas: Spring wire connectors, pre-insulated “twist-on” rated 105 degrees C per UL 468C. Where stranded conductors are terminated on screw type terminals, install crimp insulated fork or ring terminals. Thomas & Betts Sta-Kon or equal.
2. Motor connections: Spring wire connectors, pre-insulated “twist-on” rated 105 degrees C per UL 468C. Provide a minimum of 8 wraps of Scotch 33+ electrical tape around conductors and connector to eliminate connector back off.
3. Wet or exterior: Spring wire connectors, pre-insulated “twist-on”, resin filled rated for direct burial per UL 486D.

B. For conductors 6 AWG and larger:

1. Bus lugs and bolted connections: 600 V, 90 degrees C., two hole long barrel irreversible compression copper tin plated. Thomas & Betts or approved equal.
2. Motor connection: 600 V, 90 degrees C., copper tin plated compression motor pigtail connector, quick connect/disconnect, slip on insulator. Thomas & Betts or approved equal.
3. Two way connector for splices or taps: 600 V, 90 degrees C., compression long barrel, copper tin plated. Thomas & Betts or approved equal. Insulate with Scotch 23 rubber insulating base covering and Scotch 33+ outer wrap.

PART 3 EXECUTION

3.01 GENERAL WIRING METHODS

A. Use no wire smaller than 12 AWG for power and lighting circuits, and no smaller than 18 AWG for control wiring.

B. Use 10 AWG conductor for 20 ampere, 120 volt branch circuit home runs longer than 75 feet.

C. Splice only in junction or outlet boxes.

D. Neatly train and lace wiring inside boxes, equipment, and panelboards.

E. Make Conductor lengths for parallel circuits equal.

F. Wiring in lighting fixture channels shall be rated for 90º C minimum.

G. Do not share neutral conductors. Provide a dedicated neutral conductor for each branch circuit that requires a neutral.

3.02 WIRING INSTALLATION IN RACEWAYS

A. Pull all conductors into a raceway at the same time. Verify that raceway is complete and properly supported prior to pulling conductors.

B. Conductors shall be carefully inspected for insulation defects and protected from damage as they are installed in the raceway. Where the insulation is defective or damaged, the cable section shall be repaired or replaced at the discretion of the Owner and at no additional cost to the Owner.

C. Place an equal number of conductors for each phase of a circuit in same raceway or cable.

D. Route conductors from each system in independent raceway system and not intermix in the same raceway, enclosure, junction box, wireway, or gutter as another system unless otherwise shown on the plans.

E. Completely and thoroughly swab raceway system before installing conductors.

F. When two or more neutrals are installed in one conduit, identify each with the proper circuit number in accordance with Section 26 05 53.

3.03 CABLE INSTALLATION

A. Provide protection for exposed cables where subject to damage.

B. Support cables above accessible ceilings; do not rest on ceiling tiles. Use spring metal clips or cable ties to support cables from structure. Do not support cables from ceiling suspension system. Include bridle rings or drive rings.

C. Use suitable cable fittings and connectors.

3.04 WIRING CONNECTIONS AND TERMINATIONS

A. Stranded wire shall not be wrapped around screw terminals.

B. Splice only in accessible junction boxes.

C. Thoroughly clean wires before installing lugs and connectors.

D. Make splices, taps and terminations to carry full ampacity of conductors without perceptible temperature rise.

E. Terminate spare conductors with twist on connectors or heat shrink insulation to proper voltage rating.

F. Control systems wiring in conjunction with mechanical, electrical or miscellaneous equipment to be identified in accordance with wiring diagrams furnished with equipment.

G. Code sound and signal systems wiring and any special equipment in accordance with manufacturer's diagrams or recommendations.

H. Do not exceed manufacturer's recommended pull tensions.

3.05 FIELD QUALITY CONTROL

A. Field inspection and testing will be performed under provisions of Division 01 and Section 26 01 26.

B. Inspect wire and cable for physical damage and proper connection.

C. Torque conductor connections and terminations to manufacturer's recommended values.

3.06 WIRE AND CABLE INSTALLATION SCHEDULE

A. All Locations: Building wire and/or remote control and signal cable in conduit.

END OF SECTION 26 05 19

SECTION 26 05 29
HANGERS AND SUPPORTS FOR ELECTRICAL SYSTEMS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Section included hangers and supports for Power Systems.

B. Conduit Supports.

C. Formed Steel Channel.

D. Spring Steel Clips.

1.02 RELATED SECTIONS

A. The Work under this section is subject to requirements of the Contract Documents including the General Conditions, Supplementary Conditions, and sections under Division 01 General Requirements, and Section 26 05 00 – Common Work Results for Electrical.

1.03 SUBMITTALS

A. None required for this section.

1.04 QUALITY ASSURANCE

A. Support systems shall be adequate for weight of equipment and conduit, including wiring, which they carry.

PART 2 PRODUCTS

2.01 CONDUIT SUPPORTS

A. Manufacturers:

1. Allied Tube & Conduit Corp.
2. Minerallac Fastening Systems.
3. O-Z Gedney Co.
4. Substitutions: per Division 01

B. Hanger Rods: Threaded high tensile strength galvanized carbon steel with free running threads.

C. Beam Clamps: Malleable Iron, with tapered hole in base and back to accept either bolt or hanger rod. Set screw: hardened steel.

D. Conduit clamps for trapeze hangers: Galvanized steel, notched to fit trapeze with single bolt to tighten.

E. Conduit clamps - general purpose: One-hole malleable iron for surface mounted conduits.

F. Cable Ties: High strength nylon temperature rated to 185 degrees F. self-locking.

2.02 FORMED STEEL CHANNEL

A. Manufacturers:

1. B-Line Systems.
2. Allied Tube & Conduit Corp.
3. Unistrut Corp.
4. Substitutions: per Division 01.

B. Product Description: Galvanized 12 gage thick steel. With holes 1-1/2 inches on center.

PART 3 EXECUTION

3.01 EXAMINATION

A. Division 01: Verification of existing conditions before starting work.

3.02 PREPARATION

A. Obtain permission from Owner’s Representative before using powder-actuated anchors.

B. Obtain permission from Owner’s Representative before drilling or cutting structural members.

3.03 INSTALLATION - GENERAL

A. Fasten hanger rods, conduit clamps, and outlet and junction boxes to building structure using precast insert system, expansion anchors, preset inserts, beam clamps, or spring steel clips.

B. Use toggle bolts or hollow wall fasteners in hollow masonry 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, conduit, or ceiling suspension system.

D. 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.

E. Securely fasten fixtures and equipment to building structure in accordance with manufacturer's recommendations and to provide necessary earthquake anchorage.

F. Earthquake Anchorages:

1. Equipment weighing more than 50 pounds shall be adequately anchored to the building structure to resist lateral earthquake forces.

2. Total lateral (earthquake) forces shall be 1.5 times the equipment weight acting laterally in any direction through the equipment center of gravity. Provide adequate backing at structural attachment points to accept the forces involved.

END OF SECTION 26 05 29

SECTION 26 05 33
RACEWAY AND BOXES FOR ELECTRICAL SYSTEMS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Metal Conduit.

B. Flexible Metal Conduit.

C. Liquidtight Metal Conduit.

D. Fittings and Conduit Bodies.

E. Wall and Ceiling Outlet Boxes.

F. Pull and Junction Boxes.

1.02 RELATED SECTIONS

A. The Work under this section is subject to requirements of the Contract Documents including the General Conditions, Supplementary Conditions, and sections under Division 01 - General Requirements and Section 26 05 00 – Common Work Results for Electrical.

B. Section 26 05 19 – Low-Voltage Electrical Power Conductors and Cables.

C. Section 26 05 29 – Hangers and Supports for Electrical Systems.

D. Section 26 05 53 – Identification for Electrical Systems.

E. Section 26 27 26 – Wiring Devices.

1.03 REFERENCES

A. American National Standards Institute (ANSI):

1. ANSI C80.1 - Rigid Steel Conduit, Zinc Coated.
2. ANSI C80.3 - Electrical Metallic Tubing, Zinc Coated.

B. American Society for Testing and Materials (ASTM):

1. ASTM A 123 – Specification for Zinc Coatings on Products Fabricated from Rolled, Pressed, and Forged Steel Shapes, Plates, Bars and Strip.

C. National Electrical Manufacturers Association (NEMA):

1. NEMA FB 1 - Fittings, Cast Metal Boxes, and Conduit Bodies for Conduit and Cable Assemblies.
2. NEMA OS 1 - Sheet-Steel Outlet Boxes, Device Boxes, Covers, and Box Supports.
3. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum).

D. Underwriters Laboratory (UL):

1. UL 6 - Rigid Steel Conduit, Zinc Coated.
2. UL 514B – Fittings, Cast Metal Boxes, and Conduit Bodies for Conduit and Cable Assemblies.

E. National Fire Protection Association (NFPA):

1. NFPA 70 - National Electrical Code.

F. International Building Code (IBC):

1. IBC chapters 16 and 17 seismic requirements.

1.04 RACEWAY AND BOX INSTALLATION SCHEDULE

A. Raceway Minimum Size:

1. Provide 1/2 inch minimum, unless otherwise noted. Raceway may be reduced to ½ inch for final connection of raceway up to 6 feet for connection to fixture or device where maximum conduit entry size is ½ inch.

B. In or through CMU walls:

1. Raceway: Provide rigid steel conduit or intermediate metal conduit. EMT conduit may penetrate through CMU walls where the EMT is installed in a sleeve and does not come in direct contact with the CMU. All conduit in contact with concrete or block shall be rigid steel conduit half lapped wrapped with pipe wrap or be plastic-coated conduit.
2. Boxes and Enclosures: Provide concrete tight cast and sheet metal steel metal boxes.

C. Damp or Wet Interior Locations:

1. Raceway: Provide rigid steel conduit or intermediate metal conduit.
2. Boxes and Enclosures: Provide weatherproof malleable iron for branch circuit junction and outlet boxes. Provide weatherproof NEMA 3R sheet metal enclosures for safety and disconnect switches and NEMA 4 sheet metal enclosures with gaskets for motor controllers and control panels.
3. Fittings: Provide galvanized malleable iron with gaskets. Provide Myers threaded hubs for all conduit entries into top and side of sheet metal enclosures.

D. Concealed Dry Locations:

1. Raceway: Provide rigid steel conduit, intermediate metal conduit, or electrical metallic tubing.
2. Boxes and Enclosures: Provide sheet-metal boxes.
3. Fittings: Provide galvanized malleable iron and steel.

E. Exposed Dry Locations:

1. Raceway: Provide rigid steel conduit or intermediate metal conduit. EMT conduit may be used where exposed conduit is allowed, where it is not subject to physical damage or, where installed on the ceiling or a minimum of ten feet above the floor.
2. Boxes and Enclosures: Provide sheet-metal boxes with raised steel covers.
3. Fittings: Provide galvanized malleable iron and steel.

F. Branch Circuits 60 Amperes or Larger and Feeders:

1. Raceway: Provide rigid steel conduit or intermediate metal conduit.
2. Boxes and Enclosures: Provide sheet-metal boxes.
3. Fittings: Provide galvanized malleable iron and steel.

G. Equipment Connections: Provide short extensions (three feet maximum) of flexible metal conduit for connections to light fixtures, motors, transformers, vibrating equipment or equipment that requires removal for maintenance or replacement. Use Liquidtight flexible conduit and fittings for motors and equipment in damp or wet locations or subject to spilling of liquids.

1.05 DESIGN REQUIREMENTS

A. Raceway Minimum Size:

1. Line Voltage Circuits: Raceway is sized on the drawings for copper conductors with 600-Volt type XHHW insulation, unless otherwise noted. Where a raceway size is not shown on the drawings, it shall be calculated to not exceed the percentage fill specified in the NEC Table 1, Chapter 9 using the conduit dimensions of the NEC Table 4, Chapter 9 and conductor properties of the NEC Table 5, Chapter 9.
2. Fire Alarm, Telecom, Intercom and other Low-Voltage Circuits: Where installed in raceways, the raceway size shall be calculated to not exceed the percentage fill specified in the NEC Table 1, Chapter 9, using the conduit dimensions of the NEC Table 4, Chapter 9, and cable diameter provided by the manufacturer.

B. Box Minimum Size: Provide all boxes sized and configured per NEC Article 370 and as specified in this section.

C. Seismic Support: Provide support in accordance with section 26 05 29 – Hangers and Supports for Electrical Systems.

1.06 SUBMITTALS

A. Product Data: Submit data for products to be provided.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Protect conduit from corrosion and entrance of debris by storing above grade. Provide appropriate covering.

PART 2 PRODUCTS

2.01 RIGID METAL CONDUIT (RMC)

A. Rigid Steel Conduit: ANSI C80.1, UL 6.

B. Fittings and Conduit Bodies: NEMA FB 1, UL 514B; Galvanized malleable iron with threaded hubs for all conduit entries. Provide threaded connections and couplings only. Set Screw and running thread fittings are not permitted.

C. Provide insulated throat bushings at all conduit terminations.

2.02 PVC COATED RIGID METAL CONDUIT

A. Product Description: NEMA RN 1; rigid steel conduit with external 40-mil PVC coating and 2-mil urethane internal surface.

B. Fittings and Conduit Bodies: NEMA FB 1, UL 514B; steel fittings with insulated throat bushings and external PVC coating to match conduit.

2.03 INTERMEDIATE METAL CONDUIT (IMC)

A. Product Description: ANSI C80.6, UL 1242; Galvanized Steel Conduit.

B. Fittings and Conduit Bodies: NEMA FB 1, UL 514B; use fittings and conduit bodies specified above for rigid steel conduit.

C. Provide insulated throat bushings at all conduit terminations.

2.04 FLEXIBLE METAL CONDUIT (FMC)

A. Product Description: UL 1, FS WW-C-566; galvanized or zinc-coated flexible steel, full or reduced-wall thickness.

B. Fittings and Conduit Bodies: ANSI/NEMA FB 1; steel or malleable iron with insulated throat bushings. Die cast zinc or threaded inside throat fittings are not acceptable.

2.05 LIQUIDTIGHT FLEXIBLE METAL CONDUIT (LFMC)

A. Product Description: UL 360, flexible metal conduit with interlocked steel construction and PVC jacket.

B. Fittings and Conduit Bodies: ANSI/NEMA FB 1; liquid tight steel or malleable iron with insulated throat bushings. Die cast fittings are not acceptable.

2.06 ELECTRICAL METALLIC TUBING (EMT)

A. Product Description: ANSI C80.3, UL 797; galvanized steel tubing.

B. Fire Alarm EMT: Provide EMT with factory-applied red topcoating.

C. Fittings and Conduit Bodies: ANSI/NEMA FB 1; steel or malleable iron, compression type with insulated throat bushings. Zinc die cast, set screw, or indentor fittings are not acceptable.

D. Maximum size shall be 2". Provide factory elbows on sizes 1-½" and larger.

2.07 OUTLET BOXES

A. Sheet Metal Outlet Boxes: ANSI/NEMA OS 1, UL514A galvanized steel, with plaster ring where applicable.

1. Minimum Size: 4 inches square or octagonal, 1-1/2 inches deep, unless otherwise noted.

2. Luminaire and Equipment Supporting Boxes: Rated for weight of equipment supported; furnish 1/2 inch male fixture studs where required. Minimum Size: 4 inches square or octagonal, 2-1/8 inches deep.

3. Concrete and Masonry: Concrete type with field installed tape cover to prevent concrete entry to raceway system. Minimum Size: 4 inches square, 2-1/8 inches deep.

B. Cast Boxes: NEMA FB 1, Type FD, galvanized malleable iron. Furnish gasketed cover by box manufacturer. Furnish threaded hubs. "Bell" boxes are not acceptable.

C. Wall Plates: As specified in Section 26 27 26.

2.08 PULL AND JUNCTION BOXES

A. Sheet Metal Pull and Junction Boxes: ANSI/NEMA OS 1, UL514A galvanized steel.

1. Minimum Size: 4 inches square or octagonal, 1-1/2 inches deep, unless otherwise noted.

B. Sheet Metal Boxes Larger Than 12 Inches in Any Dimension: Hinged enclosure, Hoffman or approved equal.

C. Cast Metal Boxes for Outdoor and Wet Location Installations: NEMA 250, Type 4; flat-flanged, surface mounted junction box, UL listed as raintight:

1. Material: Galvanized cast iron.

2. Cover: Furnish with ground flange, neoprene gasket, and stainless steel cover and screws.

D. Cast Metal Boxes for Underground Installations: NEMA 250, Type 4; flat-flanged, flush-mounted junction box, UL listed as raintight:

1. Material: Galvanized cast iron.

2. Cover: Furnish with outside flange, neoprene gasket, and recessed stainless steel cover and screws.

2.09 BUSHINGS

A. Non-grounding: Threaded impact resistant plastic.

B. Grounding: Insulated galvanized malleable iron/steel with hardened screw bond to raceway and conductor lug.

2.10 LOCKNUTS

A. Threaded Electro Zinc Plated Steel designed to cut through protective coatings for ground continuity.

2.11 WIREWAY

A. Product Description: General purpose type wireway. Size per NEC minimum fill capacity required.

B. Knockouts: Field-installed, no factory knockouts acceptable.

C. Cover: Screw cover.

D. Fittings and Accessories: Include factory couplings, offsets, elbows, adapters and support straps required for a complete system. Provide internal ground bonding jumper bonded to each section.

PART 3 EXECUTION

3.01 INSTALLATION

A. Ground and bond raceway and boxes.

B. Provide seismic support and fasten raceway and box supports to structure and finishes in accordance with Section 26 05 29.

C. Identify raceway and boxes with origin and destination in accordance with Section 26 05 53.

D. Unless otherwise noted, do not inter-mix conductors from separate panelboards or any other system in the same raceway system or junction boxes.

3.02 INSTALLATION - GENERAL RACEWAY

A. Install raceway for all systems, unless otherwise noted.

B. Install an equipment grounding conductor inside of all raceways containing line voltage conductors.

C. Raceway routing and boxes are shown in approximate locations unless dimensioned. Where raceway routing is not denoted, field-coordinate to provide complete wiring system.

D. Do not route raceways on floor. Arrange raceway and boxes to maintain a minimum of 6 feet 6 inches of headroom and present a neat appearance. Install raceways level and square to a tolerance of 1/8" per 10 feet. Route exposed raceways and raceways above accessible ceilings parallel and perpendicular to walls, ceiling, and adjacent piping.

E. Maintain minimum 6-inch clearance between raceway and mechanical and piping and ductwork. Maintain 12-inch clearance between raceway and heat sources such as flues, steam pipes, heating pipes, heating appliances, and other surfaces with temperatures exceeding 104 degrees F.

F. Seal raceway penetrations of fire-rated walls, ceilings, floors in accordance with the requirements of Section 26 05 00.

G. Where raceway penetrates fire-rated walls and floors, seal opening around conduit with UL listed firestop sealant or intumescent firestop, preserving the fire time rating of the construction.

H. Arrange raceway supports to prevent misalignment during wiring installation. Support raceway using coated steel or malleable iron straps, lay-in adjustable hangers, clevis hangers, and split hangers.

I. Do not attach raceway to ceiling support wires or other piping systems and do not fasten raceway with wire or perforated pipe straps. Remove all wire used for temporary raceway support during construction, before conductors are pulled. Raceway shall be installed to permit ready removal of equipment, piping, ductwork, or ceiling tiles.

J. Group raceway in parallel runs where practical and use conduit rack constructed of steel channel with conduit straps or clamps, as specified in Section 26 05 29. Provide space on each rack for 25 percent additional raceway.

K. Cut conduit square; de-burr cut ends. Bring conduit to the shoulder of fittings and couplings and fasten securely. Where locknuts are used, install with one inside box and one outside with dished part against box.

L. Use threaded raintight conduit hubs for fastening conduit to cast boxes, and for fastening conduit to sheet metal boxes in damp or wet locations. Sealing locknuts are not acceptable.

M. Install no more than the equivalent of three 90-degree bends between boxes.

N. Install conduit bodies to make sharp changes in direction, such as around beams. "Goosenecks" in conduits are not acceptable.

O. Provide protective plastic bushings or insulated throat bushings at each raceway termination not installed to an enclosure. Bushings shall be threaded to the raceway end or connector.

P. Use cable sealing fittings forming a watertight non-slip connection to pass cords and cables into conduit. Size cable sealing fitting for the conductor outside diameter. Use Appleton CG series or equal cable sealing fittings.

Q. Use suitable caps to protect installed raceway against entrance of dirt and moisture.

R. Provide nylon "jet-line" or approved equal pull string in empty raceway, except sleeves and nipples.

S. Paint all exposed conduit to match surface to which it is attached or crosses. Clean greasy or dirty conduit prior to painting in accordance with paint manufacturer's instructions. Where raceway penetrates non-rated ceilings, floors or walls, provide patching, paint and trim to retain architectural aesthetics similar to surroundings.

T.

3.03 INSTALLATION – GENERAL BOXES

A. Provide electrical boxes as shown on Drawings, and as required for splices, taps, wire pulling, equipment connections, and code compliance. All electrical box locations shown on Drawings are approximate unless dimensioned.

B. Install pull boxes and junction boxes above accessible ceilings and in unfinished areas only.

C. Coordinate layout and installation of boxes to provide adequate headroom and working clearance.

D. Align wall-mounted outlet boxes for switches, thermostats, and similar devices.

E. Use multiple-gang boxes where more than one device are mounted together; do not use sectional boxes. Provide barriers to separate wiring of different voltage systems and where normal and emergency power circuits occur in the same box.

F. Adjust box location up to 6 feet prior to rough-in to accommodate intended purpose.

G. Orient boxes to accommodate wiring devices oriented as specified in Section 26 27 26.

H. Locate and install boxes to maintain headroom and to present a neat appearance.

I. Provide knockout closures for unused openings.

J. Install boxes in walls without damaging wall insulation or reducing its effectiveness.

K. Support boxes independently of conduit.

L. Clean interior of boxes to remove dust, debris, and other material and clean exposed surfaces and restore finish.

M. Provide blank covers or plates for all boxes that do not contain devices.

END OF SECTION 26 05 33

SECTION 26 05 53
IDENTIFICATION FOR ELECTRICAL SYSTEMS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Nameplates and Tape Labels.

B. Wire and Cable Markers.

1.02 RELATED SECTIONS

A. The Work under this section is subject to requirements of the Contract Documents including the General Conditions, Supplementary Conditions, and sections under Division 01 General Requirements, and Section 26 05 00 – Common Work Results for Electrical.

B. Section 26 05 19 – Low-Voltage Electrical Power Conductors and Cables.

C. Section 26 05 33 – Raceway and Boxes for Electrical Systems.

D. Section 26 27 26 – Wiring Devices.

1.03 SUBMITTALS

A. None required for this section.

1.04 ENVIRONMENTAL REQUIREMENTS

A. Install labels and nameplates only when ambient temperature and humidity conditions for adhesive are within range recommended by manufacturer.

PART 2 PRODUCTS

2.01 NAMEPLATES

A. Product Description: Laminated three-layer plastic with engraved white letters on black background. Nameplate for service disconnect shall be engraved white letters on red background.

B. Letter Size:

1. 1/4-inch high letters for identifying individual panel or equipment.

2. 1/8-inch high letters for remaining lines with 1/8 inch spacing between lines.

C. Minimum nameplate size: 1/8 inch thick with a consistent length and height for each type of nameplate wherever installed on the project.

2.02 TAPE LABELS

A. Product Description: Adhesive tape labels, with 3/16 inch Bold Black letters on clear background made using Dymo Rhino series label printer or approved equal.

B. Embossed adhesive tape will not be permitted for any application.

2.03 WIRE MARKERS

A. Power and Lighting Description: Machine printed heat-shrink tubing, cloth or wrap-on type, for all neutrals and Phase conductors.

B. Low Voltage System Description: Self-adhesive machine printed label with unique wire number that is shown on shop drawing for system.

2.04 FIRE ALARM CONDUIT AND BOX IDENTIFICATION

A. Product Description: Red spray paint for fire alarm boxes.

B. Fire alarm conduit shall have red finish, as specified in Section 26 05 33.

PART 3 EXECUTION

3.01 GENERAL INSTALLATION

A. Degrease and clean surfaces to receive nameplates and tape labels.

B. Install nameplates and tape labels parallel to equipment lines.

3.02 NAMEPLATE INSTALLATION

A. Secure nameplates to equipment fronts using machine screws tapped and threaded into panelboard, or using rivets. The use of adhesives is not acceptable. Machine screws to not protrude more than 1/16 inch on back side.

B. Disconnects, Starters, or Contactors:

1. Provide nameplate for each device with the following information:

a. Line 1: Load served.

b. Line 2: Panelboard and circuit number from which the device is fed.

c. Line 3: Fuse or Circuit amperage and poles. Where fused disconnect is installed, denote the maximum fuse size to be installed.

3.03 LABEL INSTALLATION

A. Low-Voltage System Device Labels: Provide label on each device, denoting device ID or address where applicable. Affix label to device faceplate for ceiling-mounted devices or wall-mounted devices above 8'-0" AFF. Affix label inside backbox for exterior devices.

3.04 WIRE IDENTIFICATION

A. Provide wire markers on each conductor in panelboard gutters, pull boxes, outlet and junction boxes, and at load connection. Identification shall be as follows:

1. Markers shall be located within one inch of each cable end, except at panelboards, where markers for branch circuit conductors shall be visible without removing panel deadfront.

2. Each wire and cable shall carry the same labeled designation over its entire run, regardless of intermediate terminations.

3. Color code phases, neutral, and ground per NEC requirements and Section 26 05 19.

4. Color-code all low-voltage system wires and cables in accordance with the individual sections in which they are specified.

5. For power and lighting circuits, identify with branch circuit or feeder number.

6. Control Circuits: Control wire number as indicated on schematic and shop drawings.

7. Fire Alarm Circuits: Provide cable markers showing NAC or SLC loop identification number at all fire alarm junction boxes and pullboxes.

B. Provide pull string markers at each end of all pull strings. Marker shall identify the location of the opposite end of the pull string.

3.05 JUNCTION BOX IDENTIFICATION

A. Fire Alarm: In accessible ceiling spaces, exposed ceiling spaces, mechanical/electrical rooms, and other non-public spaces, paint fire alarm junction boxes and pullboxes with red spray paint. In all finished spaces where fire alarm boxes are visible, they shall be painted to match the surrounding finish. If there are any questions as to whether fire alarm boxes shall be painted red in a specific area, the Contractor shall get clarification from the Owner prior to painting.

B. Label each lighting and power junction box with the panelboard name and circuit number.

C. Label all junction boxes for intercom, door control, and CCTV systems with the type of system cables contained in the box.

3.06 DEVICE PLATE IDENTIFICATION

A. Label each receptacle device plate or point of connection denoting the panelboard name and circuit number.

B. Install adhesive label on the top of each plate.

END OF SECTION 26 05 53

SECTION 26 27 26

WIRING DEVICES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Receptacles.

B. Device Plates and Box Covers.

1.02 RELATED SECTIONS

A. The Work under this section is subject to requirements of the Contract Documents including the General Conditions, Supplementary Conditions, and sections under Division 01 - General Requirements and Section 26 05 00 – Common Work Results for Electrical.

B. Section 26 05 33 – Raceway and Boxes for Electrical Systems.

C. Section 26 05 53 – Identification for Electrical Systems.

1.03 REFERENCE STANDARDS

A. FS W-C-596 – Federal Specification for Electrical Power Connector, Plug, Receptacle, and Cable Outlet.

B. NEMA WD 1 - General Color Requirements for Wiring Devices.

C. ANSI/NEMA WD 6 – Wiring Devices – Dimensional Requirement.

D. UL 498 - Attachment Plugs and Receptacles.

E. UL 943 – Ground-Fault-Circuit-Interrupters.

1.04 SUBMITTALS

A. None required for this section.

PART 2 PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS - RECEPTACLES

A. Hubbell.

B. Leviton.

C. Pass & Seymour.

D. Arrow Hart

E. Substitutions: Under provisions of Division 01.

2.02 RECEPTACLES

A. Convenience and Straight-blade Receptacles: UL 498, NEMA WD 1 and Federal Specification FS W-C-596 industrial grade receptacle.

B. Convenience Receptacle Configuration: NEMA WD 1; Type 5-20R, white [ivory] nylon face.

C. GFCI Receptacles: 20A, duplex convenience receptacle with integral class ‘A’ ground fault current interrupter, LED indicator lamp and integral lockout.

2.03 DEVICE PLATES

A. Decorative Cover Plate: Smooth 430 or 302 stainless steel with metal, counter sunk screws to match device plate.

B. Exposed Work Cover Plate: ½ inch raised, square, pressed, galvanized or cadmium plated steel cover plate supporting devices independent of the outlet box.

PART 3 EXECUTION

3.01 INSTALLATION

A. Install convenience receptacles 18 inches above floor, grounding pole on bottom.

B. Unless otherwise noted, mounting heights are for finished floor to center line of outlet.

C. Install decorative plates on switch, receptacle, and blank outlets in finished areas. Use midsize or jumbo plates for outlets installed in masonry walls, where required to cover up imperfections in the wall opening.

D. Install galvanized steel plates on outlet boxes and junction boxes in unfinished areas, above accessible ceilings, and on surface-mounted outlets.

E. Install devices and wall plates flush and level.

F. Ground receptacles to boxes with a grounding wire. Grounding through the yoke or screw contact is not an acceptable alternate to the ground wire.

G. Install circuit label on each receptacle in accordance with Section 26 05 53.

END OF SECTION 26 27 26

SECTION 26 28 16
ENCLOSED SWITCHES AND CIRCUIT BREAKERS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Enclosed Switches.

B. Fuses.

1.02 RELATED SECTIONS

A. The Work under this section is subject to requirements of the Contract Documents including the General Conditions, Supplementary Conditions, and sections under Division 01 General Requirements and Section 26 05 00 – Common Work Results for Electrical.

B. Section 01 40 00 – Quality Requirements.

C. Section 26 05 53 – Identification for Electrical Systems.

1.03 REFERENCE STANDARDS

A. ANSI/UL 198C - High-Intensity Capacity Fuses; Current Limiting Types.

B. ANSI/UL 198E - Class R Fuses.

C. ANSI/UL 98 Enclosed and Dead Front Switches.

D. NEMA KS 1 - Enclosed and Miscellaneous Distribution Equipment Switches (600 Volts Maximum).

E. NEMA FU 1 – Low Voltage Cartridge Fuses.

F. NEMA 250 – Enclosures for Electrical Equipment (1000 Volts Maximum).

G. NETA ATS – Acceptance Testing Specifications for Electrical Power Distribution Equipment and Systems.

1.04 SUBMITTALS

A. Product Data: Submit product data for all components provided, showing electrical characteristics, material, and dimensions. Each catalog sheet should be clearly marked to indicate exact part number provided, including all options and accessories.

B. Shop Drawings: Submit shop drawings include outline drawings with dimensions, and equipment ratings for voltage, capacity, horsepower, and short circuit current interrupting rating.

1.05 CLOSEOUT SUBMITTALS

A. Project Record Drawings: Accurately indicate actual location of enclosed switches, circuit breakers and ratings of actual installed fuses.

1.06 QUALITY ASSURANCE

A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum three years experience.

1.07 EXTRA STOCK

A. Provide extra stock under provisions of Division 01.

B. Fuses: Provide one set of 3 fuses of each size and type of fuse installed.

PART 2 PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS - ENCLOSED SWITCHES

A. Square D.

B. Siemens.

C. Cutler Hammer.

D. General Electric.

E. Substitutions: Under provisions of Division 01.

2.02 ENCLOSED SWITCHES

A. Fusible Switch Assemblies: NEMA KS 1; Heavy Duty type; quick-make, quick-break, load interrupter enclosed knife switch with externally operable handle interlocked to prevent opening front cover with switch in ON position. Handle lockable in OFF position. Fuse Clips: Designed to accommodate Class R fuses and reject all other classes of fuse.

B. Enclosures: NEMA KS 1; Type 1.

C. Disconnect Switches For Elevators: Fusible switch assembly, as specified above, with one normally open and one normally closed electrical interlock contact.

2.03 ACCEPTABLE MANUFACTURERS - FUSES

A. Cooper-Bussmann.

B. Ferraz-Shawmut.

C. Economy.

D. Substitutions: Under provisions of Division 01.

2.04 FUSES

A. Fuses 600 Amperes and Less: ANSI/UL 198C, Class J; 250 volt.

B. Interrupting Rating: 200,000 rms amperes.

2.05 INTERNAL ACCESSORIES

A. Provide shunt trip and auxiliary switches as shown on the contract drawings.

B. All accessories shall be UL Listed for field installation.

PART 3 EXECUTION

3.01 INSTALLATION

A. Install enclosed switches where indicated on Drawings, and where required for NEC required disconnect of equipment specified under other divisions, but installed under Division 26.

B. Install fuses in fusible disconnect switches.

C. All enclosed switches shall have signage for arc hazard installed. The marking shall be located to be clearly visible to qualified personnel before examination, adjustment, servicing or maintenance of the equipment. At a minimum the signage shall state the following:

Warning

Arc Flash and Shock Hazard

Appropriate PPE Required

3.02 FIELD QUALITY CONTROL

A. Field inspecting, testing, adjusting and balancing.

B. Inspect and test in accordance with NETA ATS, exception Section 4.

C. Perform inspections and tests listed in NETA ATS, Section 7.5.

3.03 ADJUSTMENTS

A. The Contractor shall perform necessary field adjustments of the circuit breakers to place the equipment in final operating condition. The settings shall be in accordance with the approved protective device coordination study or as directed by the Engineer.

END OF SECTION 26 28 16

SECTION 26 51 00

INTERIOR LIGHTING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Interior Luminaires and Accessories.

B. Lamp Modules.

C. LED Replacement Lamps.

D. Drivers.

1.02 RELATED SECTIONS

A. The Work under this section is subject to requirements of the Contract Documents including the General Conditions, Supplementary Conditions, and sections under General Conditions of the Contract General Requirements, and Section 26 05 00 – Common Work Results for Electrical.

B. Section 26 05 19 – Low Voltage Electrical Power Conductors and Cables.

C. Section 26 05 29 - Hangers and Supports for Electrical Systems: General Supports for Luminaires.

D. Section 26 05 33 – Raceway and Boxes for Electrical Systems.

E. Section 26 05 53 – Identification for Electrical Systems.

F. Section 26 27 26 – Wiring Devices.

1.03 SUBMITTALS

A. Product Data: Submit the following:

1. Luminaires: Include manufacturer's product data sheets and/or shop drawings including outline drawings showing support points, weights, and accessory information for each luminaire type. Clearly indicate all options being provided. Arrange data for luminaires in the order of fixture designation.

2. Prior to preparing submittals, coordinate with the reflected ceiling plan for ceiling finishes and provide all necessary kits, brackets, stems, trim, etc. to install the specified fixtures in the ceilings provided. Clearly note these configurations on the product data sheets.

B. Warranty: Provide copies of manufacturer's warranty information for each luminaire. If warranty information is the same for a group of manufacturer's luminaires, provide a letter or schedule clearly indicating what warranty applies to each fixture.

1.04 DELIVERY, STORAGE, AND HANDLING

A. Deliver products to site, store and protect in a clean, dry environment under provisions of General Conditions of the Contract.

PART 2 PRODUCTS

2.01 INTERIOR LUMINAIRES AND ACCESSORIES

A. Luminaires: Provide UL listed luminaires as scheduled on the drawings or as approved equal.

B. Listing: Luminaires shall be listed for use in the environment in which they are installed.

C. Accessories: Provide all mounting kits, supports, interconnecting wiring, power supplies, trim kits, gaskets, etc. for a complete installation.

D. Housing:

1. Metal parts shall be free of burrs and sharp corners and edges. Form and support to prevent warping and sagging.

2. Doors, Frames and Other Internal Access: Smooth operating, free of light leakage under operating conditions. Designed to prevent doors, frames, lenses, diffusers, and other

components from falling accidentally during relamping and when secured in operating position.

3. Luminaires shall be factory painted and free of discoloration. Color as scheduled.

2.02 DRIVERS - LED

A. LED Driver: Provide UL listed power supply as recommended by the LED fixture manufacturer for operation of the specified LED lamps. Power supply shall be integral to the luminaire unless otherwise noted on the Plans. Power supply shall be dual voltage (120/277V) where available or operate at the supply voltage indicated on the Plans.

PART 3 EXECUTION

3.01 INSTALLATION

A. Coordinate layout and installation of lighting fixtures and suspension system with other construction that penetrates ceilings or is supported by them, including but not limited to HVAC equipment, fire-suppression system, piping, and partition assemblies.

B. Unless otherwise noted on Plans, provide drivers integral to luminaires, pre-wired and installed at the factory, suitable for use with the selected LED lamps.

C. Support surface-mounted luminaires directly from building structure. Install level and parallel/perpendicular with ceiling or wall surfaces.

D. Provide luminaire disconnecting means in the wiring compartment of each luminaire. Where the luminaire is fed from a multi-wire branch circuit, provide multi-pole disconnect to simultaneously break all supply conductors to the ballast, including the grounded conductor.

E. Mechanical Rooms: Lighting fixture locations shown on Plans are approximate. Coordinate mounting height and location of lighting fixtures to clear mechanical, electrical and plumbing equipment and to adequately illuminate meters, gauges and equipment. Support all lighting fixtures independently of duct work or piping.

3.02 RELAMPING

A. Re-lamp or replace luminaires that have failed lamps at completion of work.

3.03 ADJUSTING AND CLEANING

A. Clean paint splatters, dirt, and debris from installed luminaires.

B. Touch up luminaire finish at completion of work.

END OF SECTION 26 51 00