YONKERS 87 NEPPERHAN AVENUE
HEALTH CENTER ELEVATOR UPGRADE

PROJECT SPECIFICATIONS

100% SUBMISSION
June 22, 2018

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SECTION 078400

FIRESTOPPING

PART 1 GENERAL

1.01 REFERENCES

A. UL 263 Fire Tests of Building Construction and Materials.

B. UL 1479 Fire Tests of Through-Penetration Firestops.

C. UL 2079 Standard for Safety Tests for Fire Resistance of Building Joint Systems.

D. ASTM E 119 Methods of Fire Tests of Building Construction and Materials.

E. ASTM E 814 Method of Fire Tests of Through-Penetration Fire Stops.

1.02 DEFINITIONS

A. UL Fire Resistance Directory: Product directory published yearly, with supplements, by Underwriters Laboratories Inc., containing listings and classifications in effect as of the published date for product categories covered by UL.

B. Inchcape Directory of Listed Products: Product directory published yearly by Inchcape Testing Services containing listings which reflect certifications granted for materials, products, systems and equipment which have been tested by Inchcape Testing Services to recognized governing standards.

C. Omega Point Laboratories Listings Directory: Product Directory published yearly by Omega Point Laboratories, Inc. containing listed building products, materials, and assemblies which have been tested by Omega Point Laboratories to recognized governing standards.

D. Factory Mutual Approval Guide: Product directory published yearly, with supplements, by Factory Mutual Research Corp., containing listed building products, materials, and assemblies which have been tested by Factory Mutual Research Corp., to recognized governing standards.

E. F Rating: Prohibits flame passage through the system and requires acceptable hose stream test performance.

F. T Rating: Prohibits flame passage through the system and requires the maximum temperature rise on the unexposed surface of the wall or floor assembly, on the penetrating item and on the fill material not to exceed 325 degrees F above ambient, and requires acceptable hose stream test performance.

G. Company Field Advisor: An employee of the Company which lists and markets the primary components of the system under their name who is certified in writing by the Company to be technically qualified in design, installation, and servicing of the required products or an employee of an organization certified by the foregoing Company to be technically qualified in design, installation and servicing of the required products. Personnel involved solely in sales do not qualify.

1.03 DESIGN REQUIREMENTS

A. Devices and materials shall meet the hourly fire resistance ratings required by the Project as determined by UL 263, UL 1479, UL 2079, ASTM E 119 or ASTM E 814 and be listed and detailed in the UL Fire Resistance Directory, Inchcape Directory of Listed Products, Factory Mutual Approval Guide, or the Omega Point Laboratories Listings Directory.
   1. Exception: Where no listed designs exist that meet the requirements of a specific project condition, submit details and manufacturer's written recommendations for a design meeting the requirements. Include evidence of engineering judgment and extrapolation from listed designs.

1.04 SUBMITTALS

A. Submittals Package: Submit the following items specified below the same time as a package:
   1. Product Data.
   2. Samples.
   3. Quality Control Submittals.
   4. Firestop Schedule.

B. Product Data: Catalog sheets, specifications and installation instructions for each firestop device and material.
   1. Indicate design number for each firestop proposed to be used which is detailed in the UL Fire Resistance Directory, Inchcape Directory of Listed Products, Factory Mutual Approval Guide, or the Omega Point Laboratories Listings Directory.
   2. State the specific locations where each firestop system is proposed to be installed.

C. Quality Control Submittals:
   1. Design Data: Show details and include engineering information and manufacturer's written recommendations required under Design Requirements Article for each proposed firestop if other than a design detailed in the UL Fire Resistance Directory, Inchcape Directory of Listed Products, Factory Mutual Approval Guide, or the Omega Point Laboratories Listings Directory.
      a. State the specific locations where each firestop is proposed to be installed.
   2. Installer's Qualifications Data:

a. Name of each person who will be performing the Work and their employer's name, business address and telephone number.
b. Names and addresses of 3 similar projects that each person has worked on during the past 5 years.

3. Company Field Advisor Data:
   a. Name, business address and telephone number of Company Field Advisor secured for the required services.
   b. Certified statement from the Company listing the qualifications of the Company Field Advisor, and listing of services and each product specifically listed for this Project for which Company Field Advisor is given authorization by the Company to render advice.

D. Firestop Schedule: Submit schedule itemizing the following:
1. Manufacturer's product reference numbers and/or drawing numbers.
2. UL, Inchcape Testing Services, Factory Mutual Research Corp., or Omega Point Lab design number.
3. Location of firestop material.
4. Penetrating Item Description/Limits: Material, size, insulated or uninsulated, and combustibility.
5. Maximum allowable annular space or maximum size opening.
6. Wall type construction.
7. Floor type construction.
8. Hourly Fire resistance rating of wall or floor.
9. F rating.
10. T rating, if available.

NOTE: Firestop Schedule is for information only, and will not be acted on for approval. Refer to Sample Firestop Schedule bound in Appendix.

1.05 QUALITY ASSURANCE

A. Installer Qualifications: The persons installing the firestopping and their supervisor shall be personally experienced in firestop work and shall have been regularly employed by a company installing firestopping for a minimum of 3 years.

B. Pre-Installation Conference: Before the firestop work is scheduled to commence, a conference will be called by the Director's Representative at the Site for the purpose of reviewing the Contract Documents and discussing requirements for the Work. The conference shall be attended by related trade Contractors (if any), their qualified firestopping installers, and associated firestopping manufacturer's Company Field Advisors.

C. Container/Package Labels: Include manufacturer's name and identifying product number, date of manufacturer, lot number, shelf life (if applicable), qualified testing and inspecting agency classification marking, curing time, and mixing instructions for multi-component materials.

D. Company Field Advisor: Secure the services of a Company Field Advisor for the following:
   1. Render advice regarding suitability of firestopping materials and methods.
   2. Assist in completing firestop schedule.
   3. Attend pre-installation conference.

E. Field-Constructed Sample Installations: Prior to installing firestopping, erect sample installations for each type through-penetration firestop system indicated in the Firestop Schedule to verify selections made and to establish standard of quality and performance by which the firestopping work will be judged.
   1. Build sample installations to comply with the following requirements, using materials indicated for final installations.
      a. Locate sample installations on site at locations where directed.
      b. Obtain Director's Representative's acceptance of sample installations before start of firestopping installation.
      c. Retain and maintain sample installations during construction in an undisturbed condition.
      d. Accepted sample installations in an undisturbed condition at time of substantial completion of Project may become part of completed firestopping work.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Deliver firestopping materials to the Site in original, new unopened containers or packages bearing manufacturer's printed labels.

B. Store and handle firestopping materials to prevent deterioration or damage due to moisture, temperature changes, contaminants, etc.

1.07 PROJECT CONDITIONS

A. Environmental Requirements:
   1. Temperature: Do not install firestopping materials when ambient or substrate temperatures are outside limits permitted by manufacturer of firestopping materials.
   2. Humidity and Moisture: Do not install the Work of this Section under conditions that are detrimental to the application, curing, and performance of the materials.
   3. Ventilation: Provide sufficient ventilation wherever firestopping materials are installed in enclosed spaces. Follow manufacturer's recommendations.

1.08 SEQUENCING AND SCHEDULING

A. Leave exposed those firestopping installations that are to be concealed behind other construction until the Director's Representative has examined each installation.

PART 2 PRODUCTS

2.01 FIRESTOPPING-GENERAL

A. Through-Penetration Firestop Devices, Forming Materials, And Fill, Void or Cavity Materials: As listed in the UL Fire Resistance Directory, Inchcape Directory of Listed Products, Factory Mutual Approval Guide, or the Omega Point Laboratories Listings Directory.
   1. For firestopping exposed to moisture, furnish products that do not deteriorate when exposed to this condition.
   2. For firestopping systems exposed to view, furnish products with flame-spread values of less than 25 and smoke developed values less than 50, as determined per ASTM E 84.
   3. For penetrations for piping services below ambient temperature, furnish moisture-resistant through-penetration firestop systems.
   4. For penetrations involving insulated piping, furnish through-penetration firestop systems not requiring removal of insulation.

B. Accessories: Components required to install fill materials as recommended by the firestopping manufacturer for particular approved fire rated system.

C. Identification Labels:
   1. Furnished by fire stopping manufacturer of suitable material for permanent field identification of through-penetration firestops.
   2. Identify the following:
      a. "WARNING - FIRESTOP MATERIAL".
      b. Company Name.
      c. Product Catalog number.
      d. F rating.
      e. T rating, if available.
   3. Field fabricated labels are not acceptable.

PART 3 EXECUTION

3.01 EXAMINATION

A. Examine existing through-penetrations of floors, walls, partitions, ceilings and roofs in the Work areas.

B. Examine existing junctures, control joints, and expansion joints in the Work areas.

C. Where firestopping is missing or not intact, submit a written report to the Director's Representative describing the existing conditions.

3.02 PREPARATION

A. Clean out openings immediately before installation of through-penetration firestopping. Comply with recommendations of firestopping manufacturer and the following requirements:
   1. Remove foreign materials from surfaces of openings, and from penetrating items that could interfere with adhesion of firestopping.
   2. Clean opening and penetrating items to produce clean, sound surfaces capable of developing optimum bond with firestopping. Remove loose particles remaining from cleaning operation.
   3. Remove laitance and form release agents from concrete.

B. Clean out openings, and juncture, control, and expansion joints immediately before installation of firestopping. Comply with recommendations of firestopping manufacturer and the following requirements:
   1. Remove foreign materials from surfaces of openings and joint substrates, and from penetrating items that could interfere with adhesion of firestopping.
   2. Clean opening joint substrates to produce clean, sound surfaces capable of developing optimum bond with firestopping. Remove loose particles remaining from cleaning operation.
   3. Remove laitance and form release agents from concrete.

C. Protection:
   1. Protect surfaces adjacent to through-penetration firestops with non-staining removable masking tape or other suitable covering to prevent firestopping from contacting adjoining surfaces that will remain exposed upon completion of Work and that would otherwise be permanently stained or damaged by such contact or that would be caused by cleaning methods used to remove smears from firestopping materials.

D. Substrate Priming:
   1. Prime substrates in accordance with the firestopping manufacturer's printed installation instructions using recommended products and methods.
   2. Do not allow primer to spill or migrate onto adjoining exposed surfaces.

3.03 INSTALLATION OF THROUGH PENETRATION FIRESTOPS

A. Use through-penetration firestop devices, forming materials, and fill, void or cavity materials to form through-penetration firestops to prevent the passage of flame, and limit temperature rise of the unexposed surface as detailed in the UL Fire Resistance Directory, Inchcape Directory of Listed Products, Factory Mutual Approval Guide, or the Omega Point Laboratories Listings Directory.
   1. Where applicable design is not detailed in the Directories, use forming materials and fill, void or cavity material to form through-penetration firestop in accordance with approved printed details and installation instructions from the company producing the forming materials and fill, void or cavity material.

2. If the construction type(s) of the building cannot be determined, provide firestopping with fire resistance ratings as specified in the Building Code of New York State, Tables 720.1(1), 720.1(2), 720.1(3), and 302.3.2.

B. Provide through-penetration firestop systems with F ratings that shall equal or exceed the fire resistance rating of the penetrated building construction.

C. Provide through-penetration firestop systems with T ratings, in addition to F ratings, at floors where the following conditions exist:
1. Where firestop systems protect penetrations located outside the wall cavities.
2. Where firestop systems protect penetrations located outside fire resistive shaft enclosures.
3. Through-penetration firestop systems protecting floor penetrations require a T-rating of at least 1 hour, but not less than the required floor fire-resistance rating.

D. Firestop through-penetrations of floors, walls, partitions, ceilings, and roofs.

E. Firestop through-penetrations associated with the new Work.

F. Firestop through-penetration of partitions identified on the Construction Work Drawings as smoke partitions and fire rated assemblies.

G. Firestop through-penetrations of floors, walls, partitions, ceilings, and roofs in accordance with the fire resistance rating assigned to the walls, partitions, floors, ceilings, and roofs on the Construction Work Drawings.

H. Permanently affix label at each firestop. Use adhesive compatible with surface construction at firestop location.

3.04 INSTALLATION OF JUNCTION, CONTROL, AND EXPANSION JOINT FIRESTOPS

A. Use joint treatment materials to form firestop to prevent the passage of flame and limit temperature rise of the unexposed surface, as detailed in the UL Fire Resistance Directory, Inchcape Directory of Listed Products, Factory Mutual Approval Guide or the Omega Point Laboratories Listings Directory.
1. Where applicable design is not detailed in the Directories, use forming materials and fill, void or cavity material to form firestop in accordance with approved printed details and installation instructions from the company producing the forming materials and fill, void or cavity material.
2. If the construction type(s) of the building cannot be determined, provide firestopping with fire resistance ratings as specified in the Building Code of New York State, Tables 720.1(1), 720.1(2), 720.1(3), and 302.3.2.

B. Firestop junctures, control joints, and expansion joints associated with the new Work.

C. Firestop junctures, control joints, and expansion joints associated with smoke partitions and fire rated construction.

D. Permanently affix labels every 10 feet along each firestop. Use adhesive compatible with surface construction at firestop location.

3.05 CLEANING

A. Clean off excess fill materials and sealants adjacent to penetrations by methods and cleaning materials recommended by manufacturers of firestopping products and of products in which penetrations occur.

B. Remove masking tape as soon as practical so as not to disturb the firestopping's bond with substrate.

C. Protect firestopping during and after curing period from contact with contaminating substances, or damage resulting from adjacent Work.

D. Cut out and remove damaged or deteriorated firestopping immediately, and install new materials as specified in firestop schedule.

END OF SECTION

SECTION 083113

ACCESS DOORS

PART 1 GENERAL

1.01 SUBMITTALS

A. Product Data: Catalog sheets, specifications, and installation instructions.

1.02 QUALITY ASSURANCE

A. Regulatory Requirements:
   1. Fire Rated Access Doors For Walls: Complete assemblies complying with Underwriter's Laboratories, Inc (UL) requirements for 1-1/2 hour "B Label" rating. Identify each assembly with UL label.

PART 2 PRODUCTS

2.01 FIRE RATED ACCESS DOORS FOR WALLS AND CEILINGS

A. Frames: Minimum 16 gage steel, with integral exposed flange not less than one inch wide around the perimeter.

   1. Anchorage for New Concrete or Masonry Construction: Adjustable metal masonry anchors.

B. Door Panel: Flush type, minimum 20 gage steel double wall construction with insulation, equipped with automatic closer and inside release mechanism.

   1. Hinge: Concealed pin hinge or continuous hinge set to open to approximately 100 degrees.

C. Finish: Factory-applied baked enamel or primer over phosphate treated steel.

D. Automatic Latches: Direct action knurled knob or turn ring operated; sufficient number to hold door panel in flush, smooth plane when closed. Equip each latch with inside release device.

   1. One latch on each door panel shall be operated by a flush key. The remaining latches, if any, shall be knurled knob or turn ring operated type.
   2. One latch on each door panel shown or scheduled shall have either mortise preparation or rim cylinder latch. Builders Hardware Manufacturers Association, Inc. (BHMA) standard cylinder provided under Section 087100.

2.03 FABRICATION

A. Assemble access doors as integral units complete with all parts and ready for installation. Fabricate units of continuous welded steel construction unless otherwise indicated or specified. Grind welds smooth and flush with adjacent surfaces. Anchorage devices shall be of size and type required to secure access doors to types of supports indicated on the Drawings.

1. Allowable Size Variations: Manufacturer's standard size units which vary slightly from the sizes indicated may be acceptable, subject to the approval of the Director.

PART 3 EXECUTION

3.01 INSTALLATION

A. Install the access doors in accordance with the manufacturer's printed installation instructions, except as shown or specified otherwise.

B. Coordinate access door installation with installation of supporting construction.

C. Set units accurately in position and securely attach to supports with face panel plumb or level in relation to adjoining finish surface.

3.02 ADJUSTING

A. Adjust hardware and doors for proper operation.

3.03 SCHEDULE

A. Provide non-fire rated access doors in non-fire rated construction and fire rated access doors in fire rated construction.

END OF SECTION

SECTION 092116

GYPSUM BOARD SYSTEMS

PART 1 GENERAL

1.01 DEFINITIONS

A. Sheet Steel Gages: US Standard.

B. Gypsum Board Terminology: ASTM C 11 - Standard Terminology Relating to Gypsum and Related Building Materials and Systems.

1.02 SUBMITTALS

A. Product Data: Catalog sheets, specifications, and installation instructions for each item specified.

1.03 QUALITY ASSURANCE

A. Fire Resistance Rated Applications: Provide UL listed or ASTM E 119 tested materials, accessories, and application procedures to comply with the rating, UL Design Number, or Gypsum Association File Number indicated.

B. Single Source Responsibility: Obtain components for gypsum board shaft-wall assemblies from a single manufacturer for each type of assembly required.

1.04 DELIVERY, STORAGE AND HANDLING

A. Deliver materials in original packages, containers, or bundles bearing brand name and identification of manufacturer.

B. Store materials inside under cover and keep them dry and protected against damage from weather, direct sunlight, surface contamination, corrosion, construction traffic, and other causes. Stack gypsum panels flat to prevent sagging.

1.05 PROJECT CONDITIONS

A. Environmental Requirements: Comply with gypsum board manufacturer’s printed temperature and ventilation requirements during application and finishing. Ventilate installation areas to relieve excess moisture.

PART 2 PRODUCTS

2.01 FRAMING

A. Studs, Tracks, and Furring: ASTM C 645; 25 gage (minimum base metal thickness 0.0179 inch) galvanized steel, with additional framing members, reinforcing, accessories, and anchors necessary for the complete framing system.
   1. Deep-Leg Deflection Track: ASTM C 645 top runner with 2 inch deep flanges.
   2. Hat-Shaped, Rigid Furring Channels: ASTM C 645; 25 gage (minimum base metal thickness 0.0179 inch) galvanized steel.
   3. Resilient Furring Channels: Steel furring members designed to reduce sound transmission.

2.02 GYPSUM BOARD

A. Standard Gypsum Board: ASTM C 1396; long edges as follows:
   1. Long Edges: Tapered.

B. Fire Resistant Gypsum Board: ASTM C 1396; Type X, UL listed and bearing listing marking; long edges as follows:
   1. Long Edges: Tapered.

C. Gypsum Backing Board: ASTM C 1396; long edges square.

D. Shaft-Wall Assemblies: Materials and components listed in manufacturer's published product literature for gypsum board shaft-wall assemblies required.
   1. Steel Framing: ASTM C 645, of profile, size and base metal thickness to produce assemblies complying with indicated or required fire rating and structural properties.
   2. Gypsum Liner Panels: Manufacturer's standard or recommended panels as required for the specific fire-resistant rated gypsum board shaft-wall assemblies indicated, with moisture resistant paper facings.
   3. Gypsum Board: ASTM C 1396, type as required by fire-resistant assembly indicated; long edges tapered.

2.03 FASTENERS

A. Steel Drill Screws: ASTM C 1002; gypsum board manufacturer's recommended types and sizes for substrates involved.

B. Laminating Adhesive: Gypsum board manufacturer's recommended type for substrates involved.

C. Expansion Anchors: Anchor bodies AISI 1018 or 12L14, of dimensions indicated; with nuts, ASTM A 563; and flat washers. Expansion sleeves AISI 1010, of dimensions indicated; with bolts, SAE Grade 5; and flat washers.

D. Toggle Bolts: Tumble wing type.
   1. Wing Body: AISI 1008-1010 or equivalent cold rolled steel.
   2. Trunnion Nut: 1/4 inch thru 3/8 inch AISI 1010 steel; 1/2 inch Zamac alloy.
   3. Screw: Carbon steel.

E. Self Threading Masonry Screws: Zinc plated; Tapcon Fasteners by ITW Buildex 1349 West Bryn Mawr Ave. Itasca, IL 60143, (800) 284-5339.

2.04 TRIM

A. Interior Trim: ASTM C 1047.
   1. Material: Galvanized steel or extruded vinyl.
   2. Shapes:
      a. Cornerbead: Use at outside corners.
      b. Bullnose Bead: Use where indicated.
      c. LC-Bead: J-Shaped, exposed long flange receives joint compound. Use at exposed panel edges.
      d. L-Bead: L-shaped, exposed long leg receives joint compound with tear away bead. Use where gypsum board abuts or intersects dissimilar material.
      e. U-Bead: J-shaped, exposed short flange does not receive joint compound. Use where indicated.
      f. Expansion (Control) Joint: Use where indicated.

2.05 JOINT TREATMENT MATERIALS

A. Joint Tapes: ASTM C 475; plain or perforated.

B. Joint Compound: ASTM C 475; gypsum board manufacturer's recommended dry powder or ready-mixed, either of the following:
   1. One Compound Treatment: One compound for both bedding and finishing joints.
   2. Two Compound Treatment: Compatible joint compounds; one compound for bedding and the other compound for finishing joints.

PART 3 EXECUTION

3.01 EXAMINATION

A. Examine substrates to which gypsum board system attaches or abuts, preset steel door frames, cast in anchors, and structural framing, with installer present for compliance with requirements for installation tolerances and other conditions affecting performance of gypsum board system construction. Do not proceed with installation until unsatisfactory conditions have been corrected.

3.02 CONSTRUCTION TOLERANCES

A. Do not exceed 1/8 inch in 8 feet variation from plumb or level in any exposed line or surface, except at joints between boards do not exceed 1/16 inch variation between planes or abutting edges or ends. Shim as required to comply with specified tolerances.

3.03 SHAFT-WALL ASSEMBLY INSTALLATION

A. Install shaft-wall assemblies to comply with performance requirements indicated and with the manufacturer's published installation instructions.

3.04 GYPSUM BOARD INSTALLATION

A. Install gypsum board in the most economical direction, of maximum lengths to minimize end butt joints. Where unavoidable, locate end butt joints as far from center of walls or ceilings as possible.

B. Install gypsum board with face side out. Butt boards together at edges and ends over firm bearing with not more than 1/16 inch of open space between boards. Do not force into place.

C. Fasteners: Fasten gypsum board to supports and furring with steel drill screws of required size and spacing as recommended by the gypsum board manufacturer.
   1. Multiple-layer Work:
      a. Mechanically fasten both layers.
      b. Stagger vertical joints in multiple layer Work. Offset joints not less than 10 inches.

D. Provide additional framing and blocking required to support gypsum board at openings and cutouts.

E. Wood Supports: Provide "floating" interior angle construction between gypsum board at interior corners.

F. Reinforce joints formed by tapered edges, butt edges, and interior corners or angles with joint tape.

3.05 TRIM INSTALLATION

A. Coordinate installation of trim progressively with gypsum board installation where trim is of type required to be installed prior to, or progressively with installation of gypsum board.

B. Securely fasten trim pieces in accordance with manufacturer's printed instructions.

C. Install cornerbeads at external corners. Install LC-Bead (J-Bead) beads at unprotected (exposed) edges and where gypsum board abuts dissimilar materials. Use single unjointed lengths unless otherwise approved by the Director.
   1. Miter corners of semi-finishing type casing and trim beads.

D. Install control joint trim in accordance with ASTM C 840, where indicated.

E. Comply with joint compound manufacturer's recommended drying time for the relative humidity and temperature at time of application. Allow minimum of 24 hours drying time between applications of joint compound.

3.06 LEVELS OF GYPSUM BOARD FINISH

A. General: Finish panels to levels indicated below, in accordance with ASTM C 840, for locations indicated.

1. Level 3 Finish: Joints and angles, provide tape embedded in joint compound and provide two separate applications of joint compound over all joints, angles, and fastener heads. Accessories shall be covered with two separate coats of joint compound. Joint compound to be smooth and free of tool marks and ridges. Cover the prepared surface with a drywall primer prior to the application of the final decoration.

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SECTION 092236

FURRING AND LATHING

PART 1 GENERAL

1.01 REFERENCES

A. Reference Standard: Comply with applicable provisions of ASTM C 841, unless otherwise indicated.

1.02 DEFINITIONS

A. Gages:
   1. Sheet Steel: US Standard.
   2. Steel Wire: US Steel Wire Gage.

B. Galvanizing: Hot dip process, unless otherwise indicated.

1.03 SUBMITTALS

A. Product Data: Specifications and installation instructions for the following:
   1. Metal Lath: Each type specified.
   2. Corner and Casing Beads.

1.04 STORAGE

A. Protect metal items against distortion and rusting.

B. Protect gypsum material against distortion and moisture.

1.05 PROJECT CONDITIONS

A. Sequencing: Coordinate furring and lathing with adjoining Work.
   1. Coordinate delivery of items to be cast in poured concrete, to avoid delay.

PART 2 PRODUCTS

2.01 MATERIALS

A. Lath Types:

1. Metal Self-furring Lath: Expanded metal lath fabricated from copper-bearing steel sheet.
    a. Type C Metal Lath: Diamond mesh, 3.4 lb per sq yd, fabricated from galvanized steel.

B. Accessories:
1. Corner Beads: Metal bead with expanded metal flanges (each) not less than 2-1/2 inches wide.
    a. 26 gage galvanized steel.
    b. Standard small-nose bead.
    c. Bullnose bead, 3/4 inch radius.
2. Casing Beads: Metal bead with expanded metal flange not less than 3 inches wide.
    a. 24 gage galvanized steel.
    b. Modified or semi-square edge where plaster abuts dissimilar material.
    c. Quarter round edge at perimeter of openings.
    d. Square edge at perimeter of openings.
    e. Modified or semi-square edge at perimeter of openings.
3. Reinforcement: Diamond mesh expanded metal lath fabricated from copper-bearing steel sheet, 2.5 lb per sq yd, black asphaltum paint finish.
    a. Internal Corner Reinforcing: 6 inches wide, bent to form 3 inch legs.
    b. Strip Reinforcing: Self-furring type, 6 inches wide.

C. Miscellaneous Materials:
1. Cold Galvanizing Compound: Single component compound giving 93 percent pure zinc in the dried film, and meeting the requirements of DOD-P-21035A (NAVY).

PART 3 EXECUTION

3.01 INSTALLATION

A. General:
1. Install Work of this section in accordance with the provisions of ASTM C 841, except as otherwise indicated.
2. Do not bridge expansion joints with grillage (runner and furring bars), and do not bridge either expansion or control joints with lathing.
3. Ceiling Lath for Interior High Moisture Areas: Use Type C metal lath on ceilings, except when attached to wood construction.

B. Lathing: Apply lath to form true surfaces, free from sags and buckles, and secure to furring or directly to supporting structure as indicated. Apply lath with the long dimension of sheets at right angles to the direction of bearings.
1. Metal Lath:

a. Laps: Lap sides of sheets not less than 1/2 inch, nesting ribs if any. Lap ends of sheets not less than one inch, and locate end laps over bearings.
b. Reinforcement for Internal Corners: Reinforce internal angles of lathed surfaces and intersections of lathed surfaces with masonry (to be plastered) with continuous corner reinforcing except at junctions of load bearing and non-load bearing elements.
c. Fastening: Secure metal lath to each furring bar with lacing wire, and nail to each wood bearing, on not exceeding 6 inch centers. Fasten side laps together with lacing wire midway between bearings, and fasten terminating side edge. Secure reinforcement to other lathing with lacing wire, and to masonry with galvanized nails, on not exceeding 6 inch centers. Twist ends of wire ties together, cut off 1/2 inch from twist, and bend ends back against the lath.

C. Beams, Cornices, Columns and Pilasters: Form the shape and design of plastered beams, cornices, columns and pilasters with furring bars and Type A metal lath unless otherwise indicated, except where masonry backing of the required design is provided. Frame required shapes with furring bars spaced 12 inches on centers.

D. Accessories:
1. General: Set accessories in designed location, flush with finished plaster line, true to line and level or plumb. Align joints with concealed splices and tie plates. Use shims where necessary. Securely fasten in place without dependence upon the plastering. Beads and screeds shall be in one piece where height or length of straight run does not exceed 10 feet.
2. Corner Beads: Install continuous corner beads at all external corners of plaster, except where corners are rounded or covered by trim. Space fasteners not more than 12 inches on center on both sides of bead.
3. Casing Beads: Unless otherwise indicated, install continuous casing beads to terminate plaster at head and jambs of doors and windows, around the perimeter of suspended ceilings, at each side of expansion joints and at internal corner junctions of load bearing and non-load bearing elements. Space fasteners not more than 9 inches on center.
4. Screeds: Unless otherwise indicated, install screeds at control joints, slightly below top edge of vinyl and rubber bases, along top of tile and lime-Portland cement plaster wainscots, and along top of flush terrazzo, cement, and epoxy resin bases. Space fasteners not more than 9 inches on center.

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SECTION 092300

PLASTERING

PART 1 GENERAL

1.01 RELATED WORK SPECIFIED ELSEWHERE

A. Furring and Lathing: Section 092236.

1.02 DESCRIPTION OF PLASTER SYSTEMS

A. Type 1: Gypsum plaster consisting of scratch coat, brown coat, and regular strength finish coat.

1.03 SUBMITTALS

A. Product Data: Manufacturer's name and brand, material type, specifications, and application instructions for the following:
   1. Plaster Type(s) specified.
   2. Bonding Compound.
   3. Accessories, except fasteners.

B. Quality Control Submittals:
   1. Sand: Name and location of source, and N.Y.S. Department of Transportation Test Number.

1.04 QUALITY ASSURANCE

A. Regulatory Requirements: Do not use asbestos bearing materials and do not add asbestos to plaster mixes.

B. Allowable Tolerances: Maximum deviation from true plane shall be 1/8" in 10 ft. as measured by a straight-edge placed at any location on surface.

C. Ready-mixed plaster mixes are subject to the approval of the Director.
   1. Ready-mixed gypsum plaster mixes shall conform to the standards and requirements established by the Gypsum Association for materials and packaging.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Deliver manufactured materials in original sealed containers, with manufacturer's label intact and legible.

B. Keep cement, gypsum and lime dry, stored off ground, under cover.

C. Remove wet, lumpy, and hardened materials from the site.

1.06 PROJECT CONDITIONS

A. Environmental Requirements:
1. Do not use frozen materials in plaster mixes.
2. Do not apply plaster to surfaces that are frozen or contain frost.
3. Do not apply plaster when ambient temperature is less than 50 degrees F.
4. If necessary, heat aggregate and water prior to mixing.
5. Interior Plastering: Make arrangements thru the Director's Representative to have the required temperature maintained for a minimum of 24 hours prior to application, during application, and until plaster has cured.
6. Small on-the-job mix adjustments recommended by the plasterer for working characteristics and drying conditions may be made with the approval of the Director's Representative.

B. Protection:
1. Protect adjacent finishes with suitable, non-staining covers.
2. Protect plaster from uneven and excessive evaporation and from temperature differentials of more than 20 degrees F. until it has cured.

PART 2 PRODUCTS

2.01 LIME-PORTLAND CEMENT PLASTER AND STUCCO MATERIALS

A. Portland Cement: ASTM C 150, Type I or IA.
1. Color: Grey.

B. Lime: One of the following:
1. Special finishing hydrated type; ASTM C 206, Type S.
2. Normal finishing hydrated type; ASTM C 206, Type N.

C. Sand Aggregate: ASTM C 897.
1. For finish coat, all sand shall pass No. 8 sieve unless otherwise required for special texture finishes.

D. Finish Coat: Ready-mixed (factory-prepared) "stucco" finish coat, or a job mixture of lime, Portland cement and sand.

E. Coloring Agent: Alkali resistant, sun fast, pure mineral oxides.

2.02 MISCELLANEOUS MATERIALS

A. Water: Potable, clear, and free of substances harmful to plaster.

B. Bonding Compound: Non-oxidizing, non-crystallizing type, unaffected by reapplication of moisture; ASTM C 631.

2.03 MIXING

A. General:
   1. Accurately proportion materials for each batch with measuring devices of known value.
   2. Size batches for complete use within maximum of one hour after mixing.
   3. Do not retemper plaster, except Keene's cement finish coat and lime putty may be retempered.
   4. Do not use frozen, caked, or lumpy materials. Remove such materials from the site.
   5. When sand is required in mix proportions, use moist loose sand.
   6. Withhold 10% of mixing water until mixing is almost complete. Add remainder as needed to produce necessary consistency.

B. Machine Mixing:
   1. Unless otherwise approved by the Director's Representative, mix materials in a power mixer.
   2. Clean mixer of set materials before loading each new batch.
   3. Maintain mixer in continuous operation while adding the components. After all materials are in the machine, continue mixing for at least 2 minutes.

PART 3 EXECUTION

3.01 PREPARATION

A. Remove dust, loose particles and other foreign matter which would affect bond of plaster.

B. Wet absorptive bases with a fine spray or fog of clean water to produce a uniform moist condition.

C. When interior concrete surfaces are smooth, dense, and not suitable for keying of the plaster coat, prepare surfaces and apply bonding compound in conformance with the manufacturer's instructions.

3.02 PLASTER APPLICATION

A. General:
   1. Provide plaster thicknesses indicated on the Drawings. On solid base, thickness will be measured from face of base material. On metal lath base, thickness will be measured from the back plane of metal lath.
   2. Apply plaster by hand or machine, unless otherwise indicated.
   3. Over metal lath, apply plaster by hand only.
   4. Provide 3 coat application consisting of scratch, brown, and finish coats.
   5. Finish coats shall form true, sharp lines at angles and against other items. Where plaster abuts flush trim, make a small V-joint in the finish coat at the trim.

6. Stop off plaster application only at junctions of plaster planes, at openings, or control joints.
7. Except for metal lath, apply base and finish coats to moist surfaces only.
8. Ready-Mixed Materials: Follow the manufacturer's application instructions.
9. In spaces where plastering is indicated on the Drawings, apply plaster on surfaces of reveals, soffits, pilasters, columns, and other related surfaces, except where other finish is shown.
10. Extend scratch and brown coats in back of built-in casework unless otherwise indicated. Carry finish coat a minimum of 1" past edges of built-in casework.
11. Extend all coats to the floor where vinyl and rubber base is indicated.

B. Scratch Coat:
1. Metal Lath Base: Apply with sufficient material to form keys through lath and fill all voids in lath. Cross scratch to form key for brown coat.

2. Allow scratch coat to set hard, but not dry, before application of brown coat. Maintain moisture by fogging with clean water as necessary.

C. Brown Coat:
1. Straighten and float gypsum plaster to an even plane to allow for finish coat of uniform thickness. Let brown coat set hard. Make certain that brown coat is moist when applying finish coat.

D. Finish Coat:
1. Gypsum-Lime Trowel Finish: Work part of the material thoroughly into the basecoat. Lay additional material on well, double back, float and fill to an even plane not less than 1/16" and not more than 1/8" thick. Trowel with water to a smooth hard finish, free of cat faces, streaks, waves, and other blemishes.
2. Keene's Cement-Lime Trowel Finish: Work part of the material thoroughly into the basecoat. Lay additional material on well, double back, float and fill to an even plane not less than 3/32" thick. Trowel with water to a smooth hard finish, free of cat faces, streaks, waves, and other blemishes.

3.04 CLEAN-UP

A. Clean adjacent surfaces that have been soiled or defaced due to performing the work of this Section. Restore marred or damaged surfaces.

END OF SECTION

SECTION 099101

CONSTRUCTION PAINTING

PART 1 GENERAL

1.01 DESCRIPTION OF WORK

A. This Section includes surface preparation and field painting of the following:

1. Exposed interior items and surfaces.

2. Surface preparation, priming and finish coats specified in this Section are in addition to shop priming and surface treatment specified in other Sections.

B. Paint exposed surfaces, except where the paint schedules indicate that a surface or material is not to be painted or is to remain natural. If the paint schedules do not specifically mention an item or a surface, paint the item or surface as directed by the Architect. If the schedules do not indicate color or finish, the Architect will select from standard colors and finishes available.

1. Painting includes field painting of exposed bare and covered pipes and ducts (including color coding), hangers, exposed steel and iron work, and primed metal surfaces of mechanical and electrical equipment.

C. Do not paint prefinished items, concealed surfaces, finished metal surfaces, operating parts, and labels as described in Article 1.06B.

D. When removing or disturbing existing paint on surfaces that have not been tested by the Client for lead content, assume that the existing paint contains lead. Take necessary precautions to protect workers. Provide measures to separate paint removal work areas from occupied areas.

1.02 DEFINITIONS

A. The term "Painting" as used in this Section, means the application of all coatings such as paint, primer, enamel, varnish, shellac, oil, etc.

B. The term "Painting" also includes preparation of surfaces for such applications, and the clean-up as hereinafter specified.

C. The term "Walls" means all surfaces from floor, or top of base, or top of wainscot, to ceiling or hung ceiling.

1. Include pilasters, breaks, jambs, reveals, returns, arches.

2. Include free standing columns, low partitions.

3. Include masonry, plaster or gypsum board interiors of wardrobes or closets, cupboards and other enclosed spaces.

D. The term "Ceilings" means the general overhead horizontal surfaces.

1. Include cornices and soffits.

2. Include beam and girder haunches.

3. Include primed metal cover and border strips.

4. Include metal frame of ceiling lights and ceiling equipment.

5. Include side faces of hung or furred ceiling.

E. Touching-up bare spots specified for previously primed or painted surfaces is in addition to the coats specified for the paint system.

F. Finishes:

1. Flat refers to a lusterless or matte finish with a gloss range below 15 when measured at an 85-degree meter.

2. Satin refers to low-sheen finish with a gloss range between 15 and 35 when measured at a 60-degree meter.

3. Semigloss refers to medium-sheen finish with a gloss range between 30 and 65 when measured at a 60-degree meter.

4. Full gloss refers to high-sheen finish with a gloss range more than 65 when measured at a 60-degree meter.

G. Concealed: The term “concealed” refers to surfaces, piping, ducts or conduit which cannot be accessed without moving a building element such as within a chase, wall or ceiling.

1. Concealed surfaces include walls or ceilings in the following generally inaccessible spaces:

a. Furred areas.

b. Ceiling plenums.

c. Duct shafts.

H. The term “exposed” refers to any item which is not concealed.

1. The term “exposed to public view” means situated so that it can be seen from eye level from a public location. A public location is that which is accessible to persons not responsible for operation or maintenance of the building.

1.03 SUBMITTALS

A. Painting Schedule: Cross-referenced Painting Schedule listing all interior substrates to be painted and specified finish paint type designation; product name and manufacturer, recommended primers and product numbers, and finish paint color designation for each substrate to be painted.
1. Designate interior substrates by building name and number, floor, room name and number, and surface to be painted.

B. Product Data Sheets: Manufacturer’s published product data sheets describing the following for each finish paint product to be applied:
1. Percent solids by weight and volume, solvent, vehicle, weight per gallon, ASTM D 523 gloss/reflectance angle, recommended wet and dry film thickness, volatile organic compound (VOC) content in lbs/gallon, product use limitations and environmental restrictions, substrate surface preparation methods, directions and precautions for mixing and thinning, recommended application methods, square foot area coverage per gallon, storage instructions, and shelf-life expiration date.
2. Manufacturer’s recommended primer for each finish paint product and substrate to be painted.
3. Manufacturer’s complete range of available colors for each finish paint product to be applied.

C. Quality Control Submittals:
1. Test Reports:, Furnish certified test results from an independent testing laboratory showing that products submitted comply with the specifications, if requested by the Director’s Representative.
2. Certificates: Furnish certificates of compliance required under QUALITY ASSURANCE Article.

1.04 QUALITY ASSURANCE

A. Volatile Organic Compounds (VOCs) Regulatory Requirements: Chapter III of Title 6 of the official compilation of Codes, Rules and Regulations of the State of New York (Title 6 NYCRR), Part 205 Architectural Surface Coatings.
1. Certificate of Compliance: List of each paint product to be delivered and installed. List shall include written certification stating that each

paint product listed complies with the VOC regulatory requirements in effect at the time of job site delivery and installation.

B. Container Labels: Label each product container with paint manufacturer's name, product name and number, color name and number, thinning and application instructions, date of manufacture and shelf-life expiration, required surface preparation, recommended coverage per gallon, wet and dry film thickness, drying time, and clean up procedures.

C. Compatibility of Paint Materials: Primers and intermediate paints shall be products manufactured or recommended by the finish paint manufacturer.

D. Performance Criteria:
1. The following criteria are REQUIRED for products included in this section:
   a. Paints and coatings manufactured within 500 miles (by air) of the project site shall be documented in accordance with Submittal Requirements of Item 1.03.F.
   b. Architectural paints and coatings applied to interior walls and ceilings must not exceed the volatile organic compound (VOC) content limits established in Green Seal Standard GS-11, Paints.
   c. Anti-corrosive and anti-rust paints applied to interior ferrous metal substrates must not exceed the VOC content limit established in Green Seal Standard GC-03, AntiCorrosive Paints.
   d. Floor coatings, stains, primers, and shellacs applied to interior elements must not exceed the VOC content limits established in South Coast Air Quality Management District (SCAQMD) Rule 1113, Architectural Coatings.
2. Volatile Organic Compounds: The VOC concentrations (in grams per liter) of the product shall not exceed those listed below as determined by U. S. Environmental Protection Agency (EPA) Reference Test Method 24 and the standards referenced in 1.04.E.1.
   a. Interior Paints and Coatings:
      1. Non-flat: 150
      2. Flat: 50
   b. Anti-Corrosive Paints (if used in interior applications):
      1. Gloss: 250
      2. Semi-gloss: 250
      3. Flat: 250
   c. Exclude water and tinting color added at the point of sale in the calculation of VOC concentrations.
3. Chemical Component Limitations: Aromatic Compounds: the product must contain no more than 1.0% by weight of the sum total of aromatic compounds. Testing for the concentration of these compounds will be performed if they are determined to be present in the product during a materials audit.

4. Chemical Component Limitations, Other Chemicals: The manufacturer shall demonstrate that the following chemical compounds are not used as ingredients in the manufacture of the product:
   a. Halomethanes: Methylene chloride.
   b. Chlorinated ethanes: 1,1,1-trichloroethane.
   c. Aromatic solvents: benzene, toluene (methylbenzene), ethylbenzene.
   d. Chlorinated ethylenes: Vinyl chloride.
   e. Polynuclear aromatics: Naphthalene.
   f. Chlorobenzenes: 1,2-dichlorobenzene.
   g. Phthalate esters: Di (2-ethylhexyl) phthalate, butyl benzyl phthalate, di-n-butyl phthalate, di-n-octyl phthalate, diethyl phthalate, dimethyl phthalate.
   h. Miscellaneous semi-volatile organics: Isophorone.
   i. Metals and their compounds: antimony, cadmium, hexavalent chromium, lead, mercury
   j. Preservatives (antifouling agents): formaldehyde
   k. Ketones: methyl ethyl ketone, methyl isobutyl ketone
   l. Miscellaneous volatile organics: acrolein, acrylonitrile

1.05 DELIVERY, STORAGE, AND HANDLING

A. Delivery: Deliver materials to the Site in original, unopened containers and cartons bearing manufacturer's printed labels. Do not deliver products which have exceeded their shelf life, are in open or damaged containers or cartons, or are not properly labeled as specified.

B. Storage and Handling: Store products in a dry, well ventilated area in accordance with manufacturer's published product data sheets. Storage location shall have an ambient air temperature between 45 degrees F and 90 degrees F.

1.06 PROJECT CONDITIONS

A. Environmental Requirements:
   1. Ambient Air Temperature, Relative Humidity, Ventilation, and Surface Temperature: Comply with paint manufacturer's published product data sheet or other printed product instructions.
   2. If paint manufacturer does not provide environmental requirements, use the following:
      a. Ambient Air Temperature: Between 45 degrees F and 75 degrees F.
      b. Relative Humidity: Below 75 percent.
      c. Ventilation: Maintain the painting environment free from fumes and odors throughout the Work of this Section.
      d. Surface Temperature: At least 5 degrees F above the surface dewpoint temperature.
   3. Maintain environmental requirements throughout the drying period.

B. The following items are not to be painted unless otherwise specified, noted or directed:
   1. Exposed stainless steel, chrome, copper, bronze, brass, and aluminum.
   2 Steel to be encased in cast-in-place concrete.
   3. Top flanges of structural beams and girders in composite concrete-steel construction.
   4. Factory prefinished items.
   5. Exposed structural wood floor joists, subflooring, rafters, roof sheathing and other framing lumber.
   6. Galvanized items not exposed in finished spaces.
   7. Light Switch and Electrical Outlet Covers
   8. Labels: Do not paint over Underwriters Laboratories (UL), Factory Mutual (FM), or other code-required labels or equipment name, identification, performance rating, or nomenclature plates.

1.07 EXTRA MATERIALS

A. Provide extra finish paint materials, from the same production run as paints to be applied, in the following quantities for each color installed:
   1. Paint Type EAL-1 and IAL-1: Four gallons, each type.
   2. Paint Types EAL-2 and IAL-2: Two gallons, each type.
   3. Other Paint Types: One gallon, each type.

PART 2 PRODUCTS

2.01 PAINT MANUFACTURERS

A. Where noted, the following finish paint manufacturers produce the paint types specified.
   1. Ameron Protective Coatings, 201 Berry St., Brea, CA 92621, (800) 926-3766.
   2. Benjamin Moore and Co., 51 Chestnut Ridge Rd., Montvale, NJ 07645, (201) 573-9600.
   3. Samuel Cabot Inc., 100 Hale St., Newburyport, MA 01950, (508) 465-1900.
   4. Chromatic Paint Corp., P. O. Box 690, Stony Point, NY 10980, (800) 431-7001.
   5. Consumers Paint Factory Inc., 5300 West 5th Ave., Gary, IN 6406, (219) 949-1684.
   6. Coronado Paint Co., P. O. Box 308, Edgewater, FL 32132-0308, (800) 874-4193.
   7. Flame Control Coatings, Inc., P. O. Box 786, Niagara Falls, NY 14302-0786, (716) 282-1399.
   8. ICI Dulux Paints, 4000 Dupont Cr., Louisville, KY 40207, (800) 984-5444.
   9. Inorganic Coatings, Inc., 500 Lapp Rd., Malvern, PA 19355, (800) 345-0531.

10. PPG Architectural Finishes, One PPG Plaza, Pittsburgh, PA 15272, (800) 441-9695.
11. Rust-Oleum Corporation, 11 Hawthorn Pky., Vernon Hills, IL 60061, (800) 553-8444.
12. Sherwin-Williams Co., Cleveland, OH 44101, (800) 321-8194.
13. T.J. Ronan Paint Corp., 749 East 135th St., Bronx, NY 10454, (800) 247-6626.
14. Valspar Corp., 1401 Severn St., Baltimore, MD 21230, (800) 638-7756.
15. Wm. Zinsser & Co., 39 Belmont Drive, Somerset, NJ 08875-1285, (908) 469-8100.

2.02 PAINT PRODUCTS

A. Bedding Compound: Water based pre-mixed gypsum wallboard joint compound.

B. Cleaning Solvents: Low toxicity with flash point in excess of 100 degrees F.

C. Color Pigments: Pure, nonfading, finely ground pigments with at least 99 percent passing a 325 mesh sieve.
   1. Use lime-proof color pigments on masonry, concrete and plaster.

D. Galvanizing Compound, Cold: Single component compound with 93 percent pure zinc in the dried film and meeting the requirements of DOD-P-21035A (NAVY).

E. Glazing Compound: ASTM C 669.

F. Masking Tape: Removable paper or fiber tape, self-adhesive and nonstaining.

G. Metal Filler: Polyester resin base autobody filler.

H. Mineral Spirits: Low odor type recommended by finish paint manufacturer.

I. Nonskid Deck Enamel Additive: Sid Tex by Gamma Labs, Inc., 840 Arroyo Ave., San Fernando, CA, 91340-1832, (818) 369-7500.

J. Paint Stripper: As recommended by finish paint manufacturer.

K Spackling Compound: Water based pre-mixed plaster and gypsum wallboard finishing compound.

L. Stain Blocker, Primer-Sealer: As recommended by finish paint manufacturer.

M. Turpentine: ASTM D 13.

2.03 FINISH PAINT TYPES

A. Physical Properties:

1. Specified percent solids by weight and volume, pigment by weight, wet and dry film thickness per coat, and weight per gallon are minimum physical properties of acceptable materials.
   a. Opaque Pigmented Paints: Physical properties specified are for white titanium dioxide base before color pigments are added.
   b. Specified minimum wet and dry film thickness per coat are for determining acceptable finish paint products. Minimum wet and dry film thickness per coat to be applied shall comply with approved finish paint manufacturer's product data sheets.
2. Gloss or Reflectance: The following ASTM D 523 specified light levels and angles of reflectance:
   a. Flat: Below 15 at 85 degrees.
   b. Eggshell: Between 5 and 20 at 60 degrees.
   c. Satin: Between 15 and 35 at 60 degrees.
   d. Semigloss: Between 30 and 65 at 60 degrees.
   e. Gloss: Over 65 at 60 degrees.

B. Interior Paint Systems

a. Interior Concrete Flooring

1) Gloss Finish:

1st Coat - Polyamide Epoxy Enamel	--	2.5 Mils DFT
2nd Coat - Polyamide Epoxy Enamel	--	2.5 Mils DFT

b. Concrete Masonry Units

1) Semi-Gloss Finish:

1st Coat - Vinyl Acrylic Latex Block Filler, or 100% acrylic resin block filler/surfacer as recommended by manufacturer of succeeding coats.

1st Coat - Vinyl Acrylic Latex Primer-Sealer (Flat)	--	1.0 Mils DFT
2nd & 3rd Coats - Semi-Gloss Vinyl Acrylic Latex Enamel--	1.3 Mils DFT	each coat

2) Gloss Finish:

1st Coat - Vinyl Acrylic Latex Block Filler, or 100% acrylic resin block filler/surfacer as recommended by manufacturer of succeeding coats.

1st Coat - Vinyl Acrylic Latex
Primer-Sealer (Flat) -- 1.0 Mils DFT

2nd & 3rd Coats -
Gloss Acrylic Latex Enamel -- 1.2 Mils DFT
each coat

Apply filler coat on new and previously unpainted concrete masonry units at a rate to ensure complete coverage with all pores filled. If required, provide in two (2) or more coats.

Spot prime previously painted concrete masonry unit surfaces as needed.

c. Gypsum Drywall and Plaster:

1) Flat Finish (ceilings only):

1st Coat - Vinyl Acrylic Latex
Primer Sealer (Flat) -- 1.0 Mils DFT

2nd & 3rd Coats -
Flat Vinyl Acrylic Latex -- 1.3 Mils DFT
each coat

2) Semi-Gloss Finish:

1st Coat - Vinyl Acrylic Latex
Primer Sealer -- 1.0 Mils DFT

2nd & 3rd Coats -
Semi-Gloss Vinyl Acrylic Latex
Enamel -- 1.3 Mils DFT
each coat

3) Gloss Finish:

1st Coat - Vinyl Acrylic Latex
Primer Sealer -- 1.0 Mils DFT

2nd & 3rd Coats -
Gloss Acrylic Latex Enamel -- 1.2 Mils DFT
each coat

4) For use over existing oil based paints

100% Acrylic Primer Tinted as required to approximate Finish color	- -	1.0 mils DFT
2nd & 3rd Coats - Semi-Gloss Vinyl Acrylic Latex Enamel	--	1.3 Mils DFT each coat

OR

2nd & 3rd Coats - Gloss Acrylic Latex Enamel	--	1.2 Mils DFT each coat

d. Ferrous Metal:

1) Flat Finish: Metal ceilings, jamb and head sections, coat and hat rack, metal shelves.

1st Coat - Alkyd Modified Acrylic Rust Preventive Latex Primer	--	1.6 Mils DFT
2nd & 3rd Coats Flat Vinyl Acrylic Latex	--	1.3 Mils DFT each coat

2) Semi-Gloss Finish: Convector enclosures, grilles, access doors, frames, Steel Doors and Frames, Trim, Partitions, Screens, Demountable Office Partitions, Office Railings, Wire mesh work.

1st Coat - Alkyd Modified Acrylic Rust Preventive Latex Primer	--	1.6 Mils DFT
2nd & 3rd Coats - Semi-Gloss Vinyl Acrylic Latex Enamel	--	1.3 Mils DFT each coat

3) Gloss Finish:

1st Coat - Alkyd Modified Acrylic Rust Preventive Latex Primer	--	1.6 Mils DFT
2nd & 3rd Coats - Gloss Acrylic Latex Enamel	--	1.2 Mils DFT each coat

Spot prime previously painted surfaces, including shop-primed items, as needed. Items shop primed with modified alkyd equal to Tnemec 10-99 primer shall be touched up with same primer. See related specification sections.

e. Zinc-Coated Metal

1) Flat Finish:

1st Coat (Repaint) - Alkyd Modified Acrylic Rust Preventive Latex Primer -- 1.6 Mils DFT

2nd & 3rd Coats
Flat Vinyl Acrylic Latex -- 1.3 Mils DFT each coat

2) Semi-Gloss Finish: Railings, wire-mesh work.

1st Coat (New) - Alkyd Modified Vinyl Acrylic Latex Primer -- 1.2 Mils DFT

1st Coat (Repaint) - Alkyd Modified Acrylic Rust Preventive Latex Primer -- 1.6 Mils DFT

2nd & 3rd Coats
Semi-Gloss Vinyl Acrylic Latex
Enamel -- 1.3 Mils DFT each coat

3) Gloss Finish:

1st Coat (New) - Alkyd Modified Vinyl Acrylic Latex Primer -- 1.2 Mils DFT
1st Coat (Repaint) - Alkyd Modified Acrylic Rust Preventive Latex Primer -- 1.6 Mils DFT
2nd & 3rd Coats -
Gloss Acrylic Latex Enamel -- 1.2 Mils DFT each coat

Spot prime as needed.

C. Colors: Provide paint colors either shown on contract drawings or to be selected by the Owner's representative from finish paint manufacturers available color selections.
1. Approved finish paint manufacturers to match designated colors

of other manufacturers where colors have been shown on the contract documents.

PART 3 EXECUTION

3.01 EXAMINATION

A. Examine surfaces to be prepared, primed, or painted for compliance with contract documents, required environmental conditions, manufacturer's product data sheets, product label instructions and other written requirements.
   1. Do not begin any phase of the work without first checking and verifying that surfaces and environmental conditions are acceptable for such work and that any earlier phase deficiencies and discrepancies have been properly corrected.
      a. The commencement of new work shall be interpreted to mean acceptance of surfaces to be affected.

3.02 PREPARATION

A. Protection: Cover and protect both surfaces to be painted and adjacent surfaces not to be painted from existing paint removals, airborne sanding particles, cleaning fluids and paint spills using suitable drop cloths, barriers and other protective devices.
   1. Remove and replace removable hardware, lighting fixtures, telephone equipment, other devices and cover plates over concealed openings in substrates to be painted.
      a. Cover and neatly mask permanently installed hardware, lighting fixtures, cover plates and other devices which cannot be removed and are not scheduled for painting.
   2. Schedule and coordinate surface preparations so as not to interfere with work of other trades or allow airborne sanding dust particle to fall on freshly painted surfaces.
   3. Provide adequate natural or mechanical ventilation to allow surfaces to be prepared and painted in accordance with product manufacturer's instructions and applicable regulations.
   4. Provide and maintain "Wet Paint" signs, temporary barriers and other protective devices necessary to protect prepared and freshly painted surfaces from damages until Work has been accepted.

B. DO NOT DISTURB, CLEANOR REMOVE EXISTING MATERIAL FROM ANY SURFACE.

C. Painting Material Preparations:
   1. Prepare painting materials in accordance with manufacturer's approved product data sheets and printed label instructions.
      a. Stir materials before and during application for a consistent mixture of density. Remove container surface paint films before stirring and mixing.

b. Slightly tint first opaque finish coat where primer and finish coats are the same color.
c. Do not thin paints unless allowed and directed to do so in writing within limits stated on approved product data sheets.

3.03 APPLICATION

A. Environmental Conditions:
1. Water-based Paints: Apply when surface temperatures will be 50 degrees Fahrenheit to 90 degrees Fahrenheit throughout the drying period.
2. Other Paints: Apply when surface temperatures will be 45 degrees Fahrenheit to 95 degrees Fahrenheit throughout the drying period.

B. Install approved paints where specified, or shown on the drawings, and to match approved field examples.
1. Paint Applicators: Brushes, rollers or spray equipment recommended by the paint manufacturer and appropriate for the location and surface area to be painted.
a. Approved minimum wet and dry film thicknesses shall be the same for different application methods and substrates.

C. Paint Type Coats To Be Applied: Unless specified otherwise by finish paint manufacturer's product data sheet, the number of coats to be applied for each paint type are as follows:
1. Paint Types EAL and IAL:
a. Existing Painted Surfaces:
1) Apply 2 coats of finish paint when existing paint has a lower gloss.
2) Apply one coat of primer and 2 finish coats when existing paint has a higher gloss.
b. Pitted Concrete & Concrete Masonry Surfaces: Use block filler as primer /sealer where allowed by finish paint manufacturer.
c. Existing Structural Steel:
1) Primed Steel: Apply 2 coats of finish paint.
2) Unprimed Steel: Apply 1 coat of Paint Type ESP or ISP, depending upon exterior or interior location.
a) If topcoated, apply additional coat of finish paint manufacturer's galvanized primer and 2 coats of finish paint.
2. Paint Type MCU: Apply in accordance with paint manufacturer's product data sheet and printed label instructions.
a. Concrete Floors: 2 coats.

D. Surfaces: Unless otherwise specified or shown on the drawings, paint surfaces as follows:

1. Interior Surfaces:
   a. Ceilings: Paint Type IAL-1.
   b. Walls: Paint Type IAL-2.
   c. Doors, Windows, Frames and Trim: Paint Type IAL-3.

2. Unless otherwise noted, paint interior unremovable and exposed wall and ceiling air supply and return grilles; plumbing pipes; electrical panel and fuse boxes, raceways and conduits; heating convector cabinets, radiators, radiator cabinets, unit heaters, and similar existing and installed devices and equipment by other trades.
   a. Paint to match adjacent wall or ceiling surfaces.
   b. Paint exposed surfaces when any part of the surface is on or within 8 inches of ceiling or wall surface to be painted.
   c. Paint visible interior surfaces behind grilles, guards and screens.

3. Doors and Frames: Unless otherwise noted, paint doors and frames the same color in the next highest gloss as adjacent wall surfaces.
   a. Where walls are not the same color on both sides of a door frame, change color at the inside corner of the frame stop.
   b. Prime and finish paint door faces and edges before installation.
      1) Paint door edges the same paint type color as the exterior side of the door.
   c. Do not paint door components which are clearly not intended to be painted such as non-ferrous hardware, frame mutes, and weather stripping.
   d. Do not allow doors and frames to touch until paint is thoroughly dry on both surfaces.

4. Window Frames and Sash: Unless otherwise noted, paint window frames and sash the same color as adjacent wall surfaces.
   a. Where interior walls are not the same color on both sides, change paint color along the inside concealed corner of door frame stops.
   b. Do not paint window components which are clearly not intended to be painted such as prefinished frames, sliding metal or plastic contacts, weatherstripping, and non-ferrous hardware.
   c. Do not allow operable doors, windows and frames to touch until paint is thoroughly dry on both surfaces.

5. Ferrous Metal Door and Window Hardware: Unless otherwise noted, prime and paint to match adjacent doors, windows and frames.

6. Case Work: Paint factory unfinished exposed and semiexposed surfaces when doors and drawers are either open or closed including:
   a. Both faces and edges of cabinet doors, shelving, dividers including interior side, rear, and bottom panel surfaces.

b. Exposed bottom or underside of case work more than 4 feet above the floor.
c. Do not paint plastic laminate surfaces, special countertop materials, glazing, factory finished surfaces, finish hardware and similar items clearly not intended to be painted.

3.04 FIELD QUALITY CONTROL

A. Paint Samples: Assist the Director's Representative in obtaining random one quart paint samples for testing at any time during the Work.
1. Notify the Director's Representative upon delivery of paints to the Site.
2. Furnish new one quart metal paint containers with tight fitting lids and suitable labels for marking.
a. Furnish labor to thoroughly mix paint before sampling and provide assistance with sampling when required.

3.05 ADJUSTING AND CLEANING

A. Reinstall removed items after painting has been completed.
1. Restore damaged items to a condition equal to or better than when removed. Replace damaged items that cannot be restored.

B. Touch up and restore damaged finish paints. Touch up and restoration paint coats are in addition to the number of specified finish paint coats.

C. Remove spilled, splashed, or spattered paint without marring, staining or damaging the surface. Restore damaged surfaces to the satisfaction of the Director's representative.

D. Remove temporary barriers, masking tape, and other protective coverings upon completion of painting, cleaning and restoration work.

END OF SECTION

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SECTION 140001
ELEVATOR REHABILITATION

PART 1 – GENERAL

1.1 Description

A. General: Perform all work in accordance with the General Conditions, and all other requirements of the Contract Documents.

B. Passenger Elevators #1 and #2 serve floors B, 1 through 6. PE1 has a capacity of 2,500 lbs. and a rated speed of 400 f.p.m. PE2 has a capacity of 1,800 lbs. and a rated speed of 150 f.p.m.

C. Scope of Work: All labor, equipment, material and services required for the furnishing and installation of all elevator work as specified herein. Work shall include, but not be limited to, new controllers, hoist machines, hoist ropes, governors and governor ropes, cab enclosures, safeties (PE1 only), car and counterweight guides, buffers, car door operators, tracks, and hangers, hoistway door tracks, hangers and interlocks, door closers, hall button fixtures, directional lanterns, car operating panels, car top inspection stations and communications. Clean all car frames, car and counterweight rails, pit steel, hoistways and all other equipment being retained. Paint machine room floors, car frames and pit steel.

D. Definitions: The terms used herein are defined as follows:

1. "Consultant" shall mean Elevate Inc. 244 5th Avenue, New York, NY 10001, (212) 213-3216.

2. "Contractor" shall mean the person, firm, entity or corporation named in the Contract Documents who will execute the work. It shall include all his employees, subcontractors and suppliers.

3. "Work" shall mean the services, materials, labor and all other equipment required for complete and proper installation by the Contractor.

4. "Approved", "Accepted", "Reviewed" or similar terms as applied to materials, products and workmanship shall mean that **acceptance or review by the Consultant is required**.

5. "Directed", "requested", "selected" and similar terms shall mean that the Consultant shall in writing direct, request and select.

6. "Satisfactory" or similar terms shall mean to the satisfaction of the Consultant.

7. "Provide" shall mean to supply, install and connect complete and ready for safe and regular operation particular work referred to unless specifically indicated otherwise by the Consultant.

8. "Install" shall mean to erect, mount and connect complete with related accessories.

9. "Supply" or "Furnish" shall mean to purchase, procure, acquire and deliver new, complete with related accessories.

10. "Wiring" shall mean conduit, fittings, wire, junction and outlet boxes, switches, cutouts, receptacles and related items.

11. "Concealed" shall mean in masonry or other construction, installed in furred spaces, within double partitions or hung ceilings, in trenches, in crawl spaces or in enclosures.

12. "Exposed" shall mean not installed underground or "concealed" as defined above.

13. "Current issues" and "current editions" as applied to Reference Standards and governing codes shall mean the latest published issue or edition available during the bidding period.

14. "Best", "first class", “first grade” or similar terms as applied to materials, products and workmanship shall mean that, in the Consultant's opinion, there are no superior qualities of materials or products on the market, and there is no better class of workmanship.

15. "Substantial Completion" or "Beneficial Use" shall mean that the progress of the Work, or on any portion of the Work, is sufficiently complete in accordance with the Contract Documents, and as reviewed by the Consultant, so that the Owner can utilize the Work for its intended purpose.

16. "Notice-to-Proceed" shall mean a written document from the Consultant or Owner allowing the Contractor to commence only that portion of the Work stated in the written document.

1.2 Quality Assurance

A. Installer Qualifications: Contractor shall have not less than five years successful experience with providing and installing similar conveying systems work.

B. The Contractor shall submit a list of five or more prior installations where all the elevator equipment he proposes to furnish for this project has performed

satisfactorily together under conditions of normal use. The list shall include projects that have been in operation for a period of not less than two years preceding the date of these specifications and located within a 25 mile radius of the subject building. Include the names and addresses of the project, and the names and phone numbers of the Building Owner or Manager.

C. Regulatory Requirements: New work shall comply with all current (at time of bid) governing local codes. Conform to all laws, ordinances and regulations affecting the erection, sequence of erection and completion of the whole or any part of the work; and conform to the requirements of the Consultant and public authorities having lawful or customary jurisdiction. These requirements shall take preference over the Contract Documents except where the Contract Documents require better materials or more secure workmanship, also acceptable to the authorities. The Contractor shall be held responsible for any violations of same caused by himself or his employees. Any additional expense caused thereby shall be borne by the Contractor.

D. Standards: Except as modified by governing codes and by this Division, new work shall comply with provisions of the following and all local codes in effect at the time of bidding. Any work necessary to meet code requirements shall be performed whether or not specified in this document. In the event of conflict between these standards, the Consultant's determination shall be final:

1. New York State Building Code

2. A17.1 2013 The American Society of Mechanical Engineers (ASME): Safety Code for Elevators and Escalators.

3. A17.3 The American Society of Mechanical Engineers (ASME): Safety Code for Existing Elevators and Escalators.

4. A117.1 Accessible and Useable Buildings and Facilities

5. NEC 70 National Electrical Code.

6. NFPA Fire Prevention Code.

7. OSHA Occupational Safety and Health Admin.

1.3 Submittals

A. Within three (3) calendar weeks after the award of the contract, the Contractor shall furnish to the Consultant:

1. The names and addresses of the manufacturers, together with catalog information or other identifying description for all items specified.

2. Provide company organizational chart with phone numbers.

3. Schedule of work showing commencement and completion dates and phasing, for each elevator. PE2 shall be modernized first. PE1 shall be removed from service for modernization only after PE2 has been tested and accepted by the AHJ.

4. Three (3) sets of drawings for review by the Consultant. Drawings shall include the following:

    a. Elevator car and hall fixture drawings.
    b. Elevator layout drawings
    c. Equipment manufacturers cut sheets including
        1) Hoist Machines/Motors
        2) Car and hoistway door equipment
        3) Controllers
    d. Cab enclosure drawings

B. Review of drawings, schedules and other submitted matter will be general and shall not be construed as:

1. Permitting any departure from the contract requirements.

2. Relieving the Contractor of the responsibility for any errors, including details, dimensions, materials, etc.

3. Approving departures from details furnished by the Consultant.

C. If drawings, schedules or other submitted matter show variations from the contract requirements because of standard shop practice or for other reasons, the Contractor shall describe such variations in his letter of transmittal. If acceptable, the Consultant may accept in writing, any or all such variations. If the Contractor fails to describe such variations, and does not have the Consultants acceptance in writing, he shall not be relieved of the responsibility for executing the work in accordance with the contract, even though such drawings or schedules may have been accepted.

D. Samples: Where submissions are called for in the specifications, or when otherwise required by the Consultant, the Contractor shall submit duplicate samples of materials, appliances, finish or other items included in the work. Such samples shall be in all respects equal to that to be provided for the Work and shall be approved by the Consultant before the work is executed. Samples shall be submitted in ample time before work is installed, to permit sufficient time for Consultant's consideration. Samples shall be accompanied by a label, or shall be properly marked, indicating the type and brand of material, its place of origin, the name of the producer and address, serial numbers, the Contractor's name and the

name of the project for which the material is intended.

1.4 Permits and Tests

A. Permits: The Contractor shall secure and pay for all permits, licenses and certificates required by the governing authorities for the work.

1. Wherever a sales, consumer, use or similar tax, the Contractor shall pay such tax.

2. Contractor shall give all notices and comply with applicable local laws, ordinances, rules and regulations of governmental and other bodies having jurisdiction.

3. Contractor shall notify Consultant of any conflicts between such laws, ordinances, codes and regulations, and requirements of drawings and specifications.

B. Testing: The Contractor shall secure and pay for all inspections and tests required for the work. Provide proper facilities, at all times, for inspections and tests of work by Consultant and authorities having jurisdiction. Furnish labor, equipment, materials and services necessary to conduct all tests and inspections.

1. Upon completion of installation of all equipment and when same is in full operating condition, coordinate with the Owner to completely test all equipment, both for the governing authorities and for compliance with the requirements of the Contract Documents. All necessary equipment for testing and the cost of same shall be included as part of this contract. All tests shall be performed in accordance with the requirements of the governing code. A Pre-test shall be performed in the presence of the Consultant prior to scheduling the acceptance test with the AHJ.

2. If tests show that the equipment is in any way defective, of poor workmanship, at variance with the requirements of the Contract Documents, or dangerous or objectionable in operation, the Contractor shall make all necessary changes and remedy all defects at his expense, to the satisfaction of the Consultant, and also pay, as hereinbefore noted, for all subsequent tests until all equipment is acceptable.

3. Upon completion of satisfactory tests, secure and furnish to the Consultant certificates from all departments having jurisdiction, that the conveying systems and related equipment have been inspected and approved.

4. Review and acceptance of equipment by the Consultant is contingent upon prior approval of the above referenced authorities and compliance by the Contractor with all requirements of such authorities and the Contract

Documents.

5. **Notices of all tests shall be given to the Consultant in writing at least five days in advance of the tests.**

1.5 Royalties and Patents

Contractor shall pay all royalties and license fees. He shall defend all suits or claims for infringement of any patent rights and shall save Consultant/Owner harmless from loss accountable thereof.

1.6 Warranty

Provide special project warranty effective starting with the acceptance of the conveying system and continuing for one year after acceptance of the last elevator, which shall be signed by Contractor, Installer and Manufacturer, agreeing to replace/repair/restore defective materials and workmanship of the elevator work during warranty period. "Defective" is hereby defined to include, but not by way of limitation, operation or control system failures, performances below required minimums, excessive wear, unusual deterioration or aging of materials or finishes, unsafe conditions, the need for excessive maintenance, abnormal noise or vibration, and similar unusual, unexpected and unsatisfactory conditions.

1.7 Delivery, Storage, Disposal & Use of the Premises

A. Contractor's Use: The Contractor shall confine his equipment, the storage of materials, and the operations of his workmen to limits indicated by governing laws, ordinances and codes, and directions of the Owner's representative, and shall not unreasonably encumber the premises with his materials. Owner and Consultant will identify storage areas.

B. Materials shall be delivered to the site ready for use, in the approved manufacturer's original and unopened containers and packaging, bearing labels as to type of material, brand name and manufacturer's name. Delivered materials shall be identical to approved samples.

C. Materials shall be stored under cover in a dry and clean location, off the ground. Delivered materials, which are damaged or otherwise not suitable for installation, shall be removed from the job site and replaced with acceptable materials.

D. It will be the Contractor's responsibility to keep all of his materials stored within the boundaries of the area assigned to him and to store his material in a neat and safe manner.

E. Contractor shall not load or permit any part of the structure to be loaded with a weight that will endanger its safety.

F. Any work that is not included in this contract but is disturbed by this work, shall be restored to a "like new" condition by the Contractor.

G. All equipment hereinafter specified for demolition and removal shall be carefully removed in a professional manner by the Contractor. The disposal of the removed equipment shall be the Contractor's responsibility except as otherwise directed by the Consultant/Owner.

1.8 Safety & Accident Prevention

The Contractor shall comply with all the health and safety regulations of governing codes, laws and ordinances. Contractor shall take all reasonable steps and precautions to protect health, and minimize danger from all hazards to life and property. The Contractor is responsible for conducting all work activity associated with this project in strict conformance with all applicable OSHA standards and/or local and state regulations. The Contractor is solely liable for enforcement of those safe practices in there operation.

1.9 Supervision and Coordination

A. Supervision: Contractor shall personally supervise the work and shall have at all times, competent people at the work site. If the Contractor's representative ceases to be acceptable to Consultant, he shall be removed from the work within 24 hours after receipt of Consultant's request, and be replaced immediately by one who is acceptable to the Consultant. When requested by Consultant, Contractor shall furnish experience record of Contractor's representatives, both modernization and maintenance personnel. Provide company organizational chart with phone numbers.

B. Coordination: Contractor shall be held responsible for the proper coordination of all phases of the work under this contract. He shall be held responsible for the resolution of all conflicts between the work of his subcontractors or the work of his subcontractors and his own work.

1. Before proceeding with any Work, carefully check and field verify all pertinent dimensions and sizes, and assume full responsibility for fitting the equipment and materials to the structure. Where the apparatus and equipment have been indicated, the dimensions have been taken from typical equipment of the type specified in this section. Carefully check the existing spaces to verify that the equipment to be provided will fit into the spaces available. Should the equipment not fit the existing structure, all additional relocations and sub-framing members required to accommodate the elevators shall be provided as part of the Work of this section. Submit all structural shop drawings and calculations for the Owner's review.

2. Contractor shall familiarize himself with the specifications, drawings, project site, installation procedures and construction schedules for those

phases of work performed by his subcontractors. If the Contractor's work or the work of any of his subcontractors depends upon the execution of the work of another subcontractor or upon his own work, he shall so coordinate all phases of work so as to avoid conflicts in installation procedures and delay of construction schedules.

3. As work progresses, Contractor shall consult with his subcontractors, examine the work installed by them, and resolve all conflicts without expense to Owner.

1.10 Observation

A. The Consultant shall at all times have access to the work wherever it is in preparation or in progress, and Contractor shall provide proper facilities for such access and observation.

1. Consultant shall have the right to reject or require correction of materials and workmanship which are defective. Rejected materials shall be removed from the premises and satisfactorily replaced with proper materials without additional cost. If Contractor does not correct defective work or replace rejected materials within a reasonable time, Consultant may do so and charge the full expense to the Contractor.

2. Should it be necessary by Consultant at any time before final acceptance of the work, to make an examination of work already completed by removing or tearing out work, Contractor shall, upon request, promptly furnish all necessary facilities, labor and materials required. If such work is found to be defective, Contractor shall defray all expenses of such examination and of satisfactory reconstruction. If, however, such work is found to meet the requirements of drawings and specifications, Contractor shall be reimbursed for the removal and replacement of the work.

3. Failure of the Consultant during the progress of the work to discover or reject materials or work not in accordance with the drawings and specifications, shall not be deemed an acceptance thereof, nor a waiver of defects therein, and no payment or partial or entire occupancy of the premises shall be construed as an acceptance of the work or materials.

1.11 Cleaning, Adjustment and Final Acceptance

A. Cleaning: The Contractor shall at all times keep the premises clean and free from excess accumulation of waste materials or rubbish caused by Contractor's operations.

1. At completion of each Work day, remove all rubbish from and about the premises, and all tools and temporary work, and leave the work areas

"broom clean" or its equivalent, unless otherwise specified.

2. Should Contractor fail to attend to such cleaning with reasonable promptness, Consultant may cause such cleaning to be done by others and charge the cost of cleaning to the Contractor.

B. Adjustments and Removals: After completion of Work, and before the issuance of Certificate of Final Acceptance, Work shall be thoroughly cleaned, and elevator properly adjusted, so that they are in proper operating condition. Contractor shall remove from site, all debris, abandoned elevator equipment and associated materials which are no longer required as a result of Work performed under this Contract to be left as part of finished Work, and shall remove all stains and defacements caused by the Work. The entire Work shall be left in a clean condition, satisfactory to the Consultant. The Contractor shall be solely responsible for legally disposing of abandoned and removed materials and debris.

1.12 Security Requirements

The Contractor shall familiarize himself with the Owner's security requirements, and shall abide by and conform to such established regulations at all times.

1.13 Products

A. Quality: Unless otherwise specified or shown, materials and products shall be the best for each type or class. They shall be new, unless otherwise stated, sound, uniform in quality, size, shape, texture and color, as each case may require, and free from cracks, warping and other defects which might impair their strength, appearance, performance, durability or serviceability.

1. Materials and products shall be those of manufacturers having established reputations for products which are of high quality, are practical and durable, and require minimum of maintenance. Manufacturer shall have ample facilities for producing and delivering to meet construction schedules.

2. The Contractor shall unload, haul, pile and store material delivered by or to him, and shall assume all responsibility for care and protection of same after unloading.

B. Substitutions: Should Contractor desire to use materials, products, equipment or articles other than those specified, he shall make written application to Consultant for authority to make such substitution, stating the amount to be added or added or deducted, or stating that there is no price change. The approval of substitutions by Consultant must be obtained in writing before Notice to Proceed; otherwise Contractor shall furnish the materials, products, equipment and articles as specified.

1. Submit three copies of descriptive literature giving all pertinent data necessary to make comparison and evaluation of substitutions. Contractor shall state in his application the reason for recommending such substitution.

2. The Consultant will decide all questions of equality as to materials, products, equipment or articles that may be specified by the words "or approved equal".

1.14 Painting

A. Before shipment, all parts made of structural steel sections and plates shall be thoroughly cleaned to remove all loose mill scale, rust and foreign matter. These parts shall be given one coat of rust inhibiting linseed oil paint, applied thoroughly and evenly, and well worked into the joints and other open spaces. Parts that will be inaccessible after assembly shall be given two shop coats.

B. Machine finished surfaces shall be protected against corrosion by a coat of rust inhibiting linseed oil paint or other effective means as soon as the machining is completed.

C. Paint:

1. Best grade for purpose; rust inhibitive.

2. Deliver in original sealed containers.

3. Apply in accordance with manufacturer's instructions.

1.15 General Requirements

A. Work to be performed under this Section shall include furnishing and installation of all labor, materials and equipment as hereinafter specified. Contractor shall perform all work to provide complete installation.

B. In all cases where a device or part of the equipment is referred to herein in the singular, it is intended that such reference shall apply to as many devices as are required to complete the installation.

C. Work not particularly specified in the specifications nor detailed on the contract drawings but involved in carrying out their intent or in the complete and proper execution of the Work, is required and shall be included by the Contractor.

D. The apparent silence of the specifications as to any detail, or the apparent omission from them of a detailed description concerning any work to be done and

materials to be furnished, shall be regarded as meaning that only the best general practice is to prevail, and that only the best material and workmanship is to be used; interpretation of these specifications shall be made upon that basis.

E. Before proceeding with any work, carefully check and verify all pertinent dimensions and sizes, access and spaces and assume full responsibility for fitting the equipment and materials to the structure.

F. Coordinate the work of this Division with the work of all other trades so that the work may proceed as expeditiously as possible. Be responsible for the correct placing of the work of this Section and its connection to the work of related trades.

G. Paint all exposed metal furnished as a part of the work of this Division that is not factory finished or specified to have other than a painter's finish.

H. Should the Consultant require that any portion of the conveying system or equipment be operated prior to the final completion and acceptance of the work, such operation shall be under the Contractor's direct supervision, but such preliminary operation shall not be construed as an acceptance of any of the work.

I. If during the course of the project, asbestos or other Hazardous Material contamination is encountered or suspected, the contractor shall notify the owner, the Project Manager, and the Design Professional immediately (within 24 hrs.) in writing. Contractor will suspend work in the affected area until such time that the said area is certified as contamination free.

1.16 Electrical Design and Wiring Requirements

A. Wiring shall be installed and connected in a thoroughly secure and workmanlike manner, and in full accordance with governing Codes. Connections of all wires larger than No. 8 shall be made with approved connectors. All splices shall be soldered and heat shrunk. Proper crimping tool shall be used for the selected lugs. Aluminum wiring or connectors shall not be used.

B. The entire wiring system shall be tested as hereinafter noted.

1.17 General Design and Construction Requirements

A. All of the Elevator equipment shall be designed, constructed, installed and adjusted to secure the best commercial performance available with respect to smooth, quiet, convenient and efficient operation, durability, economy of maintenance and operations, and the highest standards of safety.

B. It is not the intent of these specifications to detail the construction and design of the several parts of the equipment, but it is expected that the type, material,

design, workmanship and construction of each and every part shall be fully adequate for the service required; durable, properly coordinated with all other parts, in accordance with the best commercial standards and of the highest commercial efficiency. All parts shall be of ample and proper size, design and material to avoid all objectionable effects which may reduce the efficiency of operation and/or economy of maintenance and upkeep below the best commercially available results. Minimum requirements for design, materials, etc., are given herein for certain parts of the equipment. Equivalent requirements approved by the Consultant shall apply to such parts as are of special design, construction or material, and to which the specified requirements are not directly applicable. These minimum requirements, as a whole, shall also be considered as establishing proportionate general minimum standards for all parts of the equipment.

C. The Contractor shall not use as part of the permanent equipment any experimental devices, construction or materials which have not been fully tried out (a minimum of five years) in at least substantially similar or under comparable service, except as may be specifically approved by the Consultant. If any equipment or devices to be used on this installation differ substantially in construction, materials, design, size, capacity or duty, from corresponding items previously used for the same purpose by the manufacturer, they shall pass tests as the Consultant may require to fully show their adequacy and suitability. These tests shall be in addition to tests herein specified and shall be made at the expense of the Contractor.

D. All equipment specified shall be new, and shall apply to the conveying system unless otherwise noted. When any item or items are specified to be replaced, the replacement item shall be in compliance with the requirements of all applicable publications and compatible with all remaining components that require direct interaction with the replacement item so that proper operation is achieved. At the Contractor's option and with the Consultant's approval, Contractor may replace equipment specified to be retained in order to achieve proper operation with the new equipment, at no additional cost.

E. All elevator equipment shall conform to the best commercial standards with respect to design, construction, operating results, performance and workmanship.

END OF PART 1

PART 2 - MATERIAL

2.1 Specific Requirements

Furnish all labor and materials and perform all elevator work as described herein. The general extent of the work for the elevator includes, but is not necessarily limited to the work description outlined below.

Quantity & Type:	Two (2) overhead traction passenger elevators
Power Supply:	Existing power supply (208v AC)
Capacity & Speed:	PE1 - 2500 Lbs. at 400 feet per minute PE2 – 1800 Lbs. at 200 feet per minute (increased from 150 FPM)
Floor Served:	B, 1 through 6
Number of Openings:	Seven (7) In line
Travel	73’-10”
Operation:	Simplex selective/collective with Independent Service. Inspection operation and Firefighter’s Emergency Service Operation (Phase I & II).
Controller:	New microprocessor with variable frequency drive
Hoist Machine:	PE1 - New Overhead AC Gearless Traction PE2 - New Overhead Geared Traction
Governor:	New Hollister Whitney
Wire Ropes:	New Hoist and Governor Ropes
Car & Counterweight Rails:	Retain, clean, align, secure, and file as required.
Car & Cwt. Guides:	PE1 – Retain and refurbish existing PE2 - New Roller Type
Car Enclosures:	PE1 - $20,000.00 Allowance PE2 - $17,000.00 Allowance

Car Platform and Safeties:	Retain existing platforms. Provide new Nickel Silver car sills. PE1 – New flexible guide safety. PE2 – Reuse, clean and adjust existing safety
Fixtures:	New car lanterns, hall buttons (with digital position indicators), access switches and car operating panels.
Communication:	New hands free, auto dial emergency telephone in cab. Provide new master station in machine room and fire command station. Provide all wiring and connections from the machine room to the elevators and the Main floor hall pushbutton station (for line monitoring feature)
Entrances	PE1 - Retain all frames and door panels at all floors. Frames and panels shall be painted (color to be selected by Owner). Stationary panels at the entrances shall be replaced with fire rated solid panels. PE2 – Retain entrance frames and door panels. Refurbish or renew closers as required for proper operation. Modify door panels as necessary for installation of new interlocks.
Door Operator	New GAL MOVFR door operators with all related linkage including door zone restrictors and clutch assembly.
Door Equipment	New GAL door equipment including tracks, hangers, interlocks, release roller assemblies and rollers and sill mounted closers. New infrared door re-opening device (PE1).
Buffers	PE1 - New oil buffers. PE2 – New spring buffers
Miscellaneous:	New normal and final limits, top emergency exit contacts, emergency car lighting, car top inspection station, GFI receptacles at the top and bottom of car

	and stop switches in the pit and secondary levels.
ADA Compliance:	Comply with ADA requirements to accommodate the disabled including applied floor markings on each hoistway entrance door jamb, and appropriate markings integral with car operating panel, floor passing chime, etc.
Painting	Paint machine room floor, car frames and pit steel.

2.2 Qualified Manufacturers

Hoist Machine – Hollister Whitney, Imperial Electric or Approved Equal
Controllers – GAL, Elevator Systems Inc., M.C.E. or Approved Equal
Door Detector Edges - Adams, Janus or Approved Equal
Door Equipment - GAL or Approved Equal
Fixtures - Monitor Controls, GAL or Approved Equal
Communication System – Janus EMS5 or approved equal

2.3 Phasing of Work

A. The Contractor shall not exceed a **10 week** lead time, commencing with approval of shop drawings for the ordering and delivery of the necessary equipment to permit commencement. The Work shall be completed as follows:

Phase 1: Prepare Schedule of Work activities and list of product manufacturers. Submit within ten (10) calendar days.

Phase 2: Prepare and submit shop drawings and samples on all items required of the contract within fourteen (14) calendar days.

Phase 3: The Contractor must provide a written schedule for approval prior commencing any work. The renovation work on the first elevator (PE2) must be completed and the elevator tested, prior taking the next elevator out of service.

2.4 Related Work By Elevator Contractor

A. The following related work shall be performed by the Elevator Contractor who shall also be responsible to coordinate his requirements with the work of other trades to avoid project delays:

1. Existing elevator smoke detector system should be retained and maintained operational during the Work (where possible) and upon completion and shall be permanently interfaced with the new elevator systems.

2. Associated Electrical and Lighting Requirements By Contractor:

a. Provide new wiring and conduit as required for new equipment. New wiring between the various items of elevator equipment and

external wiring, and wiring methods, shall conform to the NFPA National Electrical Code.

b. Check and verify all existing main line wiring and disconnect switches. Replace as necessary, wiring from the disconnect switches to the controllers.

c. New car lighting and fan circuit for each elevator shall be provided with separate disconnect switches in the machine room. Each circuit will be 300 volts maximum, single phase, 60 hertz, rated at 15 amperes connected to a normal and emergency power source. A second circuit of the same characteristics for the elevator car will be provided for the duplex grounded receptacles located on the top and bottom of the car enclosure connected to a normal and emergency power source.

3. Associated mechanical apparatus, support structures, safety devices or other similar provisions by Elevator Contractor to include but not limited to:

a. All projections of 2 or more inches in hoistways and setbacks shall be beveled at an angle of not less than 75 degrees with the horizontal per ASME A17.1

b. Floor identification numbers, a minimum of 4" inches high, shall be provided inside hoistways per ASME A17.1

c. Pit ladders shall be modified and/or otherwise installed per ASME A17.1

d. Apparatus shall be numbered and/or otherwise identified in the machine room, car top and hoistway entrances per ASME A17.1

e. Installation of new equipment guards to protect against accidental contact per ASME A17.1

f. Contractor shall properly fire stop all hoistway penetrations. All hoistways shall meet ASME A17.1, requirements after these modifications have been completed.

4. Painting and Finishes by Elevator Contractor:

a. All equipment and metal work installed under this Contract, which does not have a baked enamel or special architectural finish and which is exposed in the hoistway, shall be cleaned and painted one field coat of oil-based enamel.

b. All machine room equipment shall be painted upon completion of the installation with the manufacturer's standard machinery enamel.

c. All natural metals shall be of the best grade and shall have the grain of belting in the direction of the longest dimensions with a fine, brushed finish. All surfaces shall be perfectly smooth and without waves.

d. The motor room and pit floors shall be painted with approved quality deck enamel upon completion of the installation work. The machine room walls and ceiling shall be also painted. Color selected by Owner.

e. Patching and re-painting all disturbed elevator wall areas. Paint color to match existing or as directed by Owner

f. Paint existing hoistway entrance frames and door panels.

2.5 Performance

A. Elevators shall be adjusted to meet the basic performance standards herein noted.

B. Speed: Plus or minus 5 percent full load up and full load down.

C. Capacity: Safely lower, stop and hold 125 percent of rated load.

D. Performance Time: measured from start of door close to door open at the next adjacent typical floor in either the up or down direction. For this project the performance time shall be no more than 8.0 seconds.

2.6 Sound Reducing

The Contractor shall provide necessary sound-reducing materials, preferably rubber pads of proper density, to effectively isolate the elevator controllers and motor drives from the building structure. All rotating parts shall be properly balanced to eliminate vibration.

No conduit shall be fastened to or supported by the controller frame, starter frame or machinery except by flexible connections.

2.7 Traction Hoist Machine and Deflector Sheaves

A. Existing hoist machines shall be removed entirely. Furnish and install a new gearless AC hoist machine for PE1. Furnish and install a new geared hoist machine for PE2. Size the motor accordingly based on the duty and power supply of the elevators.

1. Gearless motor shall be a low R.P.M./ high torque operation with self-cooling provisions under varying load conditions.

2. Provide interconnection wiring and ground cables in accordance with manufacturer's design requirements.

3. Contractor shall include all dis-assembly, re-assembly of equipment, cabling, steel supports blocking beams, etc. for a proper installation.

4. Furnish and install new deflector sheaves for each elevator machine.

B. Normal and Emergency Brakes

The new machines shall be provided with a mechanical device that will, when activated, prevent unintended movement of each elevator. Activation of the unit shall exert and apply a force on the hoist cables, car or counterweight rails or drive sheave to stop the movement of the elevator. Also provide a new independent car movement protection device that will prevent the unintended car movement in the event of failure of the driving machine, motor, brake, shaft and all related equipment.

2.8 Hoist Ropes

A. Provide new 8 x l9 traction steel hoist ropes with hemp center. The number and size of ropes shall comply with the factor of safety requirements of the code.

B. All ropes shall be internally lubricated at the factory. The hoist ropes shall be given a light coat of lubricant when installed.

2.9 Motor Drive (VVVF)

The Controllers shall utilize a variable voltage, variable frequency, three phase A.C. motor drive (referred to as Drive) to control the speed of the elevator. The Drive shall not require any modification to the new elevator motor. The Drive shall utilize three phase, full wave rectifier and capacitor bank to provide D.C. for the solid state inverter. The solid state inverter shall utilize power semi-conductor devices and a duty cycle modulation fundamental frequency of not less than one kilohertz to synthesize three phase, variable voltage, variable frequency output to operate the hoist motor in an essentially synchronous mode. The drive shall be a heavy duty type capable of delivering sufficient current to accelerate the elevator to the contract speed with the rate load. The Drive shall provide regulation appropriate to the drive type, whether operated in an open loop, closed loop, or distance feedback mode. Ambient temperature requirements for the drive shall be 40 degrees C. (104 degrees F.) maximum. The Drive shall be capable of providing an adjustable D.C. current to the A.C. motor for an adjustable time (0 to 1 second) in order to provide a braking pulse to use in the topping sequence. (This feature is not required for drives using flux-vector technology). The Drive shall have the ability to adjust or program the voltage/frequency curve as necessary to properly match the characteristics of the new elevator hoist motor. The Drive shall not create excessive audible noise in the elevator motor.

2.10 Governor & Governor Rope

A. Remove the existing governor and tension frame. Install a new Hollister Whitney centrifugal governor and pit tension sheave.

B. Provide an electrical switch that shall shut the elevator down in the event of an overspeed in either direction. When said switch is activated, it shall remove the power from the driving machine and the brake.

C. The governor tripping speed shall be in accordance with ASME Code requirements.

D. Install new governor rope conforming to Code requirements.

2.11 Controller

A. The Controller shall provide solid state components and printed circuit boards to control the hoisting machine and signal functions in accordance with these specifications. Complete details of the components and printed circuit boards, together with complete operational description, shall be submitted for approval.

B. The controller assemblies shall provide efficient, smooth, stepless acceleration and deceleration of the elevator hoisting machine, automatically and irrespective of the load in the car. All control equipment shall be enclosed in a metal cabinet with lockable, hinged door(s), and shall be provided with a means of ventilation. All non-conducting metal parts in the machine room shall be grounded in accordance with the NEC. Cabinet shall be securely attached to the building structure.

C. Modules for the control of each elevator system, including dispatching, signals, door operation and special operation, shall be installed in a NEMA Type I, General Purpose Enclosure. Circuit boards shall be moisture-resistant, be non-corrosive, be non-conductive, be fabricated of non-combustible material and be of adequate thickness to support the components mounted thereon.

D. Each device, module and fuse (with ampere rating) shall be identified by name, letter or standard symbol in an approved, indelible and legible manner on the device or panel. Coordinate identification markings with identical markings on wiring diagrams.

E. The electrical connections between the printed circuit boards (modules) and the circuit connectors incorporated in the mounting racks shall be made through individual tabs which shall be an integral part of each module. The tabs shall be nickel-gold plated (or of other approved metal of equal electrical characteristics). Modules shall be keyed or notched so as to prevent insertion of the modules in the inverted position.

F. Light emitting diodes (LEDS) shall be used for visual monitoring of individual modules.

G. Components shall have interlocking circuits to assure fail-safe operation, and to prevent unwarranted elevator movement, should any component fail to function properly.

H. Method of wire wrapping for point-to-point will continue on to the mounting racks, shall be submitted.

I. Modules shall be of the type that plug into pre-wired mounting racks. Field wiring or alteration shall not be necessary in order to replace defective modules.

J. Field wiring changes required during construction shall be made only to the mounting rack connection points and not to the individual module circuitry or components. If it becomes necessary to alter individual modules, they shall be returned to the factory where such design changes shall be made and module design records changed so that correct replacement units shall be available.

K. Module boards shall be fabricated from non-conductive, non-corrosive material, and shall be of sufficient strength so as to support all components mounted thereon without warping. Mounting racks shall be spaced sufficiently apart to prevent accidental contact between individual modules.

L. All logic symbols and circuitry designations shall be in accordance with ASME Standards.

M. Solid state components shall be designed to operate within a temperature range of 40 degrees F and 95 degrees F. No temperature controlled or air conditioned rooms shall be required for proper operation of solid state components.

N. Wiring connections for operating circuits and for external control circuits shall be brought to terminal blocks mounted in an accessible location within the controller cabinet. Terminal blocks using pierce-through serrated washers shall not be acceptable.

O. All equipment and diagnostic tools shall be non-proprietary.

P. Speed Regulation

1. Speed regulation shall be such that the maximum velocity attained with any load up to full load in the car on either "UP" or "DOWN" motion shall not vary more than 5%, plus or minus, from normal operation velocity.

2. The acceleration and deceleration of the car under any condition of load shall be as nearly constant as is possible with the method of control specified and employed, and shall be independent of the operating devices in the car.

3. Entire elevator equipment including hoisting machine, motor generator and controller, shall operate without noticeable irregularities and as quietly as can be obtained by use of high-grade materials, first class workmanship and adjustment.

2.12 Car Position and Leveling System

Each elevator shall be provided with a self-leveling feature that will automatically bring the car to the floor landings within a tolerance of 1/4 inch fully loaded. The car shall be maintained approximately level with the landing, irrespective of load, while loading and unloading.

A. Provide a shaft mounted car position and leveling system.

B. A tape or chain driven type selector shall not be acceptable.

C. Provide system similar to IP8300 or approved equal.

2.13 Automatic Elevator Operation

A. Provide new operating device consisting of a series of pushbuttons in the car numbered to correspond to the various landings. "Up" and "Down" hall buttons at the intermediate landings, and a single button at the terminal landings, all connected electrically to the control system governing floor selection, car selection, direction of travel, acceleration and retardation, to supply the operation described herein. In addition to the floor buttons, in the car operating panel, a red emergency stop switch arranged to interrupt the power supply to the motor and apply the brake independently of the operating device, a car light switch, an alarm bell button, fan switch, a switch and pilot light for remote control of the motor drive, "Door Open" and "Door Close" buttons, independent service switch, and such auxiliary switches as may be required.

B. Car calls shall be registered by passengers within the car by pressing the button corresponding to the floors to which they wish to go. Corridor calls shall be registered by pressing the buttons in the corridor push-button fixture.

C. Once the car has received its start signal, the doors shall close automatically. When the doors are fully closed and the interlock circuit established, the car shall start to move in the direction established by the control system. The car shall accelerate and decelerate automatically and stop at the first floor for which a car button has been pressed, or at the first corridor floor for a demand which has been pressed, or at the first corridor floor for a demand which has been assigned to the car. The car shall stop at all floors for which car calls are registered in the order in which such floors are reached, and shall, in addition, stop for any corridor demands assigned to the cars in the order in which these floors are reached.

D. The doors shall open automatically as the car reaches the landing and, after a predetermined time, shall close at reduced speed and the car shall then proceed to answer any remaining car or assigned corridor calls. A protective device shall be provided on the car door which, when activated, shall prevent closing of the doors. The cars shall become available for assignment at whatever floor the last car demand has been satisfied in the direction in which the car is then traveling.

E. When a car does not receive a demand dispatch for an adjustable time period up to ten minutes, set initially at five minutes, the motor drive unit shall be disconnected. When a demand dispatch is received by a car whose motor drive unit is disconnected, it shall automatically restart.

F. Door open dwell times shall be adjustable so that open time for a car call is shorter than for landing calls and for second passengers. If a longer time is needed for passenger entry, doors can be prevented from closing or reversing by the light ray door control, the protective leading edge on car door, or by pressing "Door Open" button in car.

G. Elevators shall be arranged for independent service operation by means of a key switch, located in the locked section of the car operating panel which, when placed in the "On" position, shall remove the elevator from the group, disconnecting it from the hall button riser and permitting operation from the car buttons only. Hall lanterns shall be inoperative when in this mode.

H. Elevators shall be provided with adjustable load-weighing devices which will cause elevator to bypass hall calls when the elevator is filled to an adjustable percentage. The corridor calls shall remain registered until the car responds to the call. Provide a system which will cancel all car calls in the event that between 3 to 5 times the number of car calls are registered as there are passengers in the car, allowing 150 pounds per passenger.

I. Should car be delayed at a floor beyond a predetermined adjustable time, position of car on the Floor hall position indicator shall flash to show car's position.

J. No double door operation shall be permitted. If the "up" traveling car has a passenger for an intermediate floor and a "Down" call is registered at that floor with no calls above car, it shall travel to floor, open door and let passenger out, then light "Down" direction indicator in the in-car lantern and accept a waiting passenger who registered the "Down" call. Doors shall not close and reopen.

2.14 Emergency Fire Service Operation

A. Phase I - Emergency Recall Operation shall be provided for each car in accordance with ASME A17.1 code as modified under the applicable local or State law.

B. Each main or auxiliary car operating station shall be provided with an indicator light and warning buzzer, each of which shall become activated whenever Phase I Operation is engaged. The warning buzzer shall cease to function once the car has completed the recall sequence and is positioned at the designated recall landing. The indicator light shall remain illuminated as long as Phase I Operation is activated.

C. A three-position key operated switch shall be provided on the designated recall landing to manually activate Phase I Operation. When activated, Phase I Operation shall be arranged so that in order to reset normal service, all cars must first be returned to the designated recall landing, after which the Phase I key-switch must be turned to the "OFF" position.

D. Phase II - Emergency Recall In-Car Operation shall be provided for each car in accordance with A17.1 2013 code.

E. Each main car operating station shall be equipped with a three-position, key-operated switch to engage Phase II Operation on elevators which have completed the Phase I recall sequence and which are parked at the designated recall landing or alternate floor landing. Subsequent to activate Phase II Operation on any elevator, that elevator must be returned to the designated recall landing in order to discontinue that service mode.

F. Each main car operating station shall be provided with a "CALL CANCEL" push button that functions only under Phase II operating mode. When activated, pressing the "CALL CANCEL" button shall cause any previously registered car calls to cancel per A17.1 standards.

G. Each main car operating station shall incorporate the National Standard fire logo and/or operating instructions, engraved and red color filled, as required by the applicable local or State law requirements.

2.15 Independent Service

Provide an Independent Service key switch in the main car operating panel which, when placed in the ON position, will remove the elevator from its respective operation and transfer to Independent Service, it shall respond to all car signals but not hall signals. Doors shall open automatically but shall close by constant pressure on the DOOR CLOSE button. If the DOOR CLOSE button is released before the doors are fully closed, they shall reopen. Hall lanterns shall be inoperative during Independent Service Operation.

2.16 Guide Rails

A. Existing car and counterweight guide rails shall be reused in place.

B. Damaged rail sections and missing connections shall be replaced.

C. Clean rails of all grease, oil and dirt. All high spots shall be filed smooth.

2.17 Car and Counterweight Guides

A. PE2 shall be provided with new car and counterweight rail guides of the roller type.

B. Each roller guide shall be of an approved type consisting of three wheels tired with a durable resilient material, each rotating on ball bearings having sealed-in lubrication, all assembled on a substantial metal base and so mounted as to provide continuous contact of all conditions of loading and operation. The wheels shall run on three finished rail surfaces the roller guides shall be properly secured at the top and bottom on each side of car sling and counterweight frame. Sheet metal guards shall be provided to protect wheels on top of car and counterweight. Roller wheels for the car shall not be less than six inches in diameter. Roller wheels for the counterweights shall not be less than three inches in diameter.

C. PE1 roller guide assemblies shall be retained. Replace any worn rollers and adjust for smooth travel of the elevator.

2.18 Counterweight

A. The elevator shall be suitably counterbalanced for smooth and economical operation. Retain existing counterweight. Counterweight shall be equal to the weight of complete elevator car, plus approximately 40% of the specified load. Existing counterweight frame shall be retained, modified and adjusted for proper counterbalance. Use of weights of a heavier density than the existing weights to achieve the required overbalance is acceptable. Concrete or lead weights are unacceptable. NOTE: Contractor shall perform the counterbalancing in the presence of the Consultant before putting each modernized elevator back into service. Contractor shall schedule the Counterbalance Test at the time each

elevator is completed and surveyed by the constant for compliance with bidding documents.

B. Provide adapter plates as necessary on existing car and counterweight frames to secure the new roller guide assemblies.

C. Car balance shall be checked prior to the commencement of work. If an elevator is found to be out of balance, and additional weights cannot fit in the existing frame, Contractor shall immediately notify the consultant and owner in writing.

2.19 Normal Stopping Devices

Provide upper and lower terminal stopping devices in the hoistway to automatically stop the car and counterweight from any speed attained in normal operation within the top and bottom overtravels, independent of the operating device, final terminal stopping devices and buffers.

2.20 Final Limit Switches

A. Provide terminal stopping devices for the elevator, arranged to automatically stop the car and counterweight within the top clearance and bottom over-travel independently of the operation of the normal terminal stopping devices, but with the buffers operative. The final terminal devices, when operated, shall prevent further normal operation.

B. Final limit switches shall be so located that they open at or about the time buffer is engaged by the car or counterweight. Final limit switches shall be through-bolted after the conclusion of the final acceptance tests.

2.21 Car frame, Safety and Platform

A. The existing elevator cab frames shall be reused. All stiles, cross heads and safety plank connections shall be carefully inspected and re-tightened.

B. The existing elevator safety for PE1 shall be removed. New Hollister Whitney type B flexible guide clamp safeties shall be furnished and installed. Provide and install any necessary adapter plates or other components required for the proper installation of the safeties.

C. The safety for PE2 shall be retained. Safety shall be cleaned, adjusted and tested for proper operation prior to the acceptance test.

D. Existing elevator cab platforms shall be retained in place. Existing flooring and sub-flooring shall be removed and replaced with new marine grade sub-flooring

and finish flooring as selected by the owner. The cost of the installation of the flooring shall be included in the base bid. Assume a $500.00 allowance for car flooring.

E. Provide new Nickel Silver car sills for each elevator. Sills shall not be included in the cab allowance.

2.22 Hoistway Entrances

A. Existing hoistway entrance frames and panels shall be retained and shall receive new equipment as specified below. The stationary panels shall be replaced with solid fire rated panels.

B. The following general requirements shall be required for all elevator hoistway entrance assemblies:

1. All new parts and appurtenances of the elevator hoistway entrances shall conform in every way to the requirements of the Safety Code for Elevators (ASME A17.1) including all revisions to date and to all other codes and provisions of authorities having legal jurisdiction.

2. All metal gauges specified herein are U.S. Standard gauges. Where no gauges or thicknesses are shown, a minimum of No. 16 gauge shall be provided.

3. All existing elevator hoistway entrances shall be complete with door guides and bumpers, dust covers, fascias, toe guards, sight guards and all other items required for a complete installation whether or not indicated or specified.

C. Sight guard shall be No. 16 USS gauge metal of the same type and finish as the door facing, and shall be provided on doors. Sight guards shall be so installed as to reduce to a minimum the clearance between hoistway and car doors so as to conceal the hoistway and car beyond the opening.

D. Hanger support adapters shall be 3/16 inch thick steel formed sections securely bolted to existing entrance assembly.

E. Hanger dust covers shall be made of No. 14 gauge steel and shall extend the full travel of the doors. Covers shall be made in sections for convenient access when servicing the hangers. The sections above the door openings shall be removable from within the elevator car.

F. Fascia plates shall be No. 14 gauge steel, reinforced as necessary to insure a flat even surface throughout, and shall be securely fastened to hanger housings and sills above and also supported at intervals not exceeding four feet. They shall extend 6 inches beyond door opening on each side.

G. Toe guards shall be of No. 14 gauge steel and shall be installed where required by Code, one foot wider than the door opening and gradually beveled to the wall. Straight portion of all the guards shall equal the distance from the bottom landing to the top of the buffer when fully compressed.

H. Rubber bumpers mounted on brackets shall be provided at the limit of travel of the doors, located as required for the operator mechanism.

I. All fascia plates, dust and toe plates, and any other ferrous metal parts shall be thoroughly cleaned of oil, grease and other foreign substances in preparation for finishing. After fabrication, all items shall be cleaned, given a mineral filler coat and primed with a dip coat of rust resisting metal primer, each coat baked on and rubbed smooth on exposed surfaces.

2.23 Hoistway Door Hangers, Tracks and Gibs

A. All elevator hoistway sliding door leaves shall be equipped with sheave type 2-point suspension hangers and tracks complete.

B. Sheaves shall be of hardened steel or composition approximately 2-3/4 inches in diameter for high speed operators. They shall have ball bearings properly sealed to retain grease lubrication, and shall be mounted in housing attached to the door leaves by two cap screws. Each sheave shall be equipped with adjustable ball bearing rollers or approved sheave bearing rollers, to take the upthrust of the doors. Sheaves shall be quiet running.

C. Tracks shall be cold drawn high carbon steel of heavy section, with surface shaped to conform to the treads of the hanger sheaves and rollers.

D. Suitable means shall be provided to lubricate the treads of the sheaves.

E. A lever arm mechanism or approved equal arrangement shall be used to transmit motion from one door panel to the other.

F. Provide sill mounted door spring closers at each entrance.

G. Provide removable nylon or Teflon gibs on the underside of each hoistway door panel; two per panel.

H. Provide one new stainless steel safety "Z" bar guide on the underside of all doors and securely fasten to the underside of the door with stainless steel countersunk machine screws. Mount the safety "Z" guide adjacent to and in between the removable guides.

I. Provide each hoistway sill with two (2) new stainless steel safety blocks and secured with stainless steel hardware. Provide one safety block at the return post and another at the strike post, in a manner as not to cause a tripping hazard.

2.24 Electric Interlocks (GAL)

The doors at each hoistway landing shall be provided with an approved type hoistway door interlock.

2.25 Car Door Operator (GAL -MOVFR)

A. Cars shall be equipped with approved motor-driven electric heavy duty, high speed operator equipped with a worm gear reduction or belt-driven unit to open and close the car and hoistway doors simultaneously when the car is at the landing. The passenger car and hoistway doors at any landing shall be opened and closed simultaneously in a maximum time of 2.3 seconds. When on automatic operation, door closing speed shall be reduced and the closing time shall not exceed 4.5 seconds under all load conditions and shall not exceed 25 pounds torque.

Doors shall be cushioned or checked at both limits of travel and shall operate without slamming. Reversal of the doors while the elevator is being operated on automatic operation shall be accomplished by pressing the door open button.

1. The operator shall be so arranged that in case of interruption or failure of electric power from any cause, it will readily permit manual emergency opening of both the car and hoistway doors. After the doors have been opened manually, it shall be possible to continue manual operation. The hoistway doors shall continue to lock automatically when closed manually.

2. The door operating mechanisms, including motors, switches and worm gearing, shall be of rugged and ample design and construction to operate the size and type of doors shown and specified. They shall be of size, make and type which have been successfully used for comparable installations and have proved entirely adequate and to operate with a minimum of maintenance expense.

3. All levers and cams operating the door shall be constructed with heavy malleable casting and steel members and all their pivot points and bearings shall be of ample size.

4. Provide separate adjustable timers to establish minimum passenger transfer time for car stops and hall stops. Arrange to adjust transfer time at main floor separately from time for upper floor stops.

B. Equip car door with an electric contact which prevents operation of car until door is closed as defined in the Code, unless car is operating in leveling zone or hoistway access switch is used. Locate door contact to prevent its being tampered with from inside of car. Car door contact shall not be accepted unless it has successfully met requirements of the Code.

2.26 Car Door Hangers and Gibs

A. All car doors shall be hung on new heavy duty ball bearing, sheave type hangers, sheaves not less than 3 1/8 inch riding surface diameter, with adjustable up-thrust rollers of metal design, running on a polished steel track, sheave rollers to be of composition type with no flat spots. Metal stiffeners shall be installed to eliminate excessive movement in the door and hanger assembly.

B. Provide two removable nylon or teflon gibs on the underside of each car door panel.

2.27 Car Door Protection Device (PE1)

A. Provide a full field door protective device utilizing multiple infrared beams creating a screen or curtain which will detect any obstruction in the elevator entrance. Device shall comply with the following:

1. Shall extend the full height of the door.

2. Shall not extend beyond a car sill space (door face to edge of platform).

3. When obstructed it shall cause car and hall doors to reverse direction and remain open until object or person is clear.

B. If an obstruction in the car and hoistway entrance prevents door closing the door reversal devices shall be disconnected after an adjustable time of 15 to 60 seconds (set initially at 20 seconds) and permit the doors to be closed at a reduced rate of speed. A buzzer shall be provided which shall sound continually during the closing sequence when the doors are closing at reduced speed.

2.28 Door closers and Pivots (PE2)

Door closers shall be adjusted, refurbished or replaced as required. Replace any worn pivot pins and adjust doors for optimum operation.

2.29 Cab Enclosure (PE1 - $20,000.00 Allowance PE2 $17,000.00 Allowance)

A. Passenger elevator car enclosure shall include, but not necessarily be limited to, 14 USSG stretcher leveled furniture steel shell walls and 12 USSG canopy, reinforced as required by Code and sound deadened high pressure laminate wall panels, handrails, suspended ceilings, interior car lighting, wall base, new car door panels, etc.

C. The Owner reserves the right to select the manufacturer and design of the aforementioned car enclosure and to deduct the stated allowance from the Contractor bid should they decide to buy elsewhere. If such item is included in the contract, the actual purchase price of such an item shall be compared to the applicable allowance and the difference added to or deducted from the contract consideration. Allowance is exclusive of the contractor's overhead and profit which shall be deemed to have been included elsewhere in the contract consideration.

D. Pad buttons and quilted van pads shall be provided. Pads shall be of a size for complete protection of the sides, rear and front return panels. Provide stainless steel No. 4 Satin finish pad buttons in the cab enclosure. Provide one (1) set of vandal proof nylon reinforced, quilted pads of a size to afford complete protection of all sides for the aforesaid cab. The outer skin of the pads on both sides shall be a 3 ply poly scrim material not less than 12 oz per square foot. Furnish heavy duty No. 6 spur grommets. The pads shall not be included in the cab allowance.

2.30 Cab Ventilation

1. Provide a two-speed centrifugal exhaust blower, having a high speed capacity of at least 650 cfm.

2. Arrange the installation to minimize noise and vibration. Protect the fan from damage.

3. Design and install the unit so that, when operating at high speed, the maximum noise level does not exceed 55 db (A-scale) at approximately three feet above the car floor.

4. Connect the fan to the same supply as that used for the in-car lighting, so as to provide fan operation. Terminate the fan supply in a plug-in receptacle appropriately located adjacent to the fan housing, and terminate the fan in a plug.

2.31 Emergency Exit Contact

The top emergency exit shall be provided with an electric contact to prevent the operation of the car with exit door open. Provide fastening devices so that the top emergency exit can only be opened from the top of car.

2.32 Work Lights and Receptacles

Each elevator car shall be provided with suitable light fixtures fitted with wire lamp guards on top and bottom of car. In addition, a duplex GFCI receptacle shall be provided on top and bottom of each car.

2.33 Top of Car Inspection Device

Provide an operating device, mounted on the crosshead, which will permit slow speed operation for the purposes of adjusting, maintenance or inspection. The device shall contain "Up", "Down" and “Safety” constant pressure buttons, emergency stop button,

inspection/off toggle switch, Firefighter's Service light, grounded 110 volt receptacle and guarded light. Device shall conform the governing Code requirements.

2.34 Alarm Bells

A. Provide 110 volt alarm bell underneath the platform and on the rear hoistway wall 8'-0" up from the pit floor. Hoistway bell shall be located so that it is accessible and not obscured by the counterweight frame. The bells shall be secured in a permanent manner.

B. Bells shall be not less than six (6) inches in diameter.

C. Bells shall be operated from buttons inside the car marked "ALARM".

D. Bells shall be operated by the opening of the car stop stop switch.

2.35 Main Car Operating Panel

A. Type of car push buttons as per the Owner selection. The highest passenger use device shall be no more than 4 feet 0 inches above the finished floor. The keyed stop switch and alarm bell button shall be located at the bottom of the panel with their centerline no less than 2 feet 11 inches above the finished floor. Provide new 2" digital position indicators in each car operating panel.

B. All terminology on the car operating panel shall be raised or engraved. Use 1/8" letters to identify all other devices in upper section of the main car operating panel. The handicapped marking contrasting background shall be recessed .030" in a square or rectangular shape in the faceplate, with the finished face of the 0.625" high numeral and braille markings flush with the finished faceplate. The numerals and markings shall be integral with the faceplate. Applied plates are unacceptable.

C. Car operating panel:

1. Upper section shall contain:

a. Emergency Light

b. A complete set of illuminated push buttons (type selected by Owner) with a minimum diameter of 3/4 inch. Buttons shall have the floor designation engraved adjacent to the button, using 0.625 inch characters. The button illumination shall extinguish when the

car reverses its travel. As the car stops for a floor, that corresponding button shall be extinguished.

c. A three position key operated fire service switch marked "marked "OFF", "HOLD" and "ON". The switch shall be other required buttons shall be located behind a service cabinet door. Firefighters instructions for operation of elevators under Phase II shall be engraved on the inside cover of the door.

d. Vandal resistant international fire emblem of red translucent material which shall illuminate when fire service operation is in effect.

e. A buzzer for Fire Service operation and non-illuminating reset button.

g. Non-illuminating "DOOR OPEN" and "DOOR CLOSE" buttons shall be located in the service cabinet.

h. A keyed type stop switch.

i. Emergency signal alarm bell button (illuminating).

j. 5/8" diameter red flashing light jewel for telephone station with engraving "Flashing red light indicates alarm received HELP IS ON THE WAY".

k. Hands-free telephone activation button. Faceplate shall be engraved "Push to Call".

l. Engraved lettering, 3/4-inch high "NO SMOKING" and elevator "NUMBER..."; 1/4-inch high indicating "CAPACITY _____ LBS".

m. Provide a digital car position indicator with 2” characters.

n. Provide car speaker perforations for intercom and phone.

2. The lower section service cabinet shall contain:

a. Keyed switch for controlling interior car lighting.

b. Keyed switch for controlling car ventilating blower (Two Speed).

c. Keyed inspection service switch that will disconnect normal operation, activate hoistway access switches at terminal landings and allow the top-of-car operating device to function.

d. Independent service key switch.

e. Emergency light test button.

f. Any other signal lights, key switches, or devices required for adjustments and maintenance of the elevator.

D. The emergency signal bell button and stop switch shall be located below the car operating buttons at a point no closer than 2'-11" to the finished floor. Emergency signal alarm bell button shall be connected to an alarm bell located in the hoistway and on the car platform. Furnish and install bell including the necessary wiring and auxiliary devices. Activation of the alarm shall also signal the hands-free phone system.

2.36 Communications (Janus EMS5)

A. Intercommunication system shall be a complete two way conversation multipath intercom system. The system shall include a talk-back speaker in the elevator with the capability to initiate a call to the main lobby and/or the machine room.

B. Provide a new machine room master station which shall be capable of calling any elevator, lobby, master or sub-station.

C. Provide all necessary wire, conduit, fittings, mounting materials, etc. for a complete operating system.

D. The audible signaling device and means of two way conversation shall remain operable during a failure of the normal building power supply. The power source shall be capable of providing for the operation of the audible signaling device-alarm switch or visual identification for one (1) hour and the means for two-way conversation for at least four (4) hours.

E. Provide line monitoring with an audible and visual signal located at the main floor hall button station.

2.37 Emergency Lighting

Provide emergency lighting with battery backup as required by code.

2.38` Car Travel Lanterns

New lanterns shall be installed on the strike side of the cab entrance. Lanterns shall contain single stroke gongs. Gongs shall sound once if elevator is traveling up and twice if traveling down to conform with ADA requirements. The fixtures shall contain a minimum of 2" LED characters (Arrows) which shall light green for "Up" and red for "Down".

2.39 Car Position Indicators

Digital indicators with characters of no less than 2" high shall be installed in the top portion of the car operating panel.

2.40 Hall Buttons

A. Provide a new hall push button fixture on each floor. The existing back boxes may

be retained and reused. Boxes must be properly secured. Extended fixtures shall be used to lower buttons to proper height. Face plate shall cover entire opening.

B. Fixtures for intermediate landings shall contain "UP" and "DOWN" buttons. Fixtures for terminal landings shall contain a single "UP" or "DOWN" button. Hall button fixtures shall be on the vandal resistant design, and be installed at ADA height.

C. Each button shall contain an integral registration light which shall illuminate upon registration of a call and shall extinguish when that call is answered.

D. If a landing button is operated while the car and hoistway doors are closing at that floor, the doors shall re-open. Call so registered shall be canceled if closing doors are reopened by means of "DOOR OPEN" button or electronic door reversal device.

E. Provide a Firemen Service key switch, line verification signal and position indicator in the Main floor button station, as per Code requirements.

2.41 Position Indicators

Provide new digital position indicators with minimum 1” characters in each hall button station.

2.42 Accessibility Provisions

A. All operating and signal fixtures shall operate as described in the Americans with Disabilities Act (ADA).

B. Provide floor designations (where missing) with both alpha/numerical and Grade 2 braille markings on both side jambs of the hoistway entrances visible from within the car and the elevator lobby at a height of 60 inches above the floor in stainless steel. Designations shall be a minimum of 2 inches high.

C. Car Direction Lanterns shall sound once for the "Up" direction, and twice for the "Down" direction. Visual elements shall be a minimum of 2 inches high.

D. All elevators shall have the capability to level and re-level to 1/4 inch leveling accuracy.

E. Minimum time from elevator hall call response notification to start of door close shall be set based on the distance from the centerline of the respective elevator to a

point 5'-0" perpendicular to the face of the hall button, divided by 1/5 feet per second; however, in no case shall the doors begin to close in less than 3.0 seconds.

F. Corridor hall buttons center-lines shall be located 3'-6" above the finished floor.

G. Emergency communication shall be properly identified and located so that the highest operational part shall not be more than 48 inches above the finished floor. In addition, a light jewel with the appropriate engraving shall be located near the car speaker, which will illuminate to indicate that help is on the way once the emergency call has been acknowledged.

2.43 Pit Stop Switch

Provide a new emergency stop switch for each elevator in the pit at the point of access to the pit. The switch shall be of an approved type and design, with a metal guard to prevent accidental operation. Plastic or fiberglass material of box and faceplate shall not be permitted. When opened, the switch shall cause the electric power to be removed from the driving machine and brake. Location shall be in accordance to ASME Code requirements.

2.44 Buffers

All existing car and counterweight buffers shall be removed and replaced with new Hollister Whitney oil buffers (spring buffers for PE2). Paint all supporting steel.

2.45 Hoistway Access Switches

A. Provide hoistway access switches in new wall cutouts located at the top and bottom landing, to permit access to the top of car, and the pit. The exposed portion of each access switch or its faceplate shall have legible indelible legends to indicate its "UP", "DOWN" and "OFF" positions. Each access switch shall be a cylinder-type lock with key removable only when switch is in the off position. Lock shall not be operable by any other key which will operate any other lock or device used for any other purpose in the building. The hoistway switch shall be arranged to initiate and maintain movement of the car. When the car is being moved at the top terminal landing, the zone of travel shall be limited to the distance allowed by Code for down travel and a return to the top terminal.

B. Provide new wall cutouts, conduit, wiring, and patch and paint walls as required.

2.46 Electric Wiring

A. Provide all elevators with complete new conduit and wiring in the hoistway, pit and machine room, adequate for the proper operation of the equipment. Wire cable for light and signal circuits in the elevator machine room and hoistway shall conform to elevator traveling cable specified in the NFPA National Electrical Code for the particular type of location. Conductor shall be copper. The minimum size of conductors, exclusive of those which form an integral part of control devices and/or cabinets, shall be a minimum No. l4 for lighting or power circuits, and No. 16 for operating, control and signal circuits, except that for lighting conductors in traveling cable, No. 18 conductors may be used in parallel to provide a current carrying capacity equivalent to not less than No. l4 size. In no case shall the maximum current carried exceed that specified by the NFPA National Electrical Code for the conductor used. Wiring between the various items of elevator equipment and external wiring, and wiring methods, shall conform to the NFPA National Electrical Code. All insulated wiring, control wiring and wiring in traveling cables shall be tag coded at their terminals in the motor room, shaft box, elevator cab junction box and push-button stations within the cab, and shall agree with the submitted wiring diagrams.

B. Traveling cables shall be provided and designed for elevator service in accordance with the NFPA National Electrical Code, and shall be sufficiently flexible to readily adapt to all changes in the position of the elevator car and hang straight without twist. The cables shall be capable of bending 360 degrees with an inside radius of one foot without any permanent set and without cracking of the outer covering. The open loop shall show no tendency to twist upon itself. Traveling cables shall have non-metallic fillers and shall be suspended by Crosby Clips or by looping cable around supports. In addition, Kellum Grips shall be provided to reduce slippage of jacketing and conductors. The traveling cables shall terminate in a new terminal box located on the bottom of the car platform. The terminal boxes shall have approved connection strips for connecting conductors and, in addition to said devices for connecting conductors, approved strain devices for connecting the supporting strands and relieving the conductors of the traveling cables of all strain. The swing of the trail cables shall be checked when the elevator is running and all shields and pads necessary to prevent chafing shall be installed. The loop in the traveling cables shall be not less than two feet unless otherwise approved. The traveling cables and the corresponding groups of conductors connecting these cables to the control, signal and car operating panels shall each contain at least ten percent spare conductors, but not less than two spare conductors of the same size and type. Each traveling cable conductor shall have a distinctive color-coded outer covering for identification. Terminal blocks shall

have indelible identification numbers for each terminal connection. Provide shielded wires for speakers in the cab and intercommunication system.

C. New car and hoistway junction boxes shall be provided for all elevators.

D. Provide ten percent spare wires between each controller, selector, and machine room junction box; also provide ten percent spare conductors in each trail cable, all spares to be properly tagged or otherwise identified with clear and indelible markings. Install beam pads as necessary to prevent chafing of trail cable insulation.

E. Car lighting, receptacles and fan shall be on an individual circuit.

F. All insulated wiring, control wiring and wiring in traveling cables shall be color coded and number coded at their terminals in the motor room, shaft box, elevator cab junction box, and push-button stations within the cab, and shall agree with the submitted wiring diagrams.

2.47 Special Provisions

A. Provide a data plate that indicates the Code and edition in effect at the time of installation and attached to the main line disconnect switch or on the controller.

B. Provide new sound/vibration reducing isolation pads at least ½" thick securely mounted under the controller, main machine, main machine motor and drive unit. All pads shall be neoprene or approved other material with proper shims, washers and bushings.

C. Provide dry contacts in controller for fire service recall through building's smoke detector system.

D. Repair as required, all hallway walls subsequent to installation of new hall pushbutton stations.

2.48 Value Alternates

A. Provide cost savings (deduct alternates) in the base bid for the following items:

1. Reuse car safety for PE1.

2. Refurbish and reuse existing car and counterweight buffers (PE1).

2.49 Maintenance

Contractor shall provide monthly full comprehensive maintenance commencing with the completion of the first elevator and continuing for twelve (12) months after the completion of the second elevator.

END OF PART 2

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SECTION 22 05 00

COMMON WORK RESULTS FOR PLUMBING

1.01 SCOPE AND INTERPRETATION

A. These Specifications and accompanying Drawings provide for the furnishing, setting and connection of the installation of drainage and water supply systems.

B. The specifications and Drawings require the Contractor to provide all labor, materials, equipment and appliances to perform of all Work pertaining or incidental thereto, which is needed to complete the Work shown on the Drawings and called for in the Specifications.

C. The complete systems and the Work shall be so installed as to give proper and continuous service under all conditions, and shall be in accordance with the requirements of all public authorities having jurisdiction and to the complete satisfaction of the Owner. Any Work shown on the Drawings and not particularly described in the specifications, or vice versa or any Work which may be deemed necessary to complete the Contract shall be provided by the Contractor as part of its Contract.

D. For purposes of clearness and legibility, plumbing Drawings are essentially diagrammatic and size and location of equipment are drawn to scale wherever possible. The Drawings indicate size, connection points and routes of pipe. It is not intended, however, that all offsets, rises and drops are shown. Provide piping as required to fit structure, avoid obstruction, and retain clearances, headroom openings and passageways.

E. Fixtures shown and described on the Drawings shall be connected with waste, vent and water supply piping in accordance with the requirements of New York State Building Code, despite the omission of indication of such piping on the plans. Any question involving the installation of such piping shall be referred to the Engineer for resolution.

F. Scope of Work: The plumbing and drainage work of this contract shall include but shall not be limited to the following systems, equipment and services:

2. Equipment furnished under other Sections of this Contract: Including fire protection equipment shall be piped.

3. Piping, Equipment Supports, and seismic restraints: To comprise all restraints, hangers, pipe guides, rods, beam clamps, brackets, pipe anchors, other attachments, floor flanges, masonry anchors, bolts, nuts, washers, and other items as required to fully support all piping and equipment installed under this contract inclusive of spring hangers, seismic restraints, and vibration mounts where recommended by equipment manufacturers, where required to meet noise abatement regulations and as necessary to prevent piping and equipment vibrations being transmitted to structure.

4. Provide unions and stop valves at all equipment connections and where required for service, repairs and draining.

5. Piping - General: Piping, Piping installation or hook-up shall mean a complete installation in all respects including pipe, fittings, valves, unions, traps, strainers, specialties and other miscellaneous items to make piping systems and equipment operational.

6. Painting and Identification: As specified in their respective sections of this Contract.

7. Miscellaneous Work: Included shall be all items of materials, piping, controls, wiring and other miscellaneous items not specifically shown on Contract Drawings or called for herein but which are normally furnished and required for a complete installation of this type.

8. Sealing of Openings: Openings left in walls, floors, ceilings or partitions shall be sealed. Finish shall match existing adjoining finish in all respects.

9. Coordination Drawings: The plumbing contractor shall cooperate with the Fire Protection Systems, and Electrical contractors in the development of the coordination drawings. The specified order in which the various trade contractors impose their work on the coordination drawings is not intended to grant priority to any one trade contractor in the allocation of space. At the completion of this phase, hold a coordination meeting to eliminate any interference among the trades that the drawings indicate and to avoid any conflicts in installing the Work.

1.02 CODES AND STANDARDS

A. It shall be unlawful for any person to perform the work referred to under this Plumbing and Drainage Specifications and/or shown on the Plumbing and Drainage Contract Drawings unless such person is a licensed master plumber, partnership, corporation or other business association as permitted by the New York State Building Code and unless such work is performed under the direct and continuing supervision of a licensed master plumber.

B. Where requirements for products, materials, systems, equipment, methods and other portion of the work specified herein exceed minimum requirements of regulatory agencies having jurisdiction over the construction work, contractor shall comply with such requirements specified herein, unless specifically approved otherwise by the Owner.

1.03 TORCH BURNING OPERATION

A. The storing and use of oxygen and combustible gases in conjunction with torch burning apparatus is subject to the Rules and Regulations of the New York State Building and Fire Code. Fire watches shall be provided during all operations using torches for burning, cutting or welding.

B. The cost of permits, certificates, fire watches, apparatus and other items required in the torch burning operation shall be borne by the Contractor at no additional cost to the Owner.

1.04 PROTECTION OF MATERIALS AND WORK

A. Existing Building

1. Open ends of piping shall be temporarily closed by a proper fitting, until piping is approved and ready for service.

2. Equipment and other items shall be protected during the progress of the Work. When the building is practically complete and ready for use the fixtures and other items shall

be cleaned and all metal work polished and the entire installation put in perfect working order.

1.05 GUARANTEES AND WARRANTIES

A. The Requirements of Section G01740 and this Article shall apply to Guarantees and Warranties.

B. Contractor's Guarantees: The Contractor guarantees that all Work of this Contract is free from all defects, and is as specified, and that should any defects, which cannot be proven to have been caused by improper use, develop within the space of one year from the date of substantial completion of the Work, such defects shall be made good by the Contractor, free of cost to the Owner.

1.07 OPENINGS AND CHASES

A. Openings through exterior foundation walls shall be made watertight by the Contractor after pipes, conduits and other items passing through the wall have been installed. This building is planned and detailed, and is the intent of these specifications to provide a structure that will prevent the penetration by rodents and vermin of any vacant space where they might find a harborage. The Contractor will be held responsible for securing this condition by the closing of all points of access to such spaces, including the passage of piping and conduits, through all walls, partitions, ceilings and furred out spaces, the closing of access to voids in hollow tile or cinder blocks. There shall be a special inspection of the building with regard to this matter before final acceptance.

1.08 INSTRUCTION OF STAFF

A. After the plumbing, drainage systems have been tested, and fixtures, apparatus and all other items adjusted and operating properly to the satisfaction of the Owner, Contractor shall furnish a competent person to instruct the staff in the operation and maintenance of the systems. Contractor shall video record all the training sessions for various equipment and systems as specified in individual sections of these Specifications. Determination of the date and time of such instruction shall be under the direction of the Owner.

1.10 SUBMITTALS

A. Formal submission for approval of manufacturer is required as per manufacturer/model number or series listed in the specification. Formal submissions are required for materials and appurtenances (ex. sheet metal, pipes, etc.) as defined in the specification. Submittals are always required to verify capacity. Schedules, installation instructions, startup manuals, operation and maintenance manuals, and shop drawings are always required to be submitted.

1.11 CLEANING AND REPAIR

A. At the completion of the Work and before the final inspection is made the Contractor shall thoroughly clean all apparatus, appurtenances, piping, and leave these items free from all marks, scratches, stains, and other damage. All equipment shall be cleaned and left in condition to operate, and the work, as a whole, left in perfect working order. Remove all tools, debris and excess materials from the premises.

B. Contractor shall not leave sharp exposed metal edges (bottom of threaded rods, P&D equipment supports, etc.) that could otherwise present safety hazards to the building's occupants/work staff.

END OF SECTION

SECTION 220800

CLEANING AND TESTING

PART 1 GENERAL

1.01 RELATED WORK SPECIFIED ELSEWHERE

A. N/A.

1.02 SUBMITTALS

A. Quality Control Submittals
   1. Test Reports (Field Tests): Submit data for each system tested, and/or disinfected; include date performed, description, and test results for each system.

1.03 QUALITY ASSURANCE

A. Regulatory Requirements:
   1. Perform factory testing of factory fabricated equipment in complete accordance with the agencies having jurisdiction.
   2. Perform field testing of piping systems in complete accordance with the local utilities and other agencies having jurisdiction and as specified.

1.04 PROJECT CONDITIONS

A. Protection: During test Work, protect controls, gages and accessories which are not designed to withstand test pressures. Do not utilize permanently installed gages for field testing of systems.

1.05 SEQUENCING AND SCHEDULING

A. Transmit written notification of proposed date and time of operational tests to the Director's Representative at least 5 days in advance of such tests.

B. Perform cleaning and testing Work in the presence of the Director's Representative.

C. Pressure test piping systems inside buildings, at the roughing-in stage of installation, before piping is enclosed by construction Work, and at other times as directed. Perform test operations in sections as required and directed, to progress the Work in a satisfactory manner and not delay the general construction of the building. Valve or cap-off sections of piping to be tested, utilizing valves required to be installed in the permanent piping systems, or temporary valves or caps as required to perform the Work.

PART 2 PRODUCTS

2.01 MATERIALS

A. Test Equipment and Instruments: Type and kind as required for the particular system under test.

B. Test Media (air, vacuum, water): As specified for the particular piping or system under test.

C. Cleaning Agent (water): As specified for the particular piping, apparatus or system being cleaned.

PART 3 EXECUTION

3.01 PRELIMINARY WORK

A. Thoroughly clean pipe and tubing prior to installation. During installation, prevent foreign matter from entering systems. Prevent if possible and remove stoppages or obstructions from piping and systems.

3.02 PRESSURE TESTS - PIPING

A. Drainage, Vent, Conductor and Roof Drain Piping (Inside Buildings): Perform tests before fixtures are installed. Test by filling the entire system with water, and allowing to stand for 3 hours, with no noticeable loss of water. Test joints under a minimum head of 10 feet of water, except the uppermost section. Test the uppermost section to overflowing.

END OF SECTION

SECTION 221100

PLUMBING PIPING

PART 1 GENERAL

1.01 RELATED WORK SPECIFIED ELSEWHERE

A. Through Penetration Firestops: Section 078400.

1.02 REFERENCES

A. N/A

1.03 SUBMITTALS

A. Product Data:
   1. Catalog sheets and specifications indicating manufacturer name, type, applicable reference standard, schedule, or class for specified pipe and fittings.
   2. Material Schedule: Itemize pipe and fitting materials for each specified application in Pipe and Fittings Schedule in Part 3 of this Section. Where optional materials are specified indicate option selected.

B. Quality Control Submittals
   1. Copy of hydraulic press fitting manufacturer's printed field inspection procedures for hydraulic press joints in copper tubing.
   2. Brazer Qualification Data: Copies of certification; include names, home addresses and social security numbers of brazers.

1.04 QUALITY ASSURANCE

A. Qualification of Brazers: Comply with the following:
   1. The persons performing the brazing and their supervisors shall be personally experienced in brazing procedures.

PART 2 PRODUCTS

2.01 STEEL PIPE AND FITTINGS

A. Steel Pipe for Threading: Standard weight, Schedule 40, black; ASTM A 53 or ASTM A 135.

B. Malleable Iron, Steam Pattern Threaded Fittings:
   1. 150 lb Class: ASME B16.3.

D. Cast Iron Fittings:

1. Steam Pattern, Threaded: ASME B16.4.
   a. Standard Weight: Class 125.
   b. Extra Heavy Weight: Class 250.
2. Flanged Fittings and Threaded Flanges: ASME B16.1.
   a. Standard Weight: Class 125.
   b. Extra Heavy: Class 250.

E. Unions: Malleable iron, 250 lb class, brass to iron or brass to brass seats.

F. Couplings: Same material and pressure rating as adjoining pipe, conforming to standards for fittings in such pipe. Use taper tapped threaded type in screwed pipe systems operating in excess of 15 psig.

G. Nipples: Same material and strength as adjoining pipe, except nipples having a length of less than one inch between threads shall be extra heavy.

2.02 COPPER AND BRASS PIPE, TUBING AND FITTINGS

A. Copper Tube, Types K, L, and M: ASTM B 88.

B. Wrot Copper Tube Fittings, Solder Joint: ASME B16.22.

D. Drainage Tube, Type DWV: ASTM B 306.

F. Wrot Copper Drainage Tube Fittings, Solder Joint: ASME B16.29.

G. Cast Copper Alloy Drainage Fittings, Solder Joint: ASME B16.23.

H. Unions: Cast bronze, 150 lb Class, bronze to bronze seats, threaded or solder joint.

K. Flared Tube Fittings:
1. Water Tube Type: ASME B16.26.
2. Refrigerant Tube Type: SAE J513.

2.03 CAST IRON PIPE AND FITTINGS

N/A

2.04 DUCTILE IRON PIPE AND FITTINGS

N/A

2.05 COUPLINGS AND FITTINGS FOR GROOVED END PIPE

`N/A

2.06 BOLTED MECHANICAL BRANCH CONNECTION

N/A

2.07 JOINING AND SEALANT MATERIALS

A. Thread Sealant:
   1. LA-CO Industries', Slic-Tite Paste with Teflon.
   2. Loctite Corp.'s No. 565 Thread Sealant.
   3. Thread sealants for potable water shall be NSF approved.

B. Solder: Solid wire type conforming to the following:
   1. Type 3: Lead-free tin-silver solder (ASTM B 32 Alloy Grade E, AC, or HB); Engelhard Corp.'s Silvabrite 100, Federated Fry Metals' Aqua Clean, or J.W. Harris Co. Inc.'s Stay-Safe Bridgit.

C. Soldering Flux for Soldered Joints: All-State Welding Products Inc.'s Duzall, Engelhard Corp.'s General Purpose Liquid or Paste, Federated Fry Metals' Water Flow 2000, or J.W. Harris Co. Inc.'s Stay-Clean.

2.08 PACKING MATERIALS FOR BUILDING CONSTRUCTION PENETRATIONS

N/A

2.09 DIELECTRIC CONNECTORS

N/A

2.10 PIPE SLEEVES

A. No. 16 gage galvanized sheet steel.

2.11 FLOOR, WALL AND CEILING PLATES

A. Cast Brass: Solid type with polished chrome plated finish, and set screw.
   1. Series Z89 by Zurn, 929 Riverside Drive, Grosvenordale, CT 06255, (800) 243-1830.
   2. Model 127XXXX by Maguire Mfg., Cheshire CT 06410, (203) 699-1801.

B. Stamped Steel: Split type, polished chrome plated finish, with set screw.
   a. Figures 2 and 13 by Anvil International, Portsmouth, NH 03802, (603) 422-8000.

C. Cast Iron or Malleable Iron : Solid type, galvanized finish, with set screw:
   1. Model 395 by Anvil International, Portsmouth, NH 03802, (603) 422-8000.

2. Model 900-016XX by Landsdale International, Westville, NJ 08093, (800) 908-0523.

PART 3 EXECUTION

3.01 INSTALLATION

A. Install piping at approximate locations indicated, and at maximum height.

B. Install piping clear of door swings, and above sash heads.

C. Make allowances for expansion and contraction.

D. Allow for a minimum of one inch free air space around pipe or pipe covering, unless otherwise specified.

E. Install horizontal piping with a constant pitch, and without sags or humps.
1. Water Piping: Pitch 1/4 inch per 10 feet upward in direction of flow, unless otherwise noted. If it is not possible to maintain constant pitch, establish a new low point and continue. At the low point, provide a 1/2 inch drip leg and gate valve with a hose bibb end. Provide an air vent at the high point.
2. Drainage Piping: Pitch 1/4 inch per foot downward, in direction of flow, unless otherwise noted.

F. Install vertical piping plumb.

G. Use fittings for offsets and direction changes, except for Type K soft annealed copper temper water tube.

H. Cut pipe and tubing ends square; ream before joining.

I. Threading: Use American Standard Taper Pipe Thread Dies.
1. Thread brass pipe with special brass threading dies.

3.02 DRAINAGE SYSTEMS

A. Fittings:
1. Use long turn drainage pattern fittings, unless space conditions prohibit their use; in such cases, short turn pattern fittings may be used.
2. Vertical Offsets: Make vertical offsets with 45 degree elbows, or 1/8 bends.
3. Tucker Fittings: Tucker fittings may only be installed in vertical piping.

B. Cleanouts:
1. Install cleanouts with sufficient side and end clearance to allow for the removal of the cleanout plug, and the use of cleaning tools.
2. Lubricate cleanout plugs with anti-seize lubricant.

3.03 DOMESTIC WATER PIPING SYSTEM

N/A

3.04 NATURAL GAS PIPING SYSTEM

N/A

3.05 COMPRESSED AIR PIPING SYSTEM

N/A

3.09 PIPE JOINT MAKE-UP

N/A

3.10 PIPING PENETRATIONS

N/A

3.11 FLOOR, WALL AND CEILING PLATES

A. Install plates for exposed uninsulated piping passing thru floors, walls, ceilings, and exterior concrete slabs as follows:
   1. In Finished Spaces:
      a. Piping 4 Inch Size and Smaller: Solid or split, chrome plated cast brass.
      b. Piping Over 4 Inch Size: Split, chrome plated cast brass.
   2. Unfinished Spaces (Including Exterior Concrete Slabs): Solid, unplated cast iron.
   3. Fasten plates with set screws.
   4. Plates are not required in pipe shafts or furred spaces.

3.12 PIPE AND FITTING SCHEDULE

A. SEE DWG'S

END OF SECTION

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SECTION 230700

PIPING INSULATION

PART 1 GENERAL

1.01 RELATED WORK SPECIFIED ELSEWHERE

A. Through Penetration Firestops: Section 078400.

1.02 ABBREVIATIONS

A. FS: Federal Specification.

B. K: Thermal Conductivity, i.e., maximum Btu per inch thickness per hour per square foot.

C. pcf: Pounds per cubic foot.

1.03 SUBMITTALS

A. Product Data: Manufacturer's catalog sheets, specifications and installation instructions for the following:
   1. Insulation Materials.

1.04 QUALITY ASSURANCE

A. Qualifications: The persons installing the Work of this Section and their Supervisor shall be personally experienced in mechanical insulation work and shall have been regularly employed by a company installing mechanical insulation for a minimum of 5 years.

PART 2 PRODUCTS

2.01 PIPING INSULATION

A. Insulation shall be a flexible, closed-cell elastomeric pipe insulation: AP Armaflex, AC Accoflex. Adhesive shall be Armaflex 520, 520 Black or 520 BLV Adhesive. The insulation must conform to ASTM C534 Grade 1, Type I.

2.04 MISCELLANEOUS MATERIALS

A. Pressure Sensitive Tape for Sealing Laminated Jackets:
   1. Acceptable Manufacturers: Alpha Associates, Childers, Ideal Tape, Morgan Adhesive.
   2. Type: Same construction as jacket.

B. Wire, Bands, and Wire Mesh:
   1. Binding and Lacing Wire: Nickel copper alloy or copper clad steel, gage as specified.
   2. Bands: Galvanized steel, 1/2 inch wide x 0.015 inch thick, with 0.032 inch thick galvanized wing seals.
   3. Wire Mesh: Woven 20 gage steel wire with 1 inch hexagonal openings, galvanized after weaving.

PART 3 EXECUTION

3.01 PREPARATION

A. Perform the following before starting insulation Work:
   1. Install hangers, supports and appurtenances in their permanent locations.
   2. Complete testing of piping.
   3. Clean and dry surfaces to be insulated.

3.02 INSTALLATION, GENERAL

A. Install the Work of this Section in accordance with the manufacturer's printed installation instructions unless otherwise specified.

B. Provide continuous piping insulation and jacketing when passing thru interior wall, floor, and ceiling construction.
   1. At Through Penetration Firestops: Coordinate insulation densities with the requirements of approved firestop system being installed. See Section 078400.
      a. Insulation densities required by approved firestop system may vary with the densities specified in this Section. When this occurs use the higher density insulation.

C. Do not intermix different insulation materials on individual runs of piping.

3.03 INSTALLATION AT HANGERS AND SUPPORTS

A. Reset and realign hangers and supports if they are displaced while installing insulation.

3.09 PIPING INSULATION SCHEDULE

A. Schedule of Items to be Insulated:
   1. Refrigerant liquid piping, unless sub-cooled below 70 degrees F.

END OF SECTION

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SECTION 237413

AIR CONDITIONERS – SPLIT SYSTEM

PART 1 GENERAL

1.01 RELATED WORK SPECIFIED ELSEWHERE

N/A

1.02 PERFORMANCE REQUIREMENTS

A. N/A

1.02 SUBMITTALS

A. Shop Drawings: Submit drawings for each size of factory fabricated roof rail.

B. Product Data: Manufacturer's catalog sheets, brochures, performance charts, standard schematic drawings, specifications and installation instructions for each size unit
   1. Name, address, and telephone number of nearest fully equipped service organization.

C. Contract Closeout Submittals:
   1. Operation and Maintenance Data: Deliver 2 copies, covering the installed products, to the Director's Representative.

1.03 QUALITY ASSURANCE

A. Regulatory Requirements:
   1. Unit shall be factory tested and the design, construction and installation shall be in accordance with the following: ARI Standard 210, NFPA, UL, ASHRAE 15, Safety Code for Mechanical Refrigeration, and all State and Local codes or regulations having jurisdiction.
   2. Rate cooling capacities in accordance with ARI Standard 210.
   3. Electrical components shall be UL listed.

1.04 PRODUCT DELIVERY

A. Deliver each unit as an integral factory packaged assembly.

1.05 MAINTENANCE

A. Maintenance Service: A fully equipped authorized service organization capable of guaranteeing response within 8 hours to service calls shall be available 24 hours a day, 7 days a week to service the completed Work.

B. Extra Materials: Provide with each unit, one spare set of air filters. Suitable box and label spare filters as to their usage.

PART 2 PRODUCTS

2.01 SINGLE EVAPORATOR DUCTLESS SPLIT SYSTEM

A. Provide an air-to-air condenser/ heat pump (outdoor unit) in combination with a direct expansion fan-coil heat pump (indoor unit) in the location shown on the Drawings. The units shall be designed and tested for use with Refrigerant R-410A and be equipped with refrigerant line fittings which permit mechanical or sweat connection and shall be in accordance with NYSMC. The electrical requirements, the size, the cooling and heating capacities shall be as indicated on the Drawings.

B. Unit shall be factory assembled, piped, and internally wired. Units shall be UL listed and carry a UL label. Unit shall be factory run-tested to check cooling and heating operation, defrost operation, fan and blower rotation and control sequence. Unit shall be designed to operate at ambient temperature between 115°F and 55°F in cooling mode (as shipped) and between 75°F and -20°F in heating mode.

C. Coil shall be constructed with aluminum plate fins mechanically bonded to copper tubing with all joints brazed.

D. The outdoor unit shall contain a semi-hermetic compressor with crankcase heater, automatically reversible oil pump, internal and external motor protection. Outdoor fan shall be propeller type, with vertical discharge and direct driven by a factory-lubricated motor.

E. Indoor unit shall operate properly on horizontal position (with or without) ductwork. Unit shall have electric resistance heaters as specified for back-up of heat pump heating capacity) and shall contain refrigerant metering device and indoor fan relay. Fan shall be centrifugal type, belt driven.

F. Controls and protective devices shall include a high pressure stat, loss-of-charge pressure stat, crankcase heater, suction line accumulator and pressure relief device. Motor compressor shall have both thermal and current sensitive overload devices. The outdoor unit shall provide short cycle protection or safety lockout compressor protection.

G. Defrost control shall sense need to defrost every 90 minutes based on liquid temperature. On system using multiple units, a defrost interlock control shall be

provided. A 24-volt transformer shall be factory installed and wired on outdoor units for external control circuit.

H. System accessories shall include indoor thermostat, outdoor thermostat, head pressure control, heat pump piping package, return air grille, filters, electric resistant heaters, discharge air grille and plenum, suspension package, indoor coil defrost thermostat, sub-base, fan and drives, outdoor fan cycling thermostat, emergency heat control package, compressor short cycle protection and sequencer control.

I. Each unit shall have the cooling and heating capacity, phase, voltage and amperage shown on the Drawings. Provide a metal name plate securely attached to the side of the unit (outdoor and indoor), readily visible. The name plate shall have inscribed on it, the following information in clear and legible lettering, manufacturer's name, Model No., month and year of installation, BTUH Rating, voltage and current rating for each unit.

J. The maximum radiated outdoor unit sound power levels shall be as follows:

Center Frequency (Hz)	**63**	**125**	**250**	**500**	**1000**	**2000**	**4000**	**8000**
Band Designation	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**
Db								

PART 3 EXECUTION

3.01 INSTALLATION

A. Air Conditioners:
1. Install air conditioners on roof curbs in complete accordance with the manufacturers' printed instructions, and as indicated.
2. Provide all piping, electrical and ductwork connections to air conditioners through roof curb openings under units.

3.02 FIELD QUALITY CONTROL

A. Preliminary Requirements: Employ the services of a Company Field Advisor of the rooftop air conditioner manufacturer for the following:
1. Inspect air conditioner installations prior to start-up.
2. Supervise initial start-up of machine.
3. Instruction of State Personnel.
4. Service.

B. Pre-Start-Up, Start-Up and Instruction: Upon completion of the installation of the air conditioner, to the satisfaction of the Company Field Advisor, start-up

and preliminary testing shall be accomplished under the Company Field Advisor's supervision. When all necessary adjustments have been made and air conditioner is properly operating, the Company Field Advisor shall instruct State Personnel in the operation and maintenance of the air conditioner and accessories. Provide a minimum of ___8_____ hours for instruction purposes exclusive of all pre-start-up and start-up time.

END OF SECTION

SECTION 260010
GENERAL PROVISIONS FOR ELECTRICAL WORK

PART 1 - GENERAL

1.01 SCOPE OF WORK

A. Provide labor, materials, tools, machinery, equipment, and services necessary to complete the Electrical Work under this Contract. All systems and equipment shall be complete in every aspect and all items of material, equipment and labor shall be provided for a fully operational system and ready for use. Coordinate the work with the work of the other trades in order to resolve all conflicts without impeding the job progress.

B. When an item of equipment is indicated on a floor plan and not shown on associated riser diagram or vice-versa, the Contractor shall provide said item and all required conduit and wiring connections for a complete system as part of the Contract.

C. All penetrations made into other trades work (e.g. wires, electrical boxes, penetrating ductwork, etc.) are to be sealed to air tight/watertight condition. Penetrations through insulated systems, such as refrigerated rooms/equipment, etc., shall be insulated and sealed on both sides of penetration. Sealant on interior side of such insulated spaces/equipment shall be silicone recommended by manufacturer.

1.03 EXAMINATION OF SITE

A. The Contractor shall be held to have examined the site and to have compared it with the Drawings and Specifications, and deemed to have been satisfied as to the conditions existing at the site, as relating to the actual conditions of the site at the time estimating the Work, the storage and handling of materials, and all other matters as may be incidental to the Work under the Contract, before bidding, and no allowance will subsequently be made to the Contractor by reason of any error due to the Contractor's neglect to comply with the requirements of this clause.

1.04 RELATED DOCUMENTS

A. Drawings and General Provisions of the Contract.

1.05 ELECTRICAL EQUIPMENT

A. All electrical equipment shall be the latest of the current year in design, material and workmanship, and shall be the type or model called for in these Specifications.

B. If the type or model specified has been superseded by a later type or model, the latest shall be submitted for approval and shall be provided as part of the Contract.

1.06 SUBMITTALS

Provide as outlined in each individual section of these Specifications, including but not limited to:

A. Product Data: Submit manufacturer's product data for equipment including capacity, performance charts, test data, materials, dimensions, weights, and installation instructions.

B. Shop Drawings: Submit manufacturer's shop drawings indicating dimensions, weight loading, required clearances, location**,** and method of assembly of components.
Submittals are mandatory as noted in the respective specifications. Schedules, installation instructions, startup manuals, operation and maintenance manuals, and shop drawings are always required to be submitted.

C. Samples

D. Special Warranty

E. Quality Assurance submittals

F. Operation and Maintenance Manuals

G. Test results and certificates

H. Manuals.

1.07 COORDINATION DRAWINGS

A. Coordination Drawings: The Electrical contractor shall cooperate with the HVAC, P&D, and Fire Protection Systems contractors in the development of the coordination drawings. The drawings, indicating ductwork, steam, hydronic & fuel piping, etc. shall be generated by the HVAC contractor, who in turn is to provide them to the Electrical contractor for the inclusion of electrical work in this coordination set. This is after the P&D and Fire Protection Systems contractors have entered their information in the set. The specified order in which the trade contractors impose their work on the coordination drawings is not intended to grant priority to any one trade contractor in the allocation of space. At the completion of this phase, hold a coordination meeting to eliminate any interference among the trades that the drawings indicate and to avoid any conflicts in installing the Work.

1.08 BUREAU OF ELECTRICAL CONTROL – NOT USED

1.09 WORK IN EXISTING BUILDINGS

A. Removals, Replacements, Adjustments

1. The Contractor shall remove, relocate, replace, adjust or adapt, all existing conduit, wiring and other electric equipment or apparatus, as required, to provide a complete installation.

2. The Work shall include, providing all materials, all necessary extensions, connections, cuttings, repairing, adapting and other Work incidental thereto, together with such temporary connections as may be required to maintain service pending the completion of the permanent Work. All Work shall be left in good working order and in a condition equal to the adjacent new or existing Work.

B. Care in Removing Existing Conductors

1. The Contractor shall use due care and diligence in removing existing conductors from existing conduits in order to prevent conductors from breaking and becoming an irretrievable obstruction within the conduits.

C. Cutting and Repairing

1. Whenever the cutting, or drilling, or removal of any part of the structure (ceilings, walls, floors, shelving, bookcases, partitions, etc.), is required in order to remove, relocate, alter or install any article of electrical equipment (including conduits, boxes, fittings, etc.), the Contractor shall perform all cutting, drilling, etc., and remove the section of structure required. After removal and installation of the electric equipment, the Contractor shall repair the section of structure, as directed by the Owner's Representative, with new materials, equal to that of adjacent structure of the same type.

   Note that in general, all holes through existing structures for conduit installation shall be core drilled, unless prior written approval is provided by the Owner.

   Contractor shall use extreme care when core drilling to avoid damaging the existing infrastructure.

   Whenever holes are cut in fire-rated walls or floor slabs in order to permit the installation of conduit or electrical equipment, these holes shall be repaired with material that will restore the fire rating of the wall or floor slab to its original condition. This material shall be approved by MEA for this use.

2. The Contractor shall paint all repaired areas of the building. The paint shall match the paint of adjacent surface areas, or extend to the nearest architectural break-line, as directed.

3. Wherever any part of the structure is marred or damaged, the Contractor shall repair the damaged or marred areas of the structure.
4. Where a piece of electrical equipment is removed, the Contractor shall finish that part of the surface to match surroundings.

D. Disturbance of Asbestos-Containing Material

1. In the Work of this Contract, the Contractor may find it necessary to support conduit, outlet boxes, or electric equipment from wall or ceiling surfaces which contain asbestos that has been encapsulated. The Contractor may also find it necessary to cut or drill through these surfaces.

   Where this occurs, the Contractor must take all precautions required by law when disturbing asbestos-containing material.

E. Damaged Apparatus: Should any damage, due to the execution of this Contract, occur to the furniture, fixtures, or any equipment or apparatus, such damage shall be properly repaired and/or replaced by the Contractor without charge.

F. Non-Interruption of Services

1. It is imperative that all existing services (electric, light, power, fire alarm, telecommunications, etc.) be kept in operation at all times, unless prior written approval is received from the Owner.

2. Provide fire watch services, as necessary, during disruption of fire alarm system.

G. In all cases where power to any equipment needs to be shut down, this must be done with the permission and in coordination with the Owner. In all such cases, the power source must be properly locked, as required by NEC, and the keys handed over to the Owner until such time that the power needs to be turned back on.

1.10 TESTS

A. The Contractor shall make all tests, including insulation resistance test using a megger, required by the Owner's Representative to provide complete data which in the Owner's Representative's opinion is necessary and sufficient to prove that equipment, or any component part thereof (including wiring), meets the requirements of the Specifications, and the New York State Building Code.

B. Such tests shall be made before, during and/or after installation of the equipment, at any time convenient and suitable to the Owner's Representative.

C. The Contractor shall provide all apparatus, meters, conductors, equipment and labor required by the Owner's Representative for such tests; shall make any and all connections necessary; shall dismantle any piece of equipment where necessary for making tests; and in other ways render all assistance necessary. After satisfactory test results have been obtained the Contractor shall remove the testing equipment and restore the site and equipment to proper operating conditions.

D. All defects found as a result of such tests shall be immediately corrected. Defective parts, or parts found not to be in accordance with the Specifications shall be immediately replaced with proper parts, all to the satisfaction of the Owner's Representative.

1.11 CLEANING AND REPAIR

A. On completion of installation, inspect interior and exterior of installed equipment. Remove paint splatters and other spots. Vacuum dirt and debris; do not use compressed air to assist in cleaning. Repair exposed surfaces to match original finish.

C. Contractor shall not leave sharp exposed metal edges (bottom of threaded rods, electrical equipment supports, etc.) that could otherwise present safety hazards to the building's occupants/work staff.

1.12 ORDINANCES, PERMITS, FEES, ETC.

A. The Contractor is required, at its own cost and expense, to obtain all necessary permits from all municipal or public authorities. The Contractor shall give all notices required by law, municipal ordinances, the rules and regulations of the various Municipal Bureaus and Departments and, as a part of the Contract, comply with all Municipal Ordinances or Regulations that may be applicable to this Work, together with all orders of the following:

1. Fire Department.

B. Should it be necessary to open the street pavement in the performance of this Contract, the Contractor shall pay the costs of the municipal agencies involved, to supervise the Work of excavating, backfilling and relaying pavements, etc., at such rate as required by Municipal Agency. The Contractor shall comply with the requirements of Article 10 of the New York State Labor Law, Rule 23, Rule 8 Industrial Code, State of New York, Department of Labor, latest edition, and all amendments thereto, insofar as the provision of such law is applicable to the Work.

C. Attention is called to provisions of the Building Code regarding support of walls adjoining excavations, sidewalk sheds, scaffolding, roofs of adjoining buildings, floors to be filled in or covered, protection of floors, openings, overloading, etc., which provisions shall be complied with.

D. Certificates:

1. The Contractor shall provide and deliver to the Owner's representative all permits and certificates of approval issued by the various Departments in connection with this work, before the certificate for final payment is issued.

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SECTION 260521
LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES

PART 1 – GENERAL

1.01 RELATED DOCUMENTS

1. None.

1.02 DESCRIPTION OF WORK

A. Install all conductors as indicated on the Drawings, as specified, or as required for the proper operation of the various systems specified. All connections shall be made complete, and all systems shall be energized and tested for proper operation.

B. The Drawings generally indicate the wiring required for the installation and proper operation of the systems specified. If the Contractor chooses to install a system requiring different wiring, any alternate material and labor required to furnish and install the wiring for the new alternate system shall be furnished by the Contractor as part of this Contract without extra cost to the Owner.

C. All safety devices, such as pressure controls, fire controls, relays, etc., shall have their electric switching mechanism connected to the ungrounded conductor or conductors.

D. Control Wiring for Safety devices for equipment where failure of operation will cause a hazard to life and property shall comply the New York State Electrical Code.

E. When an item of equipment is indicated on a floor plan and not shown on associated riser diagram or vice-versa, the Contractor shall provide said item and all required conduit and wiring connections for a complete system as part of the Contract.

F. Note is made that grounding conductors required by Code for installation of Greenfield, Sealtite and surface metal raceway are not indicated on the Drawings, but shall nevertheless be provided under this Contract, as required by Code.

1.03 RELATED SECTIONS

A. Section 260533: "Raceway and Boxes".

1.04 QUALITY ASSURANCE

A. Wire manufactured over one year prior to delivery to the site**,** will not be accepted.

B. Tapes for splices or termination shall be dated by the tape manufacturer to indicate that they have been manufactured no longer than six months prior to use in the Work of this Section.

1.05 DELIVERY, STORAGE AND HANDLING

A. Conductors shall be of an approved manufacturer and shall be delivered at the building in original packages or on reels, and shall have the tag of the manufacturer attached thereto indicating:

1. Contractor's name.
2. Project title and number.
3. Date of manufacture (month & year).
4. Manufacturer's name.
5. Data, which explains the meaning of, coded identification (UL assigned electrical reference numbers, UL assigned combination of color marker threads, etc.).

B. Store material in a clean, dry space and protect from weather.

1.06 SUBMITTALS

A. Submit the following:

1. Splice kit materials and installation procedures.
2. Manufacturer's certification that its product meets the Owner's Standards and Specifications.

B. Certificates

Provide affidavit stating that all items used are UL listed and meet the specifications.

B. Submit field test results for wires and cables, including "Megger" readings with the method used

1.07 COLOR CODE ELECTRIC LIGHT AND POWER WIRE

A. Color code for branch circuits and feeders are as follows:

120/208 Volt Circuits Conductors
Black - Phase "A"
Red - Phase "B"
Blue - Phase "C"
White - Neutral
Green - Ground

B. 277/480 Volt Circuit Conductors
Brown - Phase "A"
Yellow - Phase "B"
Orange - Phase "C"
White - Neutral
Green - Ground

Where color coded cable is not available, the contractor shall certify same in writing and request permission for overlap - color taping of conductors (min. length 6" in.) in all visible and accessible locations, pull boxes, junction boxes, outlet boxes, etc.

C. Color code for wiring other than electric light and power, in accordance with ICEA & NEMA WC-30 "Color Coding of Wires."

PART 2 – PRODUCTS

2.01 WIRES AND CABLES

A. General

1. Acceptable Companies

a. American Insulated Wire Corp., Belden Wire & Cable, Cable Corp., Cerro Wire & Cable Corp., Collyer Insulated Wire Co., Ettco Wire and Cable Corp., General Electric Co., Hi-Tech Cable Corp., Philadelphia Insulated Wire Co., Pirelli Cable Corp., Rome Cable Corp., Royal Electric, Southwire Co., or Triangle PWC, Inc.

b. Conductors shall confirm to A.S.T.M. and I.P.C.E.A. standards, and be UL listed and labeled.

c. Conductors shall have 600 volts insulation and shall be of soft-annealed-uncoated copper of 98% conductivity. Copper clad conductors are not acceptable. Conductors No. 10 and smaller for lighting and power shall be solid; conductors No. 8 and larger shall be stranded. Control & communication wiring shall be stranded.

d. All conductors shall have identifiable lettering on the insulator jacket as to voltage rating, wire type, A.W.G. size, insulation, and manufacturer I.D.

2. Conductors in conduit in contact with the earth, in slab contiguous to the earth, outside the building, and service feeders to Main Distribution Boards from Current Transformers shall be type THWN.

3. Conductors shall meet the requirements of the New York State Electrical code.

4. Conductors, for low voltage HVAC controls, such as thermostats, aquastats, indicators etc., shall be type "TF" with not less than 1/32" thermoplastic insulation, colored and labeled as required.

B. Description

1. Type THHN/THWN-75°C, THHN-90°C shall have a thermo-plastic polyvinyl chloride insulation with nylon jacket for 600 volts, and shall comply with ASTM, IPCEA S-61-402 (latest edition) and NEMA WC5 (latest edition).

5. Metal clad cable (MC Cable) of the armored type shall be Type ACTHH with separate green insulated ground in accordance with UL 4. It shall be industry standard, factory fabricated assembly of cross linked polyethylene insulated

nylon jacketed 98% conductivity soft drawn copper conductors, and a flexible metallic covering of interlocked galvanized steel or aluminum. A continuous ground conductor in intimate contact with the armor for the entire cable length shall be included in the assembly. The assembly shall be UL listed rated at 600 volts and 90°C.

6. Armored cable shall be manufactured by AFC/Monogram, General Cable, Triangle, or National Electric Armored cable.

2.02 SPLICES AND TAPES

A. General

1. All splices shall be UL approved and per New York State Electric Code and with accepted practice and good workmanship. The conductivity and physical strength of splices shall be equal to that of the unspliced conductor.

2. All splicing and terminating materials shall be compatible so that no one material will adversely affect the physical or electrical properties of any other, or of the wire or cable itself.

3. All materials for making splices and terminations shall be specifically designed for use with the type of wire or cable, insulation and installation and operating conditions of the specific application. Splices for fire alarm system wiring shall be soldered or mechanically connected, as approved by Code and Fire Department regulations.

4. Grounding conductors and bonding jumpers shall be connected by exothermic welding, listed pressure connectors, listed clamps, or other listed means.

2.03 TAGS

A. Precision engrave letters and numbers with uniform margins, character size minimum 3/16 inches high.

1. Phenolic: Two color laminated engraver's stock, 1/16" minimum thickness, machine engraved to expose inner core color (white).

2. Aluminum: Standard aluminum alloy plate stock, minimum .032" thick, engraved areas enamel filled or background enameled with natural aluminum engraved characters.

PART 3 – EXECUTION

3.01 PREPARATION

A. Prior to pulling wires and cable, clean raceway systems of all foreign matter and perform all operations necessary so as not to cause damage to wires and cables while pulling. Install all conductors in raceways after raceway system is completed.

B. Use approved lubrication when installing cables in conduits and raceways. Any

pulling compounds shall be compatible with the finish of the wires and cables furnished.

C. Prior to pulling wires and cables into underground conduit systems, place a feeding tube at the entrance end of such systems.

D. Shared neutrals shall be permitted except in lighting multiples.

3.02 INSTALLATION

A. General

1. At least 6 inches of free conductor, measured from the point in the box where it emerges from its raceway or cable sheath, shall be left at each outlet, junction and switch point for splices or the connection of luminaries or devices. Where the opening of an outlet, junction or switch point is less than 8 inches in any dimension, each conductor shall be long enough to extend at least 3 inches outside the opening
2. Keep wires and cable clean & dry at all times.
3. Seal wire and cable ends with watertight end seals.
4. Before splicing or terminating wires and cables, make a thorough inspection to determine that water has not entered the wires and cables or that the wires and cables have not been damaged.
5. Use adequate lubrication when installing cables in conduits and raceways. Any pulling compounds shall be compatible with the finish of the wires and cables furnished. No grease, oil, or lubricant other then wire-pulling compounds specified may used to facilitate the installation of conductors.

B. Splices

1. Dry Locations:

a. For Conductors No. 8 AWG or Smaller: Use spring type pressure connectors or indent type pressure connectors with insulating jackets (except where special type splices are required).

b. For Conductors No. 6 AWG or Larger: Use uninsulated indent type pressure connectors. Fill indentions with electrical filler tape and apply insulation tape to insulation equivalent of the conductor, or insulate with heat shrinkable splices.

c. Gutter Taps in Panelboards: Install gutter tap, fill indentions with electrical filler tape and apply insulation tape to insulation equivalent of the conductor, or insulate with gutter tap cover.

2. Damp Locations: As specified for dry locations, except apply moisture-sealing tape over the entire insulated connection (moisture sealing tape not required if heat shrinkable splices are used).

3. Wet Locations: Use uninsulated indent type pressure connectors and insulate with resin splice kits or heat shrinkable splices. Exception: Splices above ground which are totally enclosed and protected in NEMA 3R, 4, 4 x enclosures may be spliced as specified for damp locations.

4. Fire Detection and Alarm System: Soldered connections or mechanical connections approved for the intended use.

C. Identifications of Wires and Cables

1. Each wire and cable shall be identified by its circuit in all cabinets, boxes, manholes, hand holes, wireways and other enclosures and access locations, and at all terminal points.

2. The circuit designations shall be as shown on the Contract Drawing or as approved on shop drawings. Tags shall be attached to wires and cables in such a manner as to be readily visible.

3. The tape ties shall be wrapped around all conductors comprising the circuit or feeder to be identified.

4. Wires and cables, which are arc proofed, shall also be identified outside the applied arc proofing.

D. Terminations

1. For Conductors No. 10 AWG or Smaller: Use terminals for:

   Connecting wiring to equipment designed for use with terminals.

2. For Conductors No. 8 AWG or Larger: use compression or mechanical type lugs for:

   a. Connecting cables to flat bus bars.

   b. Connecting cables to equipment designed for use with lugs.

3. For Conductor Sizes Larger Than Terminal Capacity On Equipment: Reduce the larger conductor to the maximum conductor size that terminal can accommodate (reduce section no longer than 1 ft.). Use compression or mechanical type connectors suitable for reducing connection. Insulate with filler tape and electrical tape specified above. Cutting of cable strands to fit terminal is not acceptable.

4. The temperature rating of all splicing hardware including lugs must match the temperature rating of the conductor. If not properly selected, the conductors ampacity must be derated.

3.03 FIELD TESTS

A. Test all feeder cables installed under this Contract with a 1000-volt Megohmmeter. Furnish the Owner's Representative with a copy of the "Megger" readings together with an outline of the method used. Any cable not attaining 100 meg shall be replaced.

Feeder cables shall be defined as cables feeding service switchgear, distribution panels, power panels, lighting panels, control panels and disconnect switches rated 60 amps. or larger.

3.04 EQUIPMENT GROUNDING CONDUCTOR

A. Note that equipment-grounding conductors are not shown on the Contract Drawings but it shall be provided when and as required by code.

3.05 INSULATED CONDUCTOR SCHEDULE - TYPES AND USE

A. Type THHN/THWN wire

1. Feeder and Branch Circuits

2. Remote-Control Signaling and Power-Limited Circuits: - Circuit Classes 1, 2 or 3, unless otherwise indicated.

B. Type MC Cable - Use in concealed installation of hung ceiling and gypsum board for:

1. Lighting Branch circuit.

2. Power branch circuit**.**

3.06 FEEDERS

A. Where the Drawings indicate, a feeder shall be connected to two or more panelboards; insulated gutter taps shall be employed.

B. Cable supports shall be installed in vertical runs as required. Cable support boxes shall be as specified for pull boxes. Approved cable supports shall be of proper type and size to prevent damage to insulation. Cable supports shall be the equal of OZ/Gedney Manufacturing Co.

3.07 BRANCH CIRCUITS

A. Install branch circuits required to supply electric current from the panelboards to the various lighting fixtures, receptacles or other electrical equipment indicated on the Drawings or described in the Specifications.

B. Branch circuits shall consist of two single conductors of size No. 12 include GND or unless otherwise indicated on Drawings or Specifications.

C. Circuit conductors shall be connected at the panelboards so that numbers adjacent to "home runs" on the Drawings, correspond to numbered circuit breakers.

D. From each recessed fixture install a flexible conduit (between 4 to 6 ft. Greenfield) with approved type of fixture wire, to a suitable junction box rigidly installed in hung ceiling within approximately 1 ft. of opening with access from opening only. Box shall be set on end so cover will face opening. Where this method is used, branch circuit wire shall be used to and between junction boxes, switches and panels, etc.

E. One-half inch flexible conduit will be permitted between fixture and junction box for incandescent units individually mounted 4 ft. and 8 ft. fluorescent units.

3.05 ELEVATOR WIRING

A. The Contractor shall provide power wiring terminating in the breaker in the electrical service room. The Contractor shall also extend power wiring from the disconnect switch in elevator machine room to terminals at the elevator controller. In addition, the Contractor shall furnish and install the following:

1. Circuit breaker(s) in panel to feed a 120 volt circuit to trailer cable for car light.

2. A communication cable from the machine room to the elevator trailer cable for the elevator intercom.

3. Dedicated light with a GFI receptacle, controlled by a switch located in the elevator pit(s).

4. Wiring for elevator recall.

5. Dedicated GFI receptacle(s) in the elevator machine room(s).

6. Power for the sump pump in the elevator pit**.**

END OF SECTION

SECTION 260529

HANGERS AND SUPPORTS FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes the following:

1. Hangers and supports for electrical equipment and systems.

1.3 DEFINITIONS

A. EMT: Electrical metallic tubing.

B. RMC (RGS): Rigid metal conduit (Rigid Galvanized Steel Conduit).

1.4 PERFORMANCE REQUIREMENTS

A. Delegated Design: Design supports for multiple raceways, including comprehensive engineering analysis by a qualified professional engineer, using performance requirements and design criteria indicated.

B. Design supports for multiple raceways capable of supporting combined weight of supported systems and its contents.

C. Design equipment supports capable of supporting combined operating weight of supported equipment and connected systems and components.

D. Rated Strength: Adequate in tension, shear, and pullout force to resist maximum loads calculated or imposed for this Project, with a minimum structural safety factor of five times the applied force.

1.5 ACTION SUBMITTALS

A. Product Data: For the following:

1. Steel slotted support systems.

B. Shop Drawings: Show fabrication and installation details and include calculations for the following:

1. Steel slotted channel systems. Include Product Data for components.
2. Equipment supports.

1.6 INFORMATIONAL SUBMITTALS

A. Welding certificates.

1.7 QUALITY ASSURANCE

A. Welding: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."

B. Comply with NFPA 70.

1.8 COORDINATION

A. Coordinate installation of equipment supports, and roof penetrations.

PART 2 - PRODUCTS

2.1 SUPPORT, ANCHORAGE, AND ATTACHMENT COMPONENTS

A. Steel Slotted Support Systems: Comply with MFMA-4, factory-fabricated components for field assembly.

1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
2. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Allied Tube & Conduit.
b. Cooper B-Line, Inc.
c. ERICO International Corporation.
d. GS Metals Corp.
e. Thomas & Betts Corporation.
f. Unistrut; Atkore International.
g. Wesanco, Inc.

3. Metallic Coatings: Hot-dip galvanized after fabrication and applied according to MFMA-4.
4. Painted Coatings: Manufacturer's standard painted coating applied according to MFMA-4.

5. Channel Dimensions: Selected for applicable load criteria.

B. Raceway and Cable Supports: As described in NECA 1 and NECA 101.

C. Conduit and Cable Support Devices: Steel/ steel and malleable iron hangers, clamps, and associated fittings, designed for types and sizes of raceway or cable to be supported.

D. Support for Conductors in Vertical Conduit: Factory-fabricated assembly consisting of threaded body and insulating wedging plug or plugs for non-armored electrical conductors or cables in riser conduits. Plugs shall have number, size, and shape of conductor gripping pieces as required to suit individual conductors or cables supported. Body shall be malleable iron.

E. Structural Steel for Fabricated Supports and Restraints: ASTM A 36/A 36M, steel plates, shapes, and bars; black and galvanized.

F. Mounting, Anchoring, and Attachment Components: Items for fastening electrical items or their supports to building surfaces include the following:

1. Powder-Actuated Fasteners: Threaded-steel stud, for use in hardened portland cement concrete, steel, or wood, with tension, shear, and pullout capacities appropriate for supported loads and building materials where used.

   a. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
   b. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

      1) Hilti, Inc.
      2) ITW Ramset/Red Head; Illinois Tool Works, Inc.
      3) MKT Fastening, LLC.
      4) Simpson Strong-Tie Co., Inc.

2. Mechanical-Expansion Anchors: Insert-wedge-type, stainless steel, for use in hardened portland cement concrete with tension, shear, and pullout capacities appropriate for supported loads and building materials in which used.

   a. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
   b. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

      1) Cooper B-Line, Inc.
      2) Empire Tool and Manufacturing Co., Inc.
      3) Hilti, Inc.
      4) ITW Ramset/Red Head; Illinois Tool Works, Inc.
      5) MKT Fastening, LLC.

3. Concrete Inserts: Steel or malleable-iron, slotted support system units similar to MSS Type 18; complying with MFMA-4 or MSS SP-58.
4. Clamps for Attachment to Steel Structural Elements: MSS SP-58, type suitable for attached structural element.
5. Through Bolts: Structural type, hex head, and high strength. Comply with ASTM A 325.
6. Toggle Bolts: All-steel springhead type.
7. Hanger Rods: Threaded steel.

PART 3 - EXECUTION

3.1 APPLICATION

A. Comply with NECA 1 and NECA 101 for application of hangers and supports for electrical equipment and systems except if requirements in this Section are stricter.

B. Maximum Support Spacing and Minimum Hanger Rod Size for Raceway: Space supports for EMT, IMC, and RMC as required by NECA 1 and other NFPA 70 standards applicable. Minimum rod size shall be 1/4 inch (6 mm) in diameter.

3.2 SUPPORT INSTALLATION

A. Comply with NECA 1 and NECA 101 for installation requirements except as specified in this Article.

B. Raceway Support Methods: In addition to methods described in NECA 1, EMT, RGS may be supported by openings through structure members, as permitted in NFPA 70.

C. Strength of Support Assemblies: Where not indicated, select sizes of components so strength will be adequate to carry present and future static loads within specified loading limits. Minimum static design load used for strength determination shall be weight of supported components plus 200 lb (90 kg).

D. Mounting and Anchorage of Surface-Mounted Equipment and Components: Anchor and fasten electrical items and their supports to building structural elements by the following methods unless otherwise indicated by code:

1. To Wood: Fasten with lag screws or through bolts.
2. To Masonry: Approved toggle-type bolts on hollow masonry units and expansion anchor fasteners on solid masonry units.
3. To Existing Concrete: Expansion anchor fasteners.
4. Instead of expansion anchors, powder-actuated driven threaded studs provided with lock washers and nuts may be used in existing standard-weight concrete 4 inches (100 mm) thick or greater. Do not use for anchorage to lightweight-aggregate concrete or for slabs less than 4 inches (100 mm) thick.
5. To Steel: Welded threaded studs complying with current applicable cods, with lock washers and nuts.
6. To Light Steel: Sheet metal screws.

7. Items Mounted on Hollow Walls and Nonstructural Building Surfaces: Mount cabinets, panelboards, disconnect switches, control enclosures, pull and junction boxes, transformers, and other devices on slotted-channel racks attached to substrate by means that meet seismic-restraint strength and anchorage requirements.

E. Drill holes for expansion anchors in concrete at locations and to depths that avoid reinforcing bars.

3.3 INSTALLATION OF FABRICATED METAL SUPPORTS

A. Cut, fit, and place miscellaneous metal supports accurately in location, alignment, and elevation to support and anchor electrical materials and equipment.

B. Field Welding: Comply with AWS D1.1/D1.1M.

3.4 PAINTING

A. Touchup: Clean field welds and abraded areas of shop paint. Paint exposed areas immediately after erecting hangers and supports. Use same materials as used for shop painting. Comply with SSPC-PA 1 requirements for touching up field-painted surfaces.

1. Apply paint by brush or spray to provide minimum dry film thickness of 2.0 mils (0.05 mm).

B. Galvanized Surfaces: Clean welds, bolted connections, and abraded areas and apply galvanizing-repair paint to comply with ASTM A 780.

END OF SECTION

SECTION 260533
RACEWAY AND BOXES

PART 1 – GENERAL

1.01 RELATED DOCUMENTS

1. None.

1.02 SCOPE

A. Provide raceways, fittings, boxes and accessories indicated on the Drawings, herein specified or required for the complete and proper operation of the systems specified or indicated on the Drawings.

B. All power wiring shall be installed in rigid galvanized conduit.

C. Low voltage systems shall be installed in RGC, EMT, and surface metal raceway or in a dedicated cable tray as indicated on the drawings.

The following exceptions shall be observed however:

1. Fire alarm system wiring shall be installed in RGC throughout, as required by code.
2. Branch circuit wiring and low voltage wiring in elevator shaft or elevator pit shall be in RGC.

D. Where the Contractor selects and installs an item of equipment which requires either additional conduit, boxes, fittings, etc., or a modification of the conduit system indicated on the Drawings, such additional conduit, boxes, fittings, etc., shall be provided and such modifications shall be performed by the Contractor as part of this Contract and without extra compensation from the Owner.

E. The Contractor shall coordinate the work with all trades so that the completed installation, particularly partitions and walls, will present a finished appearance. There shall be no structural malformation caused by improper installation of electrical equipment and no observable spaces between electrical equipment and the structure.

PART 2 – PRODUCTS

2.01 RACEWAYS

A. Rigid Galvanized Steel Conduit (RGC)

1. Rigid conduit shall be in standard lengths with manufacturer's name, nominal diameter and Underwriters label (U.L.) stamped on each length.

Material shall be galvanized steel. RGC shall meet the requirements of Article 344 of the National Electrical Code.

B. Electric Metallic Tubing (EMT)

Industry standard conduit with Underwriters Laboratories label stamped on each length.

C. Flexible Metal Conduit

Galvanized steel strip shaped into interlocking convolutions, UL categorized as Flexible Metal Conduit (identified on UL Listing Mark as Flexible Steel Conduit or Flexible Steel Conduit Type RW), as manufactured by American Flexible Conduit Co., Cerro Conduit Co., Ettco Wire and Cable Corp., or International Metal Hose Co.

D. Armored Cable (BX)

Metal clad cable of the armored type (commonly known as BX) shall be type AC. It shall be industry standard, factory fabricated assembly of cross linked polyethylene insulated nylon jacketed 98% conductivity soft drawn copper conductors, and a flexible metallic covering of interlocked galvanized steel or aluminum. A continuous ground conductor in intimate contact with the armor for the entire cable length shall be included in the assembly. The assembly shall be UL listed and rated 600 volts, 90°C.

Armored cable shall be manufactured by AFC/Monogram, General Cable, Triangle, or National Electric.

E. Liquidtight Flexible Metal Conduit

Anaconda Metal Hose Anamet Inc.'s Sealtite Type UA, Electri-Flex Co.'s Type LA Liquatite, Flexible Technology Corp.'s Type UA, or Universal Metal Hose Co.'s Universal Sealflex U.

F. Rigid Nonmetallic Conduit, Fittings, and Accessories – Not Used.

G. Surface Metal Raceway, Fittings and Accessories

As manufactured by Walker Div. of Butler Mfg. Co. or Wiremold Co.

1. Raceways shall be complete with backing. Approved fittings shall be used at all bends and terminals.

H. Plastic Coated Rigid Metal Conduit, Fittings, and Accessories:

Rigid galvanized metal conduit, fittings, and accessories coated with 40 mils thick polyvinylchloride coating; Occidental Coating Co.'s Ocal 40, Protective Coatings Developments Inc.'s Kor-Kap, or Robroy Industries' Plastibond System.

2.02 FITTINGS AND ACCESSORIES

All fittings and accessories must be U.L. approved and compatible with selected raceways. Compression fittings shall be provided with the installation of EMT.

A. Insulated Bushings

B. Plastic Bushings for 1/2" and 3/4" Conduit
C. Insulated Grounding Bushings

D. Connectors, Couplings and Locknuts

E. Conduit Bodies (Threaded)

Malleable Iron/Zinc Electroplate: Zinc electroplate malleable iron or cast iron alloy bodies with zinc electroplate steel covers.

F. Expansion Fittings

Zinc Electroplate Finish with external bonding jumper.

G. Connectors and Couplings

Waterproof Hub connectors shall be used on all exterior installations. T&B # 370.

H. Deflection Fittings

I. Sealing Fittings

J. Expanding Silicone Foam

K. Vertical Conductor Supports

L. Drag Line

1/8" polypropylene monofilament utility rope.

2.03 CONDUIT SIZES

A. The sizes of conduits and raceways indicated on the Drawings are the minimum acceptable by the Owner's Representative for the number of conductors to be installed. Where neither Drawings nor the Specifications indicate a size, conduits shall be not less than 3/4 inch size (nominal diameter) or of such larger size as required by the New York State Electric Code for the number of conductors specified or indicated on the Drawings.

Where the Drawings or the Specifications indicate existing conduit is to be extended, the new conduit extension shall be the same size as the conduit extended, unless otherwise specified in the Drawings or the Specification.

2.04 INSULATED BUSHINGS

A. All conduits having a nominal diameter of 1-inch or larger shall be equipped with insulated bushings meeting either of the following requirements:

1. Metal bushings, cadmium plated and insulated with Bakelite.
2. Bushings of heat treated aluminum alloy with phenolic treated fiber insulation.

2.05 HANGERS AND STRAPS

A. Hangers

Separate hangers shall be installed for supporting conduits. Wherever possible hangers shall be supported from concrete slab by inserts. Prefabricated adjustable metal channel framing and associated fittings the equal of Kindorf, Unistrut, Power-Strut or Binkley will be acceptable in lieu of hangers if of equal mechanical strength.

Hangers and fittings shall be rust resistant treated and where installed concealed in hung ceilings need not be painted. Where installed exposed, apply finish coat of aluminum paint or color to match, as approved. Conduits on hangers shall be firmly attached to each hanger by using approved "U" bolts or straps.

Hangers and piping installed by other trades shall not be used for supporting electric conduits.

B. Straps and backs

Straps shall be properly formed to rigidly support conduits, and to properly space conduits from each other and from the ceiling or wall; minimum acceptable thickness shall be 1/16". Straps shall be galvanized or cadmium plated after they have been formed and drilled.

Maximum spacing of straps shall be five (5) feet for conduits not mounted on hangers.

Straps for use on the exterior of the building or in pipe tunnels shall be hot dipped galvanized.

C. Vertical Supports

At each floor provide rust resistant iron conduit clamps or other approved support at floor slabs on all vertical feeder conduits. Supports shall be as manufactured by Kindorf, Steel City, OZ/Gedney and Kellem.

2.06 SLEEVES FOR CONDUIT

A. Provide sleeves for all electrical conduits passing through foundation, floors, roofs, beams, and at other areas where indicated on Drawings. Provide as detailed on Drawings and as specified herein.

1. Interior floors' roofs: Provide galvanized sheet steel sleeve, 20 gauge. Provide 1" flange at bottom end for securing purposes. Sleeve ends flush with ceiling surfaces, and top of finished floors or roof.

2. Sleeves passing through fire-rated walls, floors, roofs, ceilings, and other areas where indicated: the space between sleeve and pipe/conduit shall be fire stopped to comply with fire rating of assembly through which it passes.

PART 3 – EXECUTION

3.01 RACEWAY INSTALLATION - GENERAL

A. General Requirements for Raceway

1. Make all cuts square.
2. Ream out all burrs from ends.
3. Couple sections together utilizing fittings specifically designed for use with the raceway.
4. Make up raceway to cabinets and boxes utilizing steel or malleable iron fittings with insulated throats, and specifically designed for the purpose.
5. Equip all conduit runs, which cross building expansion or control joints with expansion fittings having flexible grounding bonds by passing sliding parts. Arrange expansion fittings so that sliding action is not impeded.
6. During installation, cap all runs left unfinished or unattended. Also cap terminations of finished runs until wires and cables are to be pulled in. For capping, utilize fittings manufactured specifically for the purpose. Exclude paper or wood plugs.
7. Where embedded in concrete, utilize concrete compression type couplings, connectors and fittings of a type, which assures ground continuity.
8. Coat all threads with conductive, oxide inhibiting compound.

B. Provide EMT for feeders and branch circuits for power, lighting and low voltage systems.

C. Number of Raceways

Do not change number of raceways to less than the number indicated on the Drawings unless prior approval is received. Existing raceways may be reused if the Contractor meets the following conditions:

1. The existing raceway must be of adequate size for the new conductors to be installed therein. More circuits may be enclosed by existing raceways than the circuiting shown on the Drawings provided conductor sizes are increased to compensate for derating.
2. Remove existing conductors.
3. Demonstrate to the Owner that the existing raceway is clear of obstructions and in good condition.
4. Check ground continuity. When ground continuity of existing raceway is inadequate, install insulated grounding bushings, grounding wedges, bonding straps, grounding jumpers or equipment grounding conductors to establish effective path to ground.
5. Install insulated bushings to replace damaged or missing bushings. Replace non-insulated bushings with insulated bushings on raceway sizes 1" and larger.

6. Install vertical conductor supports to replace existing or missing vertical conductor supports.

7. Install extension collars on existing boxes when the number of new conductors installed therein exceeds code.

D. Raceways for Future Use (Spare and Empty Raceways)

Draw fish tape through raceways in the presence of the Owner's Representative to show that the raceway is clear of obstructions.

1. Install a dragline in each raceway.

E. Conduit Installed Concealed in Existing Construction

In existing buildings new conduit systems shall be installed, in the following manner:

1. Where new partition walls and new hung or furred ceilings are being erected the conduits and related equipment shall be installed concealed in walls and in hung or furred ceilings.

2. Rigid Conduits must be used for conductors of the fire alarm system stairway lights, and exposed feeders.

F. Conduit Installed Concealed in New Construction

1. Ceilings, Walls, Partitions: Install conduit concealed in the ceilings, walls, and partitions of the building unless otherwise indicated on the Drawings.

   a. Run conduits in partitions vertically.

2. The Contractor shall not cut any hole larger than six (6) inches except where otherwise directed in the Contract, and where the opening if larger than six inches it shall be reinforced by other trades.

G. Conduit Installed Exposed

1. Work shall be done in neat and workmanlike manner at right angles and parallel to building walls and structure.

2. Install vertical runs perpendicular to floor.

3. Install runs on the ceiling perpendicular or parallel to the walls.

4. Install horizontal runs parallel to the floor.

5. Do not run conduits near heating pipes.

6. Installation of conduit directly on the floor will not be permitted.

H. Conduit Size: Not smaller than 3/4" electrical trade size.

I. Conduit Bends

For 3/4" conduits, bends may be made with manual benders. For all conduit sizes larger than 3/4" manufactured or field fabricated offsets or bends may be used. Make field fabricated offsets or bends with an approved mechanical/hydraulic bender.

3.02 RACEWAY SCHEDULE

A. Rigid Galvanized Steel Conduit (RGC)

1. Install in all locations, unless otherwise specified or indicated on the Drawings, including but not limited to the following:

   a. Conduits installed exposed up to 7'-0" AFF. Exposed risers shall be RGC for the entire vertical run.

   b. Rigid conduit shall be used for exposed work in Mechanical Spaces and in unfinished sections of the building.

   c RGC shall be used for the Fire Detection and Alarm System including the Smoke Purge System, Elevator Recall System, and Visual Annunciator System.

B. Electrical Metallic Tubing (EMT)

Provide EMT for feeders and branch circuits for power, lighting and low voltage systems.

C. Flexible Metal Conduit

Install for all connections to vibrating equipment, or as otherwise specified and as detailed as follows:

1. Use for final conduit connection to recessed lighting fixtures in suspended ceilings. Use 4 to 6 ft. of flexible metal conduit (minimum size 1/2") between junction box and fixture. Locate junction box at least 1 ft. from fixture and accessible if the fixture is removed.
2. Use 1 to 3 ft. of flexible metal conduit for final conduit connection to:

   a. Emergency lighting battery units.

   b. Motors with open, drip-proof or splash-proof housings.

   c. Equipment subject to vibration (dry locations).

   d. Equipment requiring flexible connection for adjustment or alignment (dry locations).

3. Use for concealed branch circuit conduits above existing non-removable suspended ceilings where conduit cannot be installed due to inaccessibility of space above ceiling.
4. May be installed concealed as branch circuit conduits in drywall construction with sheet metal studs, except where studs are less than 3-1/2" deep.
5. Flexible steel conduit shall be attached to boxes or to rigid conduits by means of connectors having twin screw fastenings, or other approved type, each of which will separately and securely hold the flexible conduit in place.
6. In all cases install equipment-grounding conductor in the flexible raceway and bond at each box or equipment to which flex is connected. The Contractor is advised that grounding conductors are not shown on the Drawings.

D. Liquidtight Flexible Metal Conduit

1. Use 1 to 3 ft. of liquidtight flexible metal conduit for final conduit connection to:

   a. Motors with weather-protected or totally enclosed housings.

   b. Equipment requiring flexible connection for adjustment or alignment (damp and wet locations).

E. Surface Metal Raceway

Use surface metal raceway in finished spaces at locations indicated on the Drawings only.

1. Use surface metal raceway system of size required for number of wires to be installed therein.

2. Do not run raceway through walls or floors. Install a pipe sleeve, or a short length of conduit with junction boxes or adapter fittings for raceway runs through such areas. Run raceway along top of baseboards, care being taken to avoid telephone and other signal wiring. Where raceway crosses chair railing or picture molding, cut the chair railing or picture molding to permit the raceway to lie flat against the wall. Run raceway around doorframes and other openings. Run raceway on ceiling or walls perpendicular to or parallel with walls and floors.

3. Secure one-piece raceway every 36" alternately with one-hole straps, and support clips (strap, support clip, strap, etc.). Secure 2-piece raceway every 36" alternately with straps and fasteners through back of raceway (strap, fastener through back, strap, etc.).

4. Install separate grounding conductor-grounding equipment. The raceway alone will not be considered suitable for use as an effective path to ground. The Contractor is hereby advised that the required grounding conductors for surface raceways are not shown on the Drawings.

5. Outlet box covers for pendant mounted fluorescent fixtures may be omitted if the fixture canopy is notched to receive the raceway and the canopy fits snugly against the ceiling.

6. Where equipment is mounted on an outlet box and the equipment base is larger than the outlet box, provide finishing collar around equipment base and outlet box or provide finishing collar/outlet box:

   a. Finishing Collar: Same finish and peripheral dimensions as the equipment base, including provisions for mounting, slots to fit over raceway and of depth to cover outlet box and extend back to ceiling or wall.

   b. Combination Finishing Collar/Outlet Box: Same finish and peripheral dimensions as the equipment base to be mounted thereon, gauge or thickness of metal as required by National Electrical Code, including provision for mounting and knockouts for entrance of raceway.

F. General Requirements for Raceway

1. Make all cuts square.
2. Ream out all burrs from ends.
3. Couple sections together utilizing fittings specifically designed for use with the raceway.
4. Make up raceway to cabinets and boxes utilizing steel or malleable iron fittings with insulated throats, and specifically designed for the purpose.
5. Equip all conduit runs, which cross building expansion or control joints with expansion fittings having flexible grounding bonds by passing sliding parts. Arrange expansion fittings so that sliding action is not impeded.
6. During installation, cap all runs left unfinished or unattended. Also cap terminations of finished runs until wires and cables are to be pulled in. For capping, utilize fittings manufactured specifically for the purpose. Exclude paper or wood plugs.
7. Where embedded in concrete, utilize concrete compression type couplings, connectors and fittings of a type, which assures ground continuity.
8. Coat all threads with conductive, oxide inhibiting compound.

3.03 FITTINGS AND ACCESSORIES SCHEDULE

A. All fittings and accessories must be UL listed and compatible with selected raceways and suitable for use location. Compression fittings shall be provided with the installation of EMT.

3.04 FLOOR AND WALL PENETRATIONS

A. Plug all penetrations through fire rated floors and walls with a three hour rated, fire stop penetration kit as manufactured by Hevi-Duty/Nelson or approved equal, consisting of:

1. Type CMP Firestop Compound or an approved equal.
2. 7" x 7" panel (large penetrations).
3. Type CLK Firestop Caulk.
4. Panel support material and ceramic fiber as required, to be utilized for large penetrations.

3.05 EXISTING RACEWAYS

A. Remove all existing unused exposed conduits and other related equipment in the areas to be refurbished. All existing concealed conduits not indicated to be reused shall be abandoned. Any existing conduits to be reused shall be cleaned to remove scale and burrs.

3.06 ROUTING OF CONDUITS

A. The routing of conduits, as shown on the Drawings, is approximate, only unless dimensions are indicated. Conduit runs as shown on risers and Drawings are generally diagrammatic. The Contractor shall follow the general routing shown on the risers or Drawings (e.g. whether overhead or underneath) and furnish and install all necessary offsets, fittings, wiring and miscellaneous hardware, to run from one point to another. The actual routing shall be subject to the approval of the Owner's Representative.

B. Conduits shall not be run above or in close proximity to boilers or hot pipes; nor shall conduits be run directly beneath water pipes.

C. Exposed conduits shall be rigidly fastened to structure, or to rigid hangers or angle irons connected to structure at intervals not exceeding eight (8) ft. Exposed conduits crossing expansion joints, conduits shall have approved expansion fittings in line or at the pull box.

D. Where the conduits or surface metal raceways are installed exposed they shall follow the architectural lines of the enclosure and shall be run as to be as inconspicuous as possible. Conduits or surface metal raceways shall not be installed diagonally on ceilings, walls or columns.

3.07 CONCEALED CONDUITS

A. Conduits from distribution points such as panelboards, fire signal control board, sound control cabinet, inter-connecting boxes, and the like, to outlets for switches, receptacles, lighting fixtures, fire signal stations, bells, buzzers, horns, telephones, clocks, loudspeakers, etc., and between these outlets shall be installed concealed where possible and installed in accordance with approved Shop Drawings.

1. Conduits in Hung and Furred Ceiling:

   a. In hung ceilings the conduits must be run so as not to interfere with pipes or ducts. Groups of conduits shall be suspended above the hung ceiling upon separate hangers installed by the Contractor. Hangers will not be required for conduits to and between outlets of lighting fixtures located on or in hung ceilings or to wall switch.

   b. Single conduits may be laid on and fastened to angle supports of the hung and furred ceilings.

3.08 CONDUITS FOR MOTORS

A. Prior to installing conduits for motors, the Contractor shall verify locations of motor connections with trades furnishing motors and shall run conduits accordingly.

3.09 PAINTING

A. All exposed conduits and raceways in unfinished portions of the building, such as the cellar, etc., including boxes of all kinds, except those of motor control equipment, (manufacturers motor control housings) shall not be painted. All exposed conduits and raceways including boxes in finished parts of the building shall be painted. Painting shall consist of a prime coat and a finished coat, color as selected. Factory painting will be accepted as a prime coat.

3.10 LOCATION OF OUTLETS

1. Locations of outlets, and conduits indicated on the Drawings are diagrammatic. The Contractor shall refer to the Architectural Drawings for exact locations of all outlets, carefully lay out the work to achieve the intent of design and provide shop drawings detailing same for approval. The right is reserved to change the location of any outlet before same is permanently installed. Such changes shall be at the option of the Owner and shall be done without extra charge by the Contractor.

END OF SECTION

SECTION 250534
OUTLET, JUNCTION, AND PULL BOXES

PART 1 – GENERAL

1.01 RELATED DOCUMENTS

1. None.

1.02 DESCRIPTION OF WORK

A. The Contractor shall provide outlet boxes appropriate for the purpose at all locations where the Drawings require the installation of electrical devices or electrical equipment, which may or may not embody in its construction a means of conduit, raceway or cable connection.

B. Where the Contractor selects and installs an item of equipment which requires either, additional boxes, fittings, etc., or a modification of the conduit system indicated on the Drawings, such additional boxes, fittings, etc. shall be furnished and installed and such modifications shall be performed by the Contractor as part of this Contract, without extra compensation from the Owner.

C. All outlet and enclosing boxes, and all steel or iron covers, doors, trims, etc. attached to the boxes shall be galvanized or rust proofed.

D. All boxes shall be fastened in an approved manner, independent of the attached conduit.

E. All boxes set in plastered walls shall be provided with approved plaster rings or extension covers appropriate for the equipment.

F. All pull boxes, junction boxes, splice boxes, outlet boxes, etc., which are not covered by electrical equipment shall be provided with blank steel face plates, painted by the Contractor.

G. All special boxes, such as enclosing boxes for telephones and fire signal equipment, mounting boxes for special clocks, clocks, panels, etc., shall be supplied by the manufacturer of the enclosed equipment.

1.03 REFERENCES

A. NEMA and UL.

1.04 SUBMITTALS

A. Catalogue sheets and samples as requested by the Owner's Representative only.

PART 2 – PRODUCTS

2.01 OUTLET, JUNCTION AND PULL BOXES

A. Galvanized Steel Outlet Boxes

Standard galvanized steel boxes and device covers as manufactured by Appleton Electric Co., Electrical Products Div. Midland-Ross (Steel City), or Raco Inc.

B. Galvanized Steel Junction and Pull Boxes

Code gage, galvanized steel screw cover boxes as manufactured by Gray Metal Products Inc., Hoffman Engineering Co., Keystone Columbia Inc., or Queen Products Co. Inc.

C. Threaded Type Boxes

1. Outlet Boxes:

a. Zinc Electroplate: Zinc electroplate malleable iron or cast iron alloy boxes as produced by Appleton Electric Co., Crouse-Hinds Co., or OZ/Gedney Co., with zinc electroplate steel covers to suit application.

b. Hot Dipped Galvanized: Hot dipped galvanized malleable iron or cast iron alloy boxes as produced by Crouse-Hinds Co., or OZ/Gedney Co., with stainless steel cover screws, and hot dipped malleable iron covers gasketed or ungasketed to suit application.

D. Metal Raceway (for office partition receptacles)

Partition receptacles shall be mounted in a specially fabricated extruded aluminum raceway with custom cover and ends. Raceway shall be square cross section of 1/8" aluminum of the length indicated on the Drawings. Cover plates shall be continuous of the length indicated and shall overlap the body by a minimum of 1/2" on either sides. Openings for receptacles shall be punched into the cover for a clean fit and finish. End caps and cover shall be connected to the body with screws at 12" intervals on both sides.

PART 3 – EXECUTION

3.01 PREPARATION

A. Before proceeding with the installation of junction and pull boxes, check the locations with the Architectural Drawings and have same approved, with the Owner's Representative.

3.02 INSTALLATION

A. Mounting Position of Wall Outlets For Wiring Devices: Unless otherwise indicated, install boxes so that the long axis of each wiring device will be vertical.

B. Height of Wall Outlets

Unless otherwise indicated, locate outlet boxes with their centerlines at the following elevations above finished floor:

Alarm Indicating Devices	8'-0" to center where ceiling height allows a minimum of 2" clearance between ceiling and top otherwise mount so that it's top is 2" below finished ceiling.
Indicators	8'-0" AFF.
Strobe Lights	8'-0" A.F.F. or 6" below the ceiling whichever is lower
Manual Fire Alarm Boxes	4'-0"
Single & Duplex Receptacles	1'-6"*
Switches	4'-0"
Telephone	1'-6"

*In areas containing heating convectors, install outlets above convectors at height indicated on Drawings.

C. Supplementary Junction and Pull Boxes

In addition to junction and pull boxes indicated on the Drawings and required by the Code, provide supplementary junction and pull boxes as follows:

1. When required to facilitate installation of wiring.
2. At every third 90^{o} turn in conjunction with raceway sizes over 1".
3. At intervals not exceeding 100 ft. in conjunction with raceway sizes over 1".

3.03 OUTLET, JUNCTION, AND PULL BOX SCHEDULE

A. Boxes For Concealed Conduit System:

1. Depth: To suit job conditions and also comply with Code.
2. For Lighting Fixtures: Use 4" octagonal galvanized steel outlet boxes.
3. For Junction and Pull Boxes: Use galvanized steel boxes with flush covers.
4. For Switches, Receptacles, Etc.:
   a. Plaster or Cast-In-Place Concrete Walls: Use 4" or 4-11/16" galvanized steel boxes with device covers.
   b. Walls Other Than Plaster or Cast-In-Place Concrete: Use type of galvanized steel box which will allow wall plate to cover the opening made for the installation of the box.

B. Boxes For Exposed Conduit System:

1. General:
   a. Cast metal alloy outlet, junction, and pull boxes in conjunction with ferrous raceways in dry and damp locations unless otherwise specified or indicated on the Drawings.
   b. Use hot dipped galvanized malleable iron or cast iron alloy outlet boxes in conjunction with raceway in dry locations unless otherwise specified or indicated on the Drawings.

c. Use cast outlet boxes for switch, receptacle, and device outlets in all locations below 7'-0" mounting height with number of threaded conduit bosses equal to the raceway.

d. Use hot dipped galvanized cast iron junction and pull boxes in conjunction with ferrous raceways in wet locations unless otherwise specified or indicated on the Drawings.

2. Conduit Sizes 1/2", 3/4" and 1": Use threaded type boxes.

3. Conduit Sizes Over 1" (Wet Locations and Hazardous Locations): Use threaded type boxes.

4. Conduit Sizes Over 1" (Dry Locations and Damp Locations): Use galvanized steel boxes.

5. Finishing Collar or Combination Finishing Collar/Outlet Box (Surface Mounted Equipment Used With Exposed Raceway):

a. Use finishing collar where surface mounted equipment is installed on an exposed raceway outlet box and the equipment base is larger than the outlet box.

b. Use combination finishing collar/outlet box where surface mounted equipment is not indicated to be installed on an exposed raceway outlet box, but raceway cannot be run directly into equipment body due to equipment design.

3.04 PAINTING

A. All pull boxes, junction boxes, slice boxes, outlet boxes, etc., which are not covered by electrical devices with finished cover plates shall be provided with blank steel face plates, painted by the Contractor. Boxes for fire alarm system wiring shall be painted RED in accordance with code compliance.

3.05 EXISTING OUTLET BOXES

A. Existing outlet boxes may be used for support of fluorescent and heavy incandescent fixtures only with prior written permission. Studs and other weight bearing parts of existing outlet boxes from which new lighting fixtures or other electrical equipment are to be suspended, shall be carefully inspected and weight tested (in accordance with directions of the Owner) by this Contractor to be certain that new equipment can be safely supported.

B. Suspension load test for supporting a 4' fluorescent fixture from an existing hung or furred ceiling shall consist of installing a fixture support and attach a convenient length of stem to the stud of the supporting bar. The bottom of the stem shall be fitted with a chain ring or harness supporting the weight of two (2) 94 lb. bags of cement for 48 hours.

3.06 SPECIAL CONDITIONS

A. In brick faced walls, and walls of enameled or glazed brick, light weight concrete block, wood, marble, tile or slate, install a standard box behind the facing or wainscot to receive conduit, an attach thereto a square corner extension cover similar to Arrow Conduit and Fittings 4-SC-51 series but of proper size to contain the number of switches indicated on the Drawings, and to bring switches flush with facing. Submit sample for approval before installation.

B. Switch Boxes shall be mounted in the following manner:

1. Each switch box adjacent to a door shall be rigidly attached to a steel door buck support, the approved equal of the type manufactured by the Arrow Conduit and Fittings Co.

2. At other locations, switch boxes shall be equipped with approved galvanized steel straps attached to the top or side of the box and embedded securely in the mortar between bricks, hollow tile or block, etc. or attached to furring strips. Steel strap may be omitted where boxes can be rigidly grouted in place by mortar or by an equally approved method.

END OF SECTION

SECTION 260923

LIGHTING CONTROL DEVICES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Press Switch.

B. Related Requirements:

1. Section 262726 "Wiring Devices" for wall-box manual light switches.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

1.4 INFORMATIONAL SUBMITTALS

A. Field quality-control reports.

1.5 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For each type of lighting control device to include in emergency, operation, and maintenance manuals.

PART 2 - PRODUCTS

2.1 TOGGLE SWITCH

A. Description: Single pole “PresSwitch” rated for 1500 VA, to operate connected load, complying with UL 773.

1. Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

2.2 CONDUCTORS AND CABLES

A. Power Wiring to Supply Side of Remote-Control Power Sources: Not smaller than No. 12 AWG. Comply with requirements in Section 260521 "Low-Voltage Electrical Power Conductors and Cables."

B. Class 1 Control Cable: Multiconductor cable with solid or stranded-copper conductors not smaller than No.14 AWG or larger than No.10 AWG. Comply with requirements in Section 260521 "Low-Voltage Electrical Power Conductors and Cables."

PART 3 - EXECUTION

3.1 WIRING INSTALLATION

A. Wiring Method: Comply with Section 260521 "Low-Voltage Electrical Power Conductors and Cables." Minimum conduit size is 1/2 inch (13 mm).

B. Wiring within Enclosures: Comply with NECA 1. Separate power-limited and nonpower-limited conductors according to conductor manufacturer's written instructions.

C. Size conductors according to lighting control device manufacturer's written instructions unless otherwise indicated.

D. Splices, Taps, and Terminations: Make connections only on numbered terminal strips in junction, pull, and outlet boxes; terminal cabinets; and equipment enclosures.

3.2 FIELD QUALITY CONTROL

A. Perform the following tests and inspections:

1. Operational Test: After installing switches, and after electrical circuitry has been energized, confirm proper unit operation.
2. Replace damaged and malfunctioning equipment.

B. Lighting control devices will be considered defective if they do not pass inspections.

END OF SECTION

SECTION 262416

PANELBOARDS

PART 1 GENERAL

1.01 REFERENCES

A. NEMA, UL.

1.02 SUBMITTALS

A. Submittal Packages: Submit the shop drawings, product data, and the quality control submittals specified below at the same time as a package.

B. Shop Drawings; include the following for each panelboard:
   1. Cabinet and gutter size.
   2. Voltage and current rating.
   3. Panelboard short circuit rating. Indicate if rating is Fully Rated Equipment Rating, or where acceptable, UL listed Integrated Equipment Short Circuit Rating.
   4. Circuit breaker enumeration (frame, ATE, poles, I.C.).
      a. Indicate if circuit breakers are suitable for the panelboards' Fully Rated Equipment Rating, or where acceptable, are series connected devices which have been test verified and listed with UL (include documentation proving the compatibility of the proposed circuit breaker combinations). Circuit breakers do not have to be listed as series connected devices when all of the circuit breaker interrupting ratings are equal to, or greater than, the short circuit rating of the panelboard.
   5. When indicated on the panelboard schedule, a coordinated selective scheme between the main circuit breaker and branch/feeder circuit breakers so that under fault conditions the branch/feeder circuit breaker clears the fault while the main circuit breaker remains closed.
   6. Accessories.

C. Product Data:
   1. Catalog sheets, specifications and installation instructions.
   2. Bill of materials.

D. Quality Control Submittals:
   1. List of Completed Installations: If brand names other than those specified are proposed for use, furnish the name, address, and telephone number of at least 5 comparable installations which can prove the proposed products have operated satisfactorily for one year.
   2. Company Field Advisor Data: Include:
      a. Name, business address and telephone number of Company Field Advisor secured for the required services.
      b. Certified statement from the Company listing qualifications.
      c. Services and each product for which authorization is given by the Company listed specifically for this project.

E. Contract Closeout Submittals:
   1. System acceptance test report.
   2. Certificate: Affidavit, signed by the Company Field Advisor and notarized, certifying that the system meets the contract requirements and is operating properly.
   3. Operation and Maintenance Data: Deliver 2 copies, covering the installed products, to the Director's Representative.

1.03 QUALITY ASSURANCE

A. Company Field Advisor: Secure the services of a Company Field Advisor from the manufacturer of the programmable solid state circuit breakers for a minimum of 8 working hours for the following:
   1. Render advice regarding final adjustment and programming of the circuit breakers.
   2. Witness final system test and then certify with an affidavit that the circuit breakers are installed in accordance with the contract documents and are operating properly.
   3. Train facility personnel on the operation and maintenance of the circuit breakers (minimum of two 1 hour sessions).
   4. Explain available service programs to facility supervisory personnel for their consideration.

PART 2 PRODUCTS

2.01 PANELBOARDS

A. As produced by Cutler-Hammer/Eaton Corp., Challenger Electrical Equipment Corp. General Electric Co., Siemens/ITE, Square D Co., or Westinghouse Electric Corp., having:
   1. Flush or surface type cabinets as indicated on the drawings.
   2. Increased gutter space for gutter taps, sub-feed wiring, through-feed wiring, oversize lugs.
   3. UL label "SUITABLE FOR USE AS SERVICE EQUIPMENT" where used as service equipment.
      a. Where indicated, equip panelboards used as service equipment with secondary surge arresters; GE's Tranquell Series, Joslyn's Mfr. Co.'s Surge Tec Series, Intermatic Incorp.'s AG2401 or AG6503, Square D Co.'s SDSA 1175 or SDSA 3650, to suit system primary (transformer size, available current) and secondary characteristics.
   4. Door and one piece trim. Door fastened to trim with butt or piano hinges. Trim fastened to cabinet with devices having provision for trim adjustment.
   5 Door lock. 2 keys with each lock (Exception: Not more than 7 keys, total).
   6. Solid copper bus bars. Ampere rating of bus bars not less than frame size of main circuit breaker.
   7. Full capacity copper neutral bus in panelboards are required.
   8. Copper equipment grounding bus in panelboards are required.
   9. Sections designated "space" or "provision for future breaker" equipped to accept future circuit breakers.
   10. Provisions for padlocking circuit breaker handle in OFF position where indicated.
   11. Directory.
   12. Short circuit rating not less than 65KA. Furnish panelboards having Fully Rated Equipment Rating (the short circuit rating of the panelboard is equal to the lowest

interrupting rating of any device installed in the panelboard). Exception:

a. Where indicated to be acceptable on panelboard schedule, panelboard having UL listed Integrated Equipment Short Circuit Rating may be used.

17. Molded case, bolt-on circuit breakers:
    a. Mounting: Individually mounted main circuit breaker (when MCB is required), and group mounted branch/feeder circuit breakers to accommodate the circuit breaker style and panelboard construction.
    b. Components: See panelboard schedule for specific components required for each circuit breaker. In addition to the specific components, equip each circuit breaker with additional components as required to achieve a coordinated selective scheme between the main circuit breaker and the branch/feeder circuit breakers when indicated on the panelboard schedule that a coordinated selective scheme is required.
    c. Single pole 15 ATE and 20 ATE circuit breakers marked SWD where used as switches.
    d. Single pole and two pole 15, 20, and 30 ATE circuit breakers rated for high intensity discharge lighting loads when applicable.

2.02 NAMEPLATES

A. General: Precision engrave letters and numbers with uniform margins, character size minimum 3/16 inch high.
    1. Phenolic: Two color laminated engravers stock, 1/16 inch minimum thickness, machine engraved to expose inner core color (white).
    2. Aluminum: Standard aluminum alloy plate stock, minimum .032 inches thick, engraved areas enamel filled or background enameled with natural aluminum engraved characters.
    3. Materials for Outdoor Applications: As recommended by nameplate manufacturer to suit environmental conditions.

PART 3 EXECUTION

3.01 INSTALLATION

A. Install panelboards in accordance with NEMA Publication No. PB1.1 "General Instructions for Proper Installation, Operation and Maintenance of Panelboards Rated 600 Volts or Less".
    1. Set/program the circuit breakers.

B. Flush Cabinets: Set flush cabinets so that edges will be flush with the finished wall line. Where space will not permit flush type cabinets to be set entirely in the wall, set cabinet as nearly flush as possible, and cover the protruding sides with the trim extending over the exposed sides of the cabinet and back to the finished wall line.

C. Directory: Indicate on typewritten directory the equipment controlled by each circuit breaker, and size of feeder servicing panelboard. For power panelboards also include ATE rating and feeder size for each breaker.

D. Identification:
    1. Use nameplates, or stencil on front of each panelboard with white paint, "LP-R1, etc." in 1/2 inch lettering corresponding to panelboard designations on the drawings,

and electrical parameters (phase, wire, voltage).

2. Install a nameplate on each panelboard which explains the means of identifying each ungrounded system conductor by phase and system. Examples of nameplate statements:
   a. Identification of 120/208 Volt Circuit Conductors:
      2 wire circuit - white*, black.
      3 wire circuit - white*, black, red.
      4 wire circuit - white*, black, red, blue.

   *White is used only as neutral. Where neutral is not required, black, red, or black, red, blue is used for phase to phase circuits.

3.02 FIELD QUALITY CONTROL

A. Preliminary System Test:
   1. Preparation: Have the Company Field Advisor adjust the completed circuit breakers and then operate them long enough to assure that they are performing properly.
   2. Run a preliminary test for the purpose of:
      a. Determining whether the circuit breakers are in a suitable condition to conduct an acceptance test.
      b. Checking instruments and equipment.
      c. Training facility personnel.

B. System Acceptance Test:
   1. Preparation: Notify the Director's Representative at least 3 working days prior to the test so arrangements can be made prior to the test to have a Facility Representative witness the test.
   2. Make the following tests:
      a. Test circuit breakers which have ground fault protection in accordance with the approved information sheets and test form.
      b. Test programmable solid state trip devices in accordance with the manufacturer's recommendations.
   3. Supply all equipment necessary for system adjustment and testing.
   4. Submit written report of test results signed by the Company Field Advisor and the Director's Representative. Mount a copy of the final report in a conspicuous location on, or inside, the panelboard door.

END OF SECTION

SECTION 262726
WIRING DEVICES

PART 1 – GENERAL

1.01 RELATED DOCUMENTS

1. None.

1.02 DESCRIPTION OF WORK

A. Provide all receptacles and switches.

1.03 SUBMITTALS

A. Product Data

Catalog sheets and specifications.

PART 2 – PRODUCTS

2.01 SWITCHES

A. Local Switches, Single Pole:

1. 20A, 120/277 VAC; Hubbell's 1221, Leviton's CS120-2 or Pass & Seymour's 20AC1
2. 30A, 120/277 VAC; General Electric's GE 5991-1G, Hubbell's 3031, Leviton's 3031-2, or Pass & Seymour's 30AC1.
3. 20A, 120/277 VAC 2 pole; General Electric's.

B. Local Switches, Three-Way:

1. 20A, 120/277 VAC; Hubbell's 1223, Leviton's CS320-2, or Pass & Seymour's 20AC3.
2. 30A, 120/277 VAC; Bryant's 3003, Crouse-Hinds/AH's 3993, General Electric's GE5993-1G, Hubbell's 3033, Leviton's 3033-2, or Pass & Seymour's 30AC3.

C. Local Switches, Key-Operated

Similar to toggle type lock switches, except operated by removable key instead of lever. Furnish one key with each switch.

D. Momentary Contact Switches

Components shall consist of momentary contact switches Leviton N0. 1256, 15A, 12VAC/10A.277V.AC, Arrow-Hart (A-H), and switch plates and mountings the product of Mulberry Metal Products (MMP), or approved equals.

E. Horsepower Rated Switches

Maximum HP single or 3 phase.

Two Pole ..... A-H #6808F
Three Pole ..... A-H #7810F

F. For elevator pit and machine room locations, provide 120V; 20AMP single pole press activated switch; Hubble HBL 1281 w/ HBL 1795 bubble plate; or approved equal.

2.02 RECEPTACLES

A. Straight-blade-type; Commercial Specification Grade minimum; compliance with NEMA WD 1; DSCC WC 596, AND UL 498 and UL 943 2006 Codes.

1. Single receptacle, NEMA 5-20R (20A, 125V, 2P, 3W);
Leviton 5891 or Pass & Seymour/Legrand PS5351

2. Duplex receptacle, NEMA 5-20R (20A, 125V, 2P, 3W);
Hubbell Inc. HBL5362, Leviton BR20, Pass & Seymour/Legrand PS5362

3. Ground-Fault Circuit Interrupter GFCI; duplex (20A, 125V, 2P, 3W)
Hubbell Inc GF5352SL, Leviton 6899, Pass & Seymour/Legrand PS2095

4. Weatherproof Receptacle enclosure

For use in wet location equal to Pass & Seymour/Legrand WIUC10-G.

5. For elevator pit and machine room locations, provide cast aluminum box w/ duplex receptacle (GFCI) w/ spring closure protective covers; Cooper Controls TP7018, TP7207, or approved equal.

2.03 MOMENTARY CONTACT SWITCHES

A. The Contractor shall provide two (2) position selector switches at locations shown on the Drawings. Selector switch shall consist of a legend plate, operator and contact block.

Legend plate shall be aluminum field with "OFF-ON" marking. Legend plate shall be Square `D', Catalog #KN-744 or approved equal. Operator shall be non-illuminated, spring return and key operated. Operator shall be Square D, Catalog #KS--34K1 or approved equal.

Contact block shall be normally closed. Contact block shall be Square "D" Catalog #KA-3 or approved equal.

2.04 FACE PLATES

A. Provide faceplates for switches, receptacles, and miscellaneous devices. Faceplates shall be stainless steel Type 302 (18% chrome, 8% nickel), non-magnetic with satin finish, not less than .035" thick, and shall be appropriately inscribed to indicate equipment controlled as indicated.

PART 3 – EXECUTION

3.01 INSTALLATION

A. Install wiring devices in outlet boxes.

B. Local Switches

1. Install local switches rated 15A, & 20A, 120/277 vac for lighting control unless otherwise shown on the Drawings or specified.
2. Where more than one switch occurs at the same location, arrange switches in gangs and cover with a single faceplate.
3. Install single and double pole switches so that switch handle is up when switch is in the "On" position.

C. Receptacles

1. Install Specification Grade receptacles, NEMA 5-20R, 20A, 125V, 2P, 3W, for duplex receptacles and single receptacles unless otherwise shown on the Drawings or specified.
2. Install receptacles with ground pole in down position.

D. Wall Plates

1. Install wall plates on all wiring devices of a type and finish to suit the specific location.
2. Install blank wall plates on outlet boxes, which are for future equipment except telephone outlets.
3. Install wall plates on telephone and data outlets, with integral electronic jack, suitable for the specified system.

E. Weatherproof Covers

Install weatherproof covers on wiring devices in damp and wet locations.

F. Mats

Where flush plates are required over outlet boxes that cannot be set deep enough for the plates to fit closely over the finished wall surfaces, provide mats to fill the space between the finished wall surface and the plate.

3.02 FIELD TESTS

A. Prior to energizing circuitry, test wiring for electrical continuity voltage drop, and short circuits. Ensure that proper polarity of connections is maintained. Subsequent to energization, test wiring devices to demonstrate compliance with requirements of these Specifications. All circuits evidencing a fault or an excessive voltage drop shall be replaced.

END OF SECTION

SECTION 262815
OVERCURRENT PROTECTIVE DEVICES, CIRCUIT BREAKERS AND FUSES

PART 1 – GENERAL

1.01 RELATED DOCUMENTS

1. None

1.02 DESCRIPTION OF WORK

A. This Section describes the type of circuit breakers and fuses to be provided in safety switches, switchboards, and panelboards.

1.03 NOT USED

1.04 SPARES

A. Provide and deliver the following spare fuses:

1. Three (3) fuses of each type and size for all other fuses.

PART 2 – PRODUCTS

2.01 CIRCUIT BREAKERS

A. General

Circuit breakers shall be thermal-magnetic type, conforming to the following Specifications:

1. Connection to bus shall be by "bolt-on" (or as existing). Plug-in type circuit breakers are not acceptable.
2. Breakers shall be equipped with arc chutes or other approved suitable means of quenching arcs.
3. Breakers shall have a quick-break operating mechanism on automatic operation.
4. Handles of breakers shall be "trip free".
5. Handles of breakers shall plainly indicate whether breaker is in **"ON"**, **"OFF"** or tripped position.
6. Breakers shall be designed to carry 100% of trip rating continuously; to have inverse time delay tripping above 125% of trip rating; and to trip instantaneously at 1000% of trip rating.
7. Multi-pole breakers shall have barriers between poles.

8. Multi-pole breakers shall have a separate tripping element for each pole. Each tripping element shall open all poles. Multi-pole breakers shall have one handle controlling all poles.

9. Breakers of 225-ampere trip rating or less shall have non-tamperable, permanently set trip elements enclosed and sealed in molded composition housing.

10. Single pole breakers shall be rated for not less than 120 volts, A.C.; multi-pole breakers shall be rated for not less than 250 volts A.C.

11. All breakers shall be manufactured in accordance with standards of the National Electrical Manufacturers Association and shall bear Underwriters Laboratories label.

12. Circuit breakers shall have not less than 15-ampere trip ratings for lighting or appliance circuits, unless otherwise indicated on Drawing or required for the circuit protected.

13. Circuit breakers protecting three phase circuits shall be of the three-pole type.

14. Where spaces for future breakers are required, copper connections for mounting of future breakers shall be provided.

15. For single phase 120-volt or 277 volt loads provide Westinghouse Electric Corp, "Quicklag" by General Electric, Challenger Electric, Siemens or Square D. or as existing.

16. For 208 volt or 480 volt circuits to single phase equipment, provide two (2) pole breakers as manufactured by Westinghouse Electric Corp., Challenger, General Electric, Siemens, or Square D Company with time curve 1.

17. For 3-phase, 208 volt or 480 volt circuits to three phase equipment provide three-pole breakers with time curve 1 as manufactured by Westinghouse Electric Corp., General Electric, Challenger Electric, Siemens or Square D.

18. For lighting circuits that are controlled at panel, provide devices rated for switching duty.

19. Circuit breakers shall be mounted in standard panelboards as indicated on the drawings. Frame and sizes of circuit breakers shall conform to the following:

Trip Ratings-Amps	No. of Poles	Frame Size
15-70	1	100 AMP – Frame 240V: Square D, Type QOB-VH (22,000 I.C.) 480/277V: EHB (14,000 I.C.)
15-100	2&3	100 AMP – Frame Same as for 15-70 AMPS trip rating.
101-225	2&3	225 AMP - Frame 240V: Square D, type KA (42,000 I.C.) 480V: Type KA (25,000 I.C.)
226-400	3	400 AMP - Frame 240V: Square D, type LA (42,000 I.C.) 480V: Type LA (30,000 I.C.)

2.02 MOLDED_CASE CIRCUIT BREAKERS

A. General Requirements: Comply with UL 489, NEMA AB 1, and NEMA AB 3, with interrupting capacity to comply with available fault currents.

B. Thermal-Magnetic Circuit Breakers: Inverse time-current element for low-level overloads and instantaneous magnetic trip element for short circuits. Adjustable magnetic trip setting for circuit-breaker frame sizes 250 A and larger.

C. Adjustable, Instantaneous-Trip Circuit Breakers: Magnetic trip element with front-mounted, field-adjustable trip setting.

D. Electronic Trip Circuit Breakers: Field-replaceable rating plug, rms sensing, with the following field-adjustable settings:

1. Instantaneous trip.
2. Long- and short-time pickup levels.
3. Long- and short-time time adjustments.
4. Ground-fault pickup level, time delay, and I^2t response.

E. Current-Limiting Circuit Breakers: Frame sizes 400 A and smaller, and let-through ratings less than NEMA FU 1, RK-5.

F. Integrally Fused Circuit Breakers: Thermal-magnetic trip element with integral limiter-style fuse listed for use with circuit breaker and trip activation on fuse opening or on opening of fuse compartment door.

G. Ground-Fault, Circuit-Interrupter (GFCI) Circuit Breakers: Single- and two-pole configurations with Class A ground-fault protection (6-mA trip).

H. Features and Accessories:

1. Standard frame sizes, trip ratings, and number of poles.
2. Lugs: Compression type, suitable for number, size, trip ratings, and conductor material.
3. Ground-Fault Protection: Comply with UL 1053; [integrally mounted, self-powered] [remote-mounted and powered] type with mechanical ground-fault indicator; relay with adjustable pickup and time-delay settings, push-to-test feature, internal memory, and shunt trip unit; and three-phase, zero-sequence current transformer/sensor.

2.03 FUSES

A. Fuse holders for distribution equipment and panelboards (except as otherwise specified for service switches) shall be equipped with H.R.C. type cartridge fuses of type and voltage required. All fuses including spares shall have a minimum interrupting rating of 200,000 R.M.S. amperes the equal of Bussman or Gould Shawmut.

1. All Circuits 600A and Below:

   a. Dual element, time delay, current limiting 600 amp maximum rating at required voltage, and 200,000 amp interrupting rating.

   b. Similar to type low peak LPN-RK (rating) - SP, 250 volt, 15-600A or low peak LPS-RK (rating) - SP, 600 volt, 15-600A (U.L. Class RK1 with dual element time delay).

2. All circuits above 600A:

   a. Time delay, current limiting type with 200,000 amp interrupting rating similar to low-peak KRPC (rating)-SP, 600 volt, 601-6000A (U.L. Class L).

3. All fuses shall be the product of the same manufacturer.

4. Spare Fuses

   Furnish and deliver the following spare fuses:

   a. Three fuses of each type and size for all other fuses.

   b. A minimum 2:1 ratio must be maintained between the ampere rating of a main fuse and that of the feeder fuse, and between the feeder fuse and the branch circuit fuse to obtain selective coordination and allow for minimum fusible switch size.

2.03 SPARE FUSE CABINET

A. Cabinet: Wall-mounted, 0.05-inch- (1.27-mm-) thick steel unit with full-length, recessed piano-hinged door and key-coded cam lock and pull.

1. Size: Adequate for storage of spare fuses specified with 15 percent spare capacity minimum.
2. Finish: Gray, baked enamel.

3. Identification: "SPARE FUSES" in 1-1/2-inch- (40-mm-) high letters on exterior of door.
4. Fuse Pullers: For each size fuse.

PART 3 – EXECUTION

3.01 INSTALLATION

A. Examine utilization equipment nameplates and installation instructions. Install fuses of sizes and with characteristics appropriate for each piece of equipment.

END OF SECTION

SECTION 262816

ENCLOSED SWITCHES AND CIRCUIT BREAKERS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

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

1.02 DESCRIPTION OF THE WORK

A. Provide Safety Switches as and where shown on the Drawings for service or motor disconnect use. Switches shall be fusible type where noted with Service Entrance Label, as required.

1.03 SUBMITTALS

A. Product Data

Catalog sheets, Specifications and Installation Instructions.

B. Shop Drawings: For enclosed switches, include plans, elevations, sections, details and attachments to other work.
1. Wiring Diagrams: For power, signal and control wiring.

1.04 SPARE PARTS

A. Three spare fuses for each type and size installed.

1.05 QUALITY ASSURANCE

A. Comply with NFPA 70.

1.06 COORDINATION

A. Coordinate layout and installation of switches, circuit breakers, and components with equipment served and adjacent surfaces. Maintain required workspace clearances and required clearances for equipment access doors and panels.

PART 2 PRODUCTS

2.01 SAFETY SWITCHES (SINGLE THROW)

A. NEMA 1 & 3R.

Challenger, Cutler-Hammer, General Electric, Siemens, Square D or Westinghouse Electric, heavy duty type, having:

1. Fused, or unfused as indicated on Drawings and shall be of applicable H. P. rating.
2. Fused switches equipped with fuseholders to accept only the fuses specified in this section.
3. NEMA 1 enclosure, unless otherwise indicated on Drawing.
4. Voltage Ratings
   a. 250V rating for 120V, 208V, or 240V, circuits.
5. Solid neutral bar when neutral conductor is included with circuit.
6. Ground bar when equipment grounding conductor is included with circuit.
7. Current rating and number of poles as indicated on Drawings.

2.02 NAMEPLATES

A. General

Precision engraved letters and numbers with uniform margins, character size minimum 3/16" high.

1. Phenolic: Two color laminated engravers stock, 1/16" minimum thickness, machine engraved to expose inner core color (white).
2. Aluminum: Standard aluminum alloy plate stock, minimum .032" thick, engraved areas enamel filled or background enameled with natural aluminum engraved characters.
3. Materials for Outdoor Applications: As recommended by nameplate manufacturer to suit environmental conditions.

PART 3 EXECUTION

3.01 INSTALLATION

A. Install switches so that the maximum height above the floor to the center of the operating handle does not exceed 6'-6". When shown as wall-mounted switches shall be mounted to horizontal strut supports. Free standing units shall be mounted on a free-standing strut system anchored to the floor, ceiling, and walls.

B. Identify each safety switch, indicating purpose or load served; Rivet or bolt nameplate to the cover:

1. NEMA 1 Enclosures

2. NEMA 3R Enclosures

C. Provide fusing as indicated on the Drawings.

END OF SECTION

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DIVISION 16 - ELECTRICAL

SECTION 265100 - INTERIOR LIGHTING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes the following:

1. Interior lighting fixtures with lamps and ballasts.
2. Emergency lighting units.
3. Accessories, including fluorescent fixture dimmers, occupancy sensors and lighting fixture retrofitting.

1.3 DEFINITIONS

A. BF: Ballast factor. Ratio of light output of a given lamp(s) operated by the subject ballast to the light output of the same lamp(s) when operated on an ANSI reference circuit.

B. CRI: Color rendering index.

C. CU: Coefficient of utilization.

D. LER: Luminaire efficiency rating, which is calculated according to NEMA LE 5. This value can be estimated from photometric data using the following formula:

1. LER is equal to the product of total rated lamp lumens times BF times luminaire efficiency, divided by input watts.

E. RCR: Room cavity ratio.

1.4 SUBMITTALS

A. Product Data: For each type of lighting fixture scheduled, arranged in order of fixture designation. Include data on features, accessories, finishes, and the following:

1. Physical description of fixture, including dimensions and verification of indicated parameters.
2. Emergency lighting unit battery and charger.
3. Fluorescent and high-intensity-discharge ballasts.
4. Lamps.

B. Shop Drawings: Show details of nonstandard or custom fixtures. Indicate dimensions, weights, methods of field assembly, components, features, and accessories.

C. Wiring Diagrams: Power, signal, and control wiring.

D. Product Certificates: For each type of ballast for dimmer-controlled fixtures, signed by product manufacturer.

E. Field quality-control test reports.

F. Operation and Maintenance Data: For lighting equipment and fixtures to include in emergency, operation, and maintenance manuals. In addition to items specified in Division 1 Section " Operation and Maintenance Data," include the following:

1. Catalog data for each fixture. Include the diffuser, ballast, and lamps installed in that fixture.

G. Warranties: Special warranties specified in this Section.

1.5 QUALITY ASSURANCE

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

B. Comply with NFPA 70.

C. NFPA 101 Compliance: Comply with visibility and luminance requirements for exit signs.

1.6 WARRANTY

A. Special Warranty for Emergency Lighting Unit Batteries: Manufacturer's standard form in which manufacturer of battery-powered emergency lighting unit agrees to repair or replace components of rechargeable batteries that fail in materials or workmanship within specified warranty period.

1. Warranty Period: 10 years from date of Substantial Completion. Full warranty shall apply for first year, and prorated warranty for the remaining nine years.

B. Special Warranty for Fluorescent Ballasts: Manufacturer's standard form in which ballast manufacturer agrees to repair or replace ballasts that fail in materials or workmanship within specified warranty period.

1. Warranty Period for Electronic Ballasts: Five years from date of Substantial Completion.

C. Manufacturer's Special Warranty for T8 Fluorescent Lamps: Manufacturer's standard form, made out to Owner and signed by lamp manufacturer agreeing to replace lamps that fail in materials or workmanship, f.o.b. the nearest shipping point to Project site, within specified warranty period indicated below.

1. Warranty Period: Two years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. In other Part 2 articles where titles below introduce lists, the following requirements apply to product selection:

1. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, products specified.
2. Products: Subject to compliance with requirements, provide one of the products specified.

2.2 FIXTURES AND COMPONENTS, GENERAL

A. Fluorescent Fixtures: Comply with UL 1598. Where LER is specified, test according to NEMA LE 5 and NEMA LE 5A as applicable.

B. Metal Parts: Free of burrs and sharp corners and edges.

C. Sheet Metal Components: Steel, unless otherwise indicated. Form and support to prevent warping and sagging.

D. Doors, Frames, and Other Internal Access: Smooth operating, free of light leakage under operating conditions, and designed to permit relamping without use of tools. Designed to prevent doors, frames, lenses, diffusers, and other components from falling accidentally during relamping and when secured in operating position.

E. Reflecting surfaces shall have minimum reflectance as follows, unless otherwise indicated:

1. White Surfaces: 85 percent.
2. Specular Surfaces: 83 percent.
3. Diffusing Specular Surfaces: 75 percent.
4. Laminated Silver Metallized Film: 90 percent.

F. Plastic Diffusers, Covers, and Globes:

1. Acrylic Lighting Diffusers: 100 percent virgin acrylic plastic. High resistance to yellowing and other changes due to aging, exposure to heat, and UV radiation.

a. Lens Thickness: At least 0.125 inch (3.175 mm) minimum unless different thickness is scheduled.
b. UV stabilized.

2. Glass: Annealed crystal glass, unless otherwise indicated.

2.3 LIGHTING FIXTURES

A. Refer to Lighting Fixture Schedule on Construction Document Set.

2.4 FLUORESCENT LAMP BALLASTS

A. Description: Include the following features, unless otherwise indicated:

1. Designed for type and quantity of lamps indicated at full light output except for emergency lamps powered by in-fixture battery-packs.
2. Externally fused with slow-blow type rated between 2.65 and 3.0 times the line current.

B. Electronic ballasts for linear lamps shall include the following features, unless otherwise indicated:

1. Comply with NEMA C82.11.
2. Ballast Type: Rapid start, unless otherwise indicated.
3. Programmed Start: Ballasts with two-step lamp starting to extend life of frequently started lamps.
4. Sound Rating: A.
5. Total harmonic distortion rating of less than 10 percent according to NEMA C82.11.
6. Transient Voltage Protection: IEEE C62.41, Category A.
7. Operating Frequency: 20 kHz or higher.
8. Lamp Current Crest Factor: Less than 1.7.
9. Parallel Lamp Circuits: Multiple lamp ballasts connected to maintain full light output on surviving lamps if one or more lamps fail.

C. Ballasts for compact lamps in recessed fixtures shall have the following features, unless otherwise indicated:

1. Type: Electronic.
2. Power Factor: 90 percent, minimum.
3. Flicker: Less than 5 percent.
4. Lamp Current Crest Factor: Less than 1.7.
5. Electronic Ballast Operating Frequency: 20 kHz or higher.
6. Lamp end-of-life detection and shutdown circuit.
7. Transient Protection: Comply with IEEE C62.41 for Category A1 locations.

D. Ballasts for Low-Temperature Environments:

1. Temperatures 0 deg F (Minus 17 deg C) and Higher: Electronic or electromagnetic type rated for 0 deg Fminus 17 deg C starting temperature.

2.5 EMERGENCY LIGHTING UNITS

A. General: Self-contained units complying with UL 924.

1. Battery: Sealed, maintenance-free, nickel-cadmium type, last minimum 90 minutes with minimum 10-year nominal life and special warranty.
2. Charger: Fully automatic, solid-state type with sealed transfer relay.

3. Operation: Relay automatically turns lamp on when power supply circuit voltage drops to 80 percent of nominal voltage or below. Lamp automatically disconnects from battery when voltage approaches deep-discharge level. When normal voltage is restored, relay disconnects lamps from battery, and battery is automatically recharged and floated on charger.
4. Wire Guard: Where indicated, heavy-chrome-plated wire guard protects lamp heads or fixtures.
5. Integral Time-Delay Relay: Holds unit on for fixed interval when power is restored after an outage; time delay permits high-intensity-discharge lamps to restrike and develop adequate output.

2.6 FLUORESCENT EMERGENCY LIGHTING FIXTURES

A. Internal Type: Self-contained, modular, battery-inverter unit factory mounted within fixture body. Comply with UL 924.

1. Emergency Connection: Operate one fluorescent lamp continuously. Connect unswitched circuit to battery-inverter unit and switched circuit to fixture ballast.
2. Test Switch and Light-Emitting-Diode Indicator Light: Visible and accessible without opening fixture or entering ceiling space.
3. Battery: Sealed, maintenance-free, nickel-cadmium type, last minimum 90 minutes with minimum seven-year nominal life.
4. Charger: Fully automatic, solid-state, constant-current type.

B. External Type: Self-contained, modular, battery-inverter unit, suitable for powering one or more fluorescent lamps, remote mounted from light fixture. Comply with UL 924.

1. Emergency Connection: Operate one fluorescent lamp continuously. Connect unswitched circuit to battery-inverter unit and switched circuit to fixture ballast.
2. Battery: Sealed, maintenance-free, nickel-cadmium type, last minimum 90 minutes with minimum seven-year nominal life.
3. Charger: Fully automatic, solid-state, constant-current type.
4. Housing: NEMA 250, Class 1 enclosure.

2.7 FLUORESCENT LAMPS

A. T8 rapid-start low-mercury lamps, rated 32 W maximum, 2800 initial lumens (minimum), CRI of 75 (minimum), color temperature of 3500 K, and average rated life of 20,000 hours, unless otherwise indicated.

B. Compact Fluorescent Lamps: CRI 80 (minimum), color temperature 3500, average rated life of 10,000 hours at 3 hours operation per start, unless otherwise indicated.
1. T4, Twin Tube: Rated 13 W, 825 initial lumens (minimum).

2.8 FIXTURE SUPPORT COMPONENTS

A. Comply with Division 16 Section "Basic Electrical Materials and Methods" for channel- and angle-iron supports and nonmetallic channel and angle supports.

B. Single-Stem Hangers: 1/2-inch (13-mm) steel tubing with swivel ball fittings and ceiling canopy. Finish same as fixture.

C. Twin-Stem Hangers: Two, 1/2-inch (13-mm) steel tubes with single canopy designed to mount a single fixture. Finish same as fixture.

D. Wires: ASTM A 641/A 641M, Class 3, soft temper, zinc-coated, [12 gage (2.68 mm)] <Insert wire size>.

E. Wires For Humid Spaces: ASTM A 580/A 580M, Composition 302 or 304, annealed stainless steel, 12 gage (2.68 mm) .

F. Rod Hangers: 3/16-inch- (5-mm-) minimum diameter, cadmium-plated, threaded steel rod.

2.9 FINISHES

A. Fixtures: Manufacturers' standard, unless otherwise indicated.

1. Paint Finish: Applied over corrosion-resistant treatment or primer, free of defects.
2. Metallic Finish: Corrosion resistant.

2.10 FLUORESCENT FIXTURE RETROFIT MATERIALS

A. Comply with UL 1598 listing requirements.
1. Ballast and Lamp Change Kit: UL 1598, Type II. Suitable for changing existing ballast, lamps, and sockets as scheduled.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Fixtures: Set level, plumb, and square with ceilings and walls. Install lamps in each fixture.

B. Support for Fixtures in or on Grid-Type Suspended Ceilings: Use grid for support.

1. Install a minimum of four ceiling support system rods or wires for each fixture. Locate not more than 6 inches (150 mm) from fixture corners.
2. Support Clips: Fasten to fixtures and to ceiling grid members at or near each fixture corner with clips that are UL listed for the application.
3. Fixtures of Sizes Less Than Ceiling Grid: Install as indicated on reflected ceiling plans or center in acoustical panel, and support fixtures independently with at least two 3/4-inch (20-mm) metal channels spanning and secured to ceiling tees.

C. Suspended Fixture Support: As follows:

1. Pendants and Rods: Where longer than 48 inches (1200 mm), brace to limit swinging.
2. Stem-Mounted, Single-Unit Fixtures: Suspend with twin-stem hangers.

3. Continuous Rows: Use tubing or stem for wiring at one point and tubing or rod for suspension for each unit length of fixture chassis, including one at each end.

D. Adjust fixtures capable of being aimed to provide required light intensities.

3.2 CONNECTIONS

A. Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A and UL 486B.

3.3 FIELD QUALITY CONTROL

A. Inspect each installed fixture for damage. Replace damaged fixtures and components.

B. Verify normal operation of each fixture after installation.

C. Test for Emergency Lighting: Interrupt power supply to demonstrate proper operation. Verify normal transfer to battery power source and retransfer to normal.

D. Prepare a written report of tests, inspections, observations, and verifications indicating and interpreting results. If adjustments are made to lighting system, retest to demonstrate compliance with standards.

E. Corroded Fixtures: During warranty period, replace fixtures that show any signs of corrosion.

END OF SECTION