



**DESIGN & CONSTRUCTION GROUP  
THE GOVERNOR NELSON A. ROCKEFELLER  
EMPIRE STATE PLAZA  
ALBANY, NY 12242**

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**ADDENDUM NO. 1 TO PROJECT NO. 47512**

**CONSTRUCTION, HVAC, AND ELECTRICAL WORK  
PROVIDE HEATED SIDEWALK  
BROADWAY STATE OFFICE BUILDING  
625 BROADWAY  
ALBANY, NY**

April 4, 2024

**NOTE:** This Addendum forms a part of the Contract Documents. Insert it in the Project Manual. Acknowledge receipt of this Addendum in the space provided on the Bid Form.

**HVAC SPECIFICATIONS**

1. SECTION 232006 HYDRONIC SPECIALTIES: Discard the Section bound in the Project Manual and substitute the accompanying Section (pages 232006-1 thru 232006-8) noted "Revised 04/02/2024".
2. SECTION 235239 FACTORY PACKAGED ELECTRIC BOILER LOW PRESSURE: Discard the Section bound in the Project Manual and substitute the accompanying Section (pages 235239-1 thru 235239-7) noted "Revised 04/02/2024".
3. SECTION 260502 BASIC ELECTRICAL MATERIALS AND METHODS FOR DIRECT DIGITAL BUILDING CONTROL SYSTEM: Discard the Section bound in the Project Manual and substitute the accompanying Section (pages 260502-1 thru 260502-13) noted "Revised 04/02/2024".

**GENERAL DRAWINGS**

4. Revised Drawing:
  - a. Drawing No. LS-100, noted "REVISED DRAWING 03/25/2024" accompanies this Addendum and supersedes the same numbered originally issued drawing.

**END OF ADDENDUM**

Brady Sherlock, P.E.  
Director, Division of Design  
Design and Construction

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Project Nos. 47512-C,H,E

## SECTION 232006

### HYDRONIC SPECIALTIES

#### PART 1 GENERAL

##### 1.01 RELATED WORK SPECIFIED ELSEWHERE

- A. Pipe and Pipe Fittings: Section 232000.

##### 1.02 SUBMITTALS

- A. Product Data: Catalog sheets, specifications, and installation instructions for each item specified.
- B. Contract Closeout Submittals:
  - 1. Operation and Maintenance Data: Deliver 2 copies, covering the installed products, to the Director's Representative.

#### PART 2 PRODUCTS

##### 2.01 EXPANSION TANKS

- A. Expansion Tank: Pre-pressurized, welded steel (ASME Boiler and Pressure Vessel Code Section VIII, Division I) with heavy duty butyl rubber bladder, air charging valve, and plugged drain.
  - 1. Maximum Working Pressure: 125 psig.
  - 2. Maximum Operating Temperature: 240 degrees F.

##### 2.02 AIR SEPARATOR WITH INTERNAL STRAINER

- A. Type: Welded steel (ASME Boiler and Pressure Vessel Code Section VIII, Division I) with the following features:
  - 1. Internal stainless steel strainer with 3/16 inch perforations and free area greater than 5 times the cross sectional area of the connecting pipe.
  - 2. Bolted and gasketed removable cover plate.
  - 3. Blowdown connection.
- B. Maximum Working Pressure: 125 psig.
- C. Maximum Operating Temperature: 375 degrees F.

##### 2.03 AIR VENTS

- A. Automatic Float Operated Vent; Taco, Model
  - 1. Construction: Brass body with stainless steel ball check, and 1/8 inch safety drain connection.
  - 2. Maximum Working Pressure: 150 psig.
  - 3. Maximum Operating Temperature: 250 degrees F.

## 2.04 GASKETED-PLATE HEAT EXCHANGERS

- A. Configuration: Freestanding assembly consisting of frame support, top and bottom carrying and guide bars, fixed and movable end plates, tie rods, individually removable plates, and one-piece gaskets.
- B. Construction: Fabricate and label heat exchangers to comply with ASME Boiler and Pressure Vessel Code, Section VIII, "Pressure Vessels," Division 1.
- C. Frame:
  - 1. Capacity to accommodate 20 percent additional plates.
  - 2. Painted carbon steel with provisions for anchoring to support.
- D. Top and Bottom Carrying and Guide Bars: Painted carbon steel, aluminum, or stainless steel.
  - 1. Fabricate attachment of heat-exchanger carrying and guide bars with reinforcement strong enough to resist heat-exchanger movement during seismic event when heat-exchanger carrying and guide bars are anchored to building structure.
- E. End-Plate Material: Painted carbon steel.
- F. Tie Rods and Nuts: Steel or stainless steel.
- G. Plate Material: 0.024 inch thick before stamping; Type 304 stainless steel.
- H. Gasket Materials: Nitrile rubber.
- I. Piping Connections:
  - 1. NPS 2 and Smaller: Threaded ends according to ASME B1.20.1.
  - 2. NPS 2-1/2 and Larger: Flanged ends according to ASME B16.5 for steel and stainless-steel flanges and according to ASME B16.24 for copper and copper-alloy flanges.
- J. Enclose plates in solid aluminum removable shroud.
- K. Capacities as scheduled on the drawings.

## 2.05 SNOW MELT SYSTEM

- A. Basis of Design:
  - 1. Watts Radiant, Inc., (Subsidiary of Watts Water Technologies, Inc.), 4500 E. Progress Place, Springfield, MO 65803, (800) 276-2419; (417) 864-6108; Fax: (417) 864-8161, Web: <http://www.wattsradiant.com>
- B. Cross-linked Polyethylene Tubing (PEX):
  - 1. Show compliance with ASTM F877.
  - 2. Show compliance with DIN 4726 regarding oxygen diffusion concerns where applicable.

3. Show compliance with NFPA 90A requirements of flame spread/smoke development rating of 25/50 in accordance with ASTM E84 through certification listings with Intertek.
- C. Pressure Ratings:
1. Standard Grade hydrostatic design.
  2. Pressure ratings as issued by the Plastics Pipe Institute (PPI), a division of the Society of the Plastics Industry (SPI).
- D. Temperature/Pressure Ratings: shall be capable of withstanding temperatures of:
1. 73.4°F (23°C) at 160 psi (1.10 MPa).
  2. 180°F (82.2°C) at 100 psi (0.69 MPa).
  3. 200°F (93.3°C) at 80 psi (0.55 MPa).
- E. Minimum Bend Radius (Cold Bending):
1. No less than six times the outside diameter.
  2. Use the tubing manufacturer's bend supports if radius is less than stated.
- F. Barrier Tubing Type:
1. Provide an oxygen diffusion barrier that shall not exceed an oxygen diffusion rate of 0.10 g/cubic meter (.000062 lb/cu. ft.) per day at 104 degrees F (40 degrees C) water temperature in accordance with German DIN 4726.
  2. Provide a protective polypropylene layer to the outside of the EVOH barrier.
  3. Nominal Inside Diameter: Nominal inside diameter in accordance with ASTM F876, as indicated:
    - a. ¼ inch (19.05 mm).
- G. Manifolds:
1. For system compatibility, use 1 or 1½" (25 – 38mm) Stainless Steel manifolds offered by the respective tubing manufacturer.
  2. Manifolds shall provide individual flow control for each loop of the manifold through valve actuators available from the manifold supplier.
  3. Manifolds shall feature manual flow balancing capability within the manifold body for balancing unequal loop lengths across the manifold. Balance valves shall not be ball valves.
  4. Manifolds shall accommodate ⅜ - ¾" (9.5 – 19 mm) PEX tubing.
  5. Each manifold location shall have the ability to vent air manually from the system.
  6. Stainless Steel 1½" (38 mm) Manifolds:
    - a. Heavy-duty, DIN Standard, 304 stainless steel.
    - b. Matching fittings and accessories are made of solid brass and plated with nickel to match the appearance of the manifold trunk.
    - c. Internal balancing valves.
    - d. 0 - 4 gpm (0 – 0.25 L/sec) flow meters.
    - e. Manifold brackets.
    - f. All connections are BSP (British Standard Pipe) or straight thread and require the use of the included gasket.
    - g. 2½" (54 mm) OC circuit spacing.
    - h. 22 gpm (1.4 L/sec) maximum flow rate.

- i. 194°F (90°C) maximum operating temperature.
- j. 87 psi (600 kPa) maximum operating pressure.
- k. 4 gpm (0.25 L/sec) per circuit maximum flow rate.

H. Fittings:

- 1. For system compatibility, use fittings offered by the tubing manufacturer.
  - a. The fitting assembly shall comply with ASTM F877 and CAN/CSA B137.5 requirements.
  - b. Fittings shall be designed to work with either ASTM F1807 CrimpRings or ASTM F2098 CinchClamps or a Compression ferrule, and are designed to be used with ASTM F876 (SDR-9) rated PEX tubing.

I. Controls:

- 1. Provide controller to control all aspects of the snow melt system as outlined within the specifications and drawings. Controller shall provide independent control of the snow melt system and provide outputs to the existing building BMS to allow BMS to monitor points listed on the contract drawings.
- 2. Use sensors/controls provided by manufacturer:
- 3. HSC-5 Snow Melting Slab Detector:
  - a. Slab / Pavement mounted.
  - b. Senses actual pavement conditions.
  - c. Microprocessor control eliminates ice-bridging.
  - d. Provides a low-amperage output relay contact.
  - e. Heavy-duty machined brass housing.
  - f. Removable top cover.
  - g. Plug-in electronic assembly.
  - h. 24 VAC.
- 4. LCD-1H Automatic Snow Switch:
  - a. Pole-mounted.
  - b. Senses both temperature and precipitation.
  - c. Isolated 3 Amp resistive/1 Amp inductive relay contact.
  - d. 24 VAC.

J. Accessories: Provide accessories associated with the installation of the radiant heating system as recommended by or available from the tubing manufacturer.

- 1. FlowGuard:
  - a. FlowGuards shall be of commercial-quality, non-electronic flow indicator and flow setter.
  - b. Cast brass construction.
  - c. Accurate visual flow indication in GPM.
  - d. Ability to set fluid flow.
  - e. FlowGuards shall allow zone-by-zone control and optimization.
  - f. No special training or electronic instrumentation required.
  - g. Sizes:
    - 1) 1" (25 mm) MNPT ends: 0.5 – 4 gpm (0.03 to 0.25 L/sec) flow meter.
    - 2) 1" (25 mm) FNPT ends: 1 – 13 gpm (0.06 to 0.8 L/sec) flow meter.

2. Tempering Valves:
  - a. MixTemp 180 Mixing Valve:
    - 1) The MixTemp 180 is a 3 port, non-electric mixing valve for use in Hydronic heating systems.
      - (a) Hot, cold, and mix ports are clearly marked “H,” “C,” and “M.”
    - 2) This mix valve shall be capable of delivering water temperatures ranging from 90° to 160°F (32° to 71°C) +/- 3° F.
    - 3) The Hydronic mix valve shall have a cast bronze body.
    - 4) Copper, stainless steel and EPDM internal parts.
    - 5) The actuator for the piston shall have lineal expansion characteristics and shall be completely filled with a temperature-sensitive wax.
    - 6) Available in ¾” (19 mm) and 1” (25 mm) female NPT fittings.
      - (a) ¾” Cv = 3.1 gpm (0.195 L/sec)
      - (b) 1” Cv = 3.2 gpm (0.20 L/sec)

## 2.06 TRIPLE DUTY VALVE

- A. Angle or straight pattern.
- B. 175-psig pressure rating, ductile-iron body, pump-discharge fitting.
- C. Drain plug and bronze-fitted shutoff, balancing, and check valve features.
- D. Brass gage ports with integral check valve and orifice for flow measurement.

## 2.07 GLYCOL FEED UNIT

- A. Automatic Glycol Feed Unit as manufactured by Skidmore.
- B. Model: S-55-100-2-PEFS.
- C. Factory Engineered, assembled and tested.
- D. UL/CUL 508A Control Panel in type 4X enclosure.
- E. Pressure Pump – 1/3 HP, 110 volt, 1 PH, 2 GPM @ 100 PSI.
- F. Low level cut-out float switch.
- G. High level alarm.
- H. 55 gallon, heavy duty, polyethylene tank.
- I. Brass discharge and suction piping.
- J. Maximum Working Pressure: 175 psig.

## 2.08 BACKFLOW PREVENTERS

- A. Reduced-Pressure-Principle Backflow Preventers:
1. Products: Subject to compliance with requirements, provide one of the following:
    - a. Ames Fire & Waterworks; A Watts Water Technologies Company
    - b. FEBCO; A WATTS Brand
    - c. WATTS; A Watts Water Technologies Company;
    - d. Zurn Industries, LLC;
  2. Standard: ASSE 1013.
  3. Operation: Continuous-pressure applications.
  4. Pressure Loss: 12 psig maximum, through middle third of flow range.
  5. Body: Bronze] for NPS 2 and smaller; ductile or cast iron with interior lining that complies with AWWA C550 or that is FDA approved for NPS 2-1/2 and larger.
  6. End Connections: Threaded for NPS 2 and smaller; flanged] for NPS 2-1/2 and larger.
  7. Configuration: Designed for horizontal, straight-through flow.
  8. Accessories:
    - a. Valves NPS 2 and Smaller: Ball type with threaded ends on inlet and outlet.
    - b. Valves NPS 2-1/2 and Larger: Outside-screw and yoke-gate type with flanged ends on inlet and outlet.
  9. Air-Gap Fitting: ASME A112.1.2, matching backflow-preventer connection.

## PART 3 EXECUTION

### 3.01 INSTALLATION OF HEAT EXCHANGERS

- A. Retain first paragraph below for contractor-fabricated saddle supports. Delete if factory-fabricated cradle supports are retained.
- B. Install gasketed-plate heat exchanger in approximate location indicated on Drawings.
- C. Install metal shroud over installed gasketed-plate heat exchanger according to manufacturer's written instructions.
- D. Comply with requirements for piping specified in Section 232113 "Hydronic Piping" and Section 232116 "Hydronic Piping Specialties." Drawings indicate general arrangement of piping, fittings, and specialties.
- E. Maintain manufacturer's recommended clearances for tube removal, service, and maintenance.
- F. Install piping adjacent to heat exchangers to allow space for service and maintenance of heat exchangers. Arrange piping for easy removal of heat exchangers.

- G. Install shutoff valves at heat-exchanger inlet and outlet connections.
- H. Install relief valves on heat-exchanger heated-fluid connection and install pipe relief valves, full size of valve connection, to floor drain.
- I. Install thermometer on heat-exchanger inlet and outlet piping, and install thermometer on heating-fluid inlet and outlet piping. Comply with requirements for thermometers specified in Section 230519 "Meters and Gages for HVAC Piping."
- J. Install pressure gages on heat-exchanger and heating-fluid piping. Comply with requirements for pressure gages specified in Section 230519 "Meters and Gages for HVAC Piping."
- K. Equipment Mounting:
  - 1. Install heat exchangers on cast-in-place concrete equipment bases. Comply with requirements for equipment bases and foundations specified in Section 033000 "Cast-in-Place Concrete."

### 3.02 INSTALLATION OF HYDRONIC SNOW MELTING SYSTEM

- A. Install the Work of this Section in accordance with the manufacturer's printed installation instructions.
- B. Slab-Over-Existing Slab Installation:
  - 1. Fasten the tubing to the rewire or rebar in accordance with the tubing manufacturer's installation recommendations.
  - 2. Install tubing at a consistent depth below the surface elevation. Ensure sufficient clearance to avoid control joint saw cutting.
  - 3. Where tubing crosses metal expansion joints in the concrete, ensure that the tubing passes below the joints or is sleeved through the joints in accordance with manufacturer's instructions.
- C. Field Quality Control and Testing:
  - 1. To ensure system integrity, pressure test the system before covering tubing in concrete or when other trades are working in the vicinity of the tubing.
  - 2. Test all electrical controls in accordance with respective installation manuals.
  - 3. System shall be checked after 3 years of operation and every year thereafter. System shall be checked for pH levels to ensure that it is operating within suggested guidelines.
- D. System Adjusting:
  - 1. Balancing Across Manifold: Balance all loops across each manifold for equal flow resistance based on actual loop lengths and total manifold flow.
  - 2. Balancing between manifolds is accomplished with a flow control device installed on the return piping leg from each manifold when direct return piping is used for the supply and return mains or the circuits deviate by more than 10%.



- E. Cleaning:
  - 1. Remove temporary coverings and protection of adjacent work areas.
  - 2. Repair or replace damaged installed products.
  - 3. Clean installed products in accordance with manufacturer's instructions prior to State's acceptance.
  - 4. Remove construction debris from project site and legally dispose of debris.
  
- F. Demonstration:
  - 1. Demonstrate operation of system to the Director's Representative or Facility's personnel.
  - 2. Instruct the Director's Representative or Facility's personnel about the type, concentration and maintenance of the glycol and water solution.
  - 3. Provide Director's Representative or Facility's personnel with manufacturer's installation, operation, and maintenance instructions for installed components within the system.
  
- G. Protection:
  - 1. Protect installed work from damage caused by subsequent construction activity on the site. Provide Director's Representative with copy of photos and drawings of product locations to assist.

**END OF SECTION**

## SECTION 235239

### FACTORY PACKAGED ELECTRIC BOILER LOW PRESSURE

#### PART 1 - GENERAL

##### 1.01 SUBMITTALS

- A. Submittals Package (**PRE-AWARD SUBMITTAL**): Submit the shop drawings, product data, and quality control submittals specified below at the same time as a package.
- B. Shop Drawings: Manufacturer's certified detail drawings of the boiler fabrication; wiring diagrams, operating and safety controls.
- C. Product Data: Catalog sheets, standard diagrams, standard schematic drawings, specifications and installation instructions as a package.
- D. Quality Control Submittals:
  - 1. Certificates: Affidavit required under Quality Assurance Article.
  - 2. 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.
  - 3. List of Completed Installations: Boilers shall be factory packaged, rated and cataloged units of a nationally recognized manufacturer, approved by the Director, and shall have been in operation for a period of not less than 5 years, in the State of New York.
    - a. The Director may require the manufacturer to submit evidence, that not less than 3 different installations of comparable size have been in satisfactory operation for this period of time.
    - b. The 3 indicated installations shall be accessible for inspection by the Director's Representative.
- E. Contract Closeout Submittals:
  - 1. Department of Labor Certification of Inspection: Deliver 2 copies to the Director's Representative.
  - 2. Operation and Maintenance Data: Deliver 2 copies covering the installed boiler to the Director's Representative.
  - 3. Service Organization Data: Written notification from boiler manufacturer specifying the name, address, telephone number and available service programs of the manufacturers' fully equipped and authorized service organization.

##### 1.02 QUALITY ASSURANCE

- A. Regulatory Requirements:
  - 1. Packaged boiler shall be constructed, tested and stamped in accordance

- with the ASME Code for Low Pressure Heating Boilers.
2. Installation of boiler shall comply with the requirements of Part 4 of Title 12 Rules and Regulations of the State of New York Industrial Code Rule No. 4 (12NYCRR4).
  3. Boiler shall comply with NYS Department of Environmental Conservation Law 6NYCRR, Parts 200, 201, 225, 227 and 231.
- B. Certification: Affidavit by the Company Field Advisor, certifying that the boiler meets the contract requirements and is operating properly.
- C. Company Field Advisor: Secure the services of a Company Field Advisor for a minimum of 8 working hours for the following:
1. Render advice regarding installation and final adjustment of the boiler.
  2. Visit the Site upon completion of boiler to inspect the Work, and to notify the Director's Representative of any Work which must be done or modified prior to NYS Department of Labor inspection.
  3. Supervise initial operation of boiler.
  4. Witness final system test and then certify with an affidavit that the boiler is installed in accordance with the Contract Documents and is operating properly.
  5. Train facility personnel on the operation and maintenance of the system (minimum of two 4 hour sessions).
  6. Explain available service programs to facility supervisory personnel for their consideration.

### **1.03 MAINTENANCE**

- A. Maintenance Service: A fully equipped service organization authorized by boiler manufacturer and 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. Special Tools: Deliver the following tools for each boiler to the Director's Representative.
1. Tools for opening manholes, handholes, and front and rear covers.
  2. Brushes for cleaning boiler elements.

## **PART 2 - PRODUCTS**

### **2.01 MANUFACTURERS**

- A. Cemline Corporation, or approved equal.

### **2.02 MANUFACTURED UNITS**

- A. Description: Factory-fabricated, -assembled, and -tested electric boilers with trim and controls necessary to generate hot water.
- B. Pressure Vessel: Carbon-steel pressure vessel mounted on structural-steel base.

- C. Nozzles: Flanges for water inlet and outlet and heating element inserts; threaded connections for trim and controls.
- D. Insulation: One layer 3-inch thick, glass-fiber insulation.
- E. Jacket: Galvanized sheet metal casing with baked-enamel protective finish and removable panels with snap-in or interlocking closures for access to pressure vessel.
- F. Lifting Lugs: Welded to pressure vessel, extending above jacket.
- G. Heating Elements: Incoloy-sheathed, replaceable electric-resistance element.
- H. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- I. ASME Compliance: Fabricate and label boilers to comply with 2013 ASME Boiler and Pressure Vessel Code.
- J. NFPA Compliance: Design and fabricate boilers to comply with NFPA 70, Article 424, Paragraphs G and H.
- K. UL Compliance: Test boilers for compliance with UL 834. Boilers shall be listed and labeled by a testing agency acceptable to authorities having jurisdiction.
- L. Retain "CSA Compliance" Paragraph below for projects in Canada.
- M. CSA Compliance: Test boilers for compliance with CSA B51.

### **2.03 TRIM FOR HOT-WATER BOILERS**

- A. In first paragraph below, retain first option if boiler operating pressure exceeds 160 psig (1100 kPa) or boiler temperature exceeds 250 deg F (120 deg C).
- B. Include devices sized to comply with ASME B31.1.
- C. Retain "Aquastat Controllers" Paragraph below if using modulating sequence of elements.
- D. Aquastat Controllers: Operating auto-reset high limit.
- E. Safety Relief Valve: ASME rated.
- F. Pressure and Temperature Gage: Minimum 3-1/2-inch diameter, combination water-pressure and -temperature gage. Gages shall have operating-pressure and -temperature ranges, so normal operating range is about 50 percent of full range.
- G. Boiler Air Vent: Automatic.
- H. Dip-tube in water outlet.

- I. Drain Valve: Minimum NPS 3/4 hose-end ball valve sized according to requirements of authorities having jurisdiction.
- J. Accessories:
  - 1. Tappings NPS 2 and Smaller: Threaded ends according to ASME B1.20.1 for pipe threads.
  - 2. Tappings NPS 2-1/2 and Larger: Flanged ends according to ASME B16.5 for steel and stainless-steel flanges, and according to ASME B16.24 for copper and copper-alloy flanges.
  - 3. Fused disconnect.
  - 4. Alarm bell.
  - 5. Flow switch.
  - 6. High pressure cut-off.
  - 7. Emergency E-stop.

## 2.04 CONTROLS

- A. Refer to Section 230924 "Modifications to Direct Digital Control (DDC) System"
- B. Boiler operating controls shall include the following devices and features:
  - 1. Control transformer.
  - 2. Step controller.
  - 3. Recycling relay returns controller to off position after power failure.
  - 4. Multistage thermostat.
  - 5. Control-circuit switch.
  - 6. Visual indication for each step.
  - 7. Supply-voltage indicator.
  - 8. Set-Point Adjust: Set points shall be adjustable.
  - 9. Retain one of two "Sequence of Operation" subparagraphs below for operating control sequences.
  - 10. Sequence of Operation: Electric, factory-fabricated and field-installed panel to control element sequence controller to maintain space temperature in response to thermostat with heat anticipator located in heated space.
    - a. Include automatic, alternating-operation sequence for multiple boilers to provide equal runtime for boilers.
  - 11. Sequence of Operation: Electric, factory-fabricated and field-installed panel to control element sequence controller.
    - a. Include automatic, alternating-operation sequence for multiple boilers to provide equal runtime for boilers.
- C. Safety Controls: To maintain safe operating conditions, safety controls limit boiler operation.
  - 1. High Cutoff: Manual reset stops boiler if operating conditions rise above set point or maximum boiler design temperature.
  - 2. Low-Water Cutoff Switch: Float and electronic probe shall prevent boiler operation on low water. Cutoff switch shall be manual-reset type.
  - 3. Audible Alarm: Factory mounted on control panel with silence switch; shall sound alarm for above conditions.

- D. Building Management System Interface: Factory install hardware and software to enable building management system to monitor, control, and display boiler status and alarms.
  - 1. Hardwired Points:
    - a. Monitoring: On/off status, common trouble alarm and low-water-level alarm.
    - b. Control: On/off operation, hot water supply temperature set-point adjustment.
  - 2. A BACNet communication interface with building management system shall enable building management system operator to remotely control and monitor the boiler from an operator workstation. Control features available and monitoring points displayed locally at boiler control panel shall be available through building management system.

## 2.05 ELECTRICAL POWER

- A. Single-Point Field Power Connection: Factory-installed and -wired switches, transformers, and electrical devices necessary shall provide a single-point field power connection to boiler.
  - 1. Interlock with door to de-energize power with door open.
- B. Electrical Enclosures: NEMA 250, Type 1 enclosure with hinged door and key-locking handle.
- C. Install factory wiring outside of an enclosure in a metal raceway.
- D. Comply with NFPA 70.
  - 1. Electrical Circuits: 48 A, maximum.
- E. Connectors: Mechanical lugs bolted to copper bus bars or distribution blocks with pressure connectors.
- F. Fuses: NEMA FU 1, Class J or K5; 60 A, maximum.
- G. Contactors: Three-pole magnetic contactors, listed for 500,000 cycles at full load.
- H. Factory-wired internal control devices and heating elements.
  - 1. Wiring shall be numbered and color coded to match wiring diagram.

## 2.06 CAPACITIES AND CHARACTERISTICS

- A. Hot-Water Heating:
  - 1. Refer to drawings.
- B. Output Capacity: 150 kW.
- C. Electrical Characteristics:
  - 1. Refer to drawings.

## 2.07 SOURCE QUALITY CONTROL

- A. Test and inspect factory-assembled boilers, before shipping, according to 2013 ASME Boiler and Pressure Vessel Code.

Hydrostatic Test: Factory test assembled boiler, including hydrostatic test.

## PART 3 - EXECUTION

### 3.01 INSTALLATION

- A. Install boiler at location noted on the drawings, of such a physical size, that can be satisfactorily arranged in the space available, and provide sufficient room for replacing boiler tubes, cleaning and servicing of all components.
- B. Place NYS Department of Labor certificate of inspection in framed glass holder and post near the boiler prior to operation of the boiler.
- C. Attach identification number assigned by the Commissioner of NYS Department of Labor to boiler.

### 3.02 FIELD QUALITY CONTROL

- A. Preliminary Requirements:
  - 1. Employ the services of Company Field Advisor to complete duties specified in Quality Assurance Article.
- B. Boiler Pre-Start Up and Start-Up:
  - 1. Arrange with State Department of Labor for inspection of boiler upon completion of installation.
    - a. Do not operate boiler until State Department of Labor inspection is made and a Certificate of Inspection is posted.
    - b. Pay application and inspection fees required by State Department of Labor.
    - c. Prepare boiler for internal inspection or hydrostatic pressure test on the date specified by the Department of Labor inspector.
      - 1) Remove manhole and handhole plates, and washout plugs in the water column connection.
      - 2) Remove insulation if requested by the State Department of Labor inspector.
      - 3) Remove gages for testing if requested by State Department of Labor inspector.
      - 4) Stop leaks of hot water into the boiler being inspected.
      - 5) Make available to the State Department of Labor inspector a competent person to be placed under the inspector's supervision if necessary to disassemble, reassemble, test, adjust, operate or subject to forcible handling any part of the boiler.

2. Preliminary System Tests:
  - a. Preparation: After the State Department of Labor Certificate of Inspection has been posted, operate the boiler for the purpose of checking general operation, proving mechanical and electrical controls, and making necessary adjustments. Operate the system long enough to assure that it is performing properly.
  - b. Run preliminary test for the purpose of:
    - 1) Determining whether the boiler and appurtenances are in suitable condition to conduct the acceptance test.
    - 2) Checking the adjusting equipment.
    - 3) Training Facility personnel.
3. System Acceptance Test:
  - a. Preparation: Notify the Director's Representative at least 3 working days prior to the test so arrangements can be made to have a Facility Representative witness the test.
  - b. Make the following tests:
    - 1) Operate boiler, appurtenances, and fine tune adjustable devices.
    - 2) Test alarm indicating devices.
    - 3) Operate for a sufficient period of time to demonstrate satisfactory overall performance of the heating system.
  - c. Supply equipment necessary for system adjustment and testing.
  - d. Submit a typewritten report of the test results, signed by the Company Field Advisor and the Director's Representative. Enclose a copy of the report in a metal frame covered with plastic sheet glazing and mount it adjacent to the control panel.

**END OF SECTION**



## SECTION 260502

### BASIC ELECTRICAL MATERIALS AND METHODS FOR DIRECT DIGITAL BUILDING CONTROL SYSTEM

#### PART 1 GENERAL

##### 1.01 REFERENCES

- A. NEMA, ANSI, and UL.

##### 1.02 SUBMITTALS

- A. Product Data:
  - 1. Catalog sheets, specifications and installation instructions.
  - 2. Statement from the Company producing the system, for each size and type of cable proposed for communication bus use, indicating that the electrical characteristics meet the requirements of the Company.
  - 3. For fire rated construction, prove that materials and installation methods proposed for use are in accordance with the listing requirements of the classified construction.
- B. Submit an Environmental Product Declaration (EPD) from the manufacturer for steel this specification section, if available. A statement of the contractor's good faith effort to obtain the EPD shall be provided if not available.
  - 1. Manufacturer-provided EPDs must be Product Specific Type III (Third-Party Reviewed), in adherence with ISO 14025 *Environmental labels and declarations*, ISO 14044 *Environmental management – Life cycle assessment*, and ISO 21930 *Core rules for environmental product declarations of construction products and services*.

#### PART 2 PRODUCTS

##### 2.01 RACEWAYS, FITTINGS AND ACCESSORIES

- A. Electrical Metallic Tubing: Steel, galvanized on the outside and enameled on the inside, UL categorized as Electrical Metallic Tubing (identified on UL Listing Mark as Electrical Metallic Tubing), by Allied Tube & Conduit Corp., LTV Copperweld, or Wheatland Tube Co.
- B. 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), by AFC Cable Systems Inc., Anamet Electrical Inc., Electri-Flex Co., or International Metal Hose Co.

- C. Liquid-tight Flexible Metal Conduit: UL categorized as liquid-tight flexible metal conduit (identified on UL Listing Mark as Liquid-Tight Flexible Metal Conduit, also specifically marked with temperature and environment application data), by AFC Cable Systems Inc., Anamet Electrical Inc., Electri-Flex Co., or Universal Metal Hose Co.
- D. Surface Metal Raceway, Fittings and Accessories: By Thomas & Betts Corp., Mono-Systems Inc. or Wiremold Co. Area and conductor capacity indicated for each size raceway is for reference. Follow manufacturer's recommended raceway capacity for all types and sizes of conductors:
1. Size 1: Nominal area .3 sq. in. min., 4 No. 12 THW max.; Thomas & Betts B400, Mono-Systems SMS 700, or Wiremold's V700.
  2. Size 2: Nominal area .75 sq. in. min., 11 No. 12 THW max.; Thomas & Betts SR250, Mono-Systems SMS2100, Wiremold's 2100.
  3. Size 3: Nominal area 2.8 sq. in. min., 43 No. 12 THW max.; Thomas & Betts SR500, Mono-Systems SMS3200, or Wiremold's G3000.
- E. Connectors and Couplings:
1. Locknuts: UL, steel/zinc electroplate; Appleton Electric Co.'s BL-50 Series, Cooper/Crouse-Hinds' 11 Series, OZ/Gedney Co.'s 1-50S Series, Raco Inc.'s 1002 Series, Steel City/T&B Corp.'s LN-101 Series, or Thomas & Betts Corp.'s 141 Series.
  2. Couplings (For Rigid Metal and IMC Conduit): Standard galvanized threaded couplings as furnished by conduit manufacturer, Allied Tube & Conduit Corp.'s Kwik-Couple, or Thomas & Betts Corp.'s Shamrock.
  3. Three Piece Conduit Coupling (For Rigid Metal and IMC Conduit): Steel, malleable iron, zinc electroplate; Allied Tube & Conduit Corp.'s Kwik-Couple, Appleton Electric Co.'s EC-50 Series, Cooper/Crouse-Hinds' 190M Series, OZ/Gedney Co.'s 4-50 Series, Raco Inc.'s 1502 Series, Steel City/T & B Corp.s EK-401 Series, or Thomas & Betts Corp.'s 675 Series.
  4. Electrical Metallic Tubing Couplings and Insulated Connectors: Compression type, steel/zinc electroplate; Appleton Electric Co.'s TW-50CS1, TWC-50CS Series, Cooper/Crouse-Hinds' 1650, 660S Series, Raco Inc.'s 2912, 2922 Series, Steel City/T & B Corp.'s TC-711 Series, or Thomas & Betts Corp.'s 5120, 5123 Series.
  5. Flexible Metal Conduit Connectors: Arlington Industries Inc.'s Saddle-Grip, OZ/Gedney Co.'s C-8T, 24-34T, ACV-50T Series, or Thomas & Betts Corp.'s Nylon Insulated Tite-Bite Series.
  6. Liquid-tight Flexible Metal Conduit Connectors:
    - a. Dry, Damp Locations: Steel, malleable iron, zinc electroplate, insulated throat; Appleton Electric Co.'s STB Series, Cooper/Crouse-Hinds' LTB Series, OZ/Gedney Co.'s 4Q-50T Series, Raco Inc.'s 3512 Series, Steel City/T & B Corp.'s LT-701 Series, or Thomas & Betts Corp.'s 5332 Series.
    - b. Wet Locations: OZ/Gedney Co.'s 4Q-TG Series (hot-dip/mechanically galvanized), or Thomas & Betts Corp.'s 3322 Series (PVC coated).
- F. Conduit Bodies (Threaded):

1. Dry, Damp Locations: Zinc electroplate malleable iron or cast iron alloy bodies with zinc electroplate steel covers; Appleton Electric Co.'s Unilets, Cooper/Crouse-Hinds' Condulets, OZ/Gedney Co.'s Conduit Bodies, or Thomas & Betts Corp.'s Conduit Bodies.
- G. Expansion Fittings:
1. Dry, Damp Locations:
    - a. Malleable iron, zinc electroplate finish: Appleton Electric Co.'s XJ or OZ/Gedney Co.'s AX (TX for EMT), with external bonding jumper.
    - b. Electrogalvanized Steel: Cooper/Crouse-Hinds' XJG (XJG-EMT for EMT), or Thomas & Betts Corp.'s XJG, with internal grounding.
- H. Deflection Fittings:
1. Dry Locations: Appleton Electric Co.'s DF, Cooper/Crouse-Hinds' XD, or OZ/Gedney Co.'s Type DX.

## 2.02 OUTLET, JUNCTION AND PULL BOXES

- A. Galvanized Steel Boxes For Concealed Work: Standard galvanized steel boxes and device covers by Appleton Electric Co., Beck Mfg./Picoma Industries, Cooper/Crouse-Hinds, Raco/Div. of Hubbell , or Steel City/T & B Corp.
- B. Galvanized Steel Junction and Pull Boxes For Exposed Work: Code gage, galvanized steel screw cover boxes by Delta Metal Products Inc., Hoffman Enclosures Inc., Hubbell Wiegmann, Lee Products Co., or Rittal/Electromate.
- C. Threaded Type Boxes For Exposed Work:
1. Outlet Boxes:
    - a. For Dry, Damp Locations: Zinc electroplate malleable iron or cast iron alloy boxes by Appleton Electric Co., Cooper/Crouse-Hinds Co., OZ/ Gedney Co., or Thomas & Betts Corp. with zinc electroplate steel covers to suit application.
  2. Junction And Pull Boxes:
    - a. For Dry, Damp Locations: Zinc electroplate cast iron boxes by Appleton Electric Co., Cooper/Crouse-Hinds, OZ/Gedney Co., or Thomas & Betts Corp. with zinc electroplate steel or cast iron cover.
  3. Conduit Bodies, Threaded (Provided with a Volume Marking):
    - a. For Dry, Damp Location: Zinc electroplate malleable iron or cast iron alloy bodies with zinc electroplate steel covers; Appleton Electric Co.'s Unilets, Cooper/Crouse-Hinds' Condulets, OZ/Gedney Co.'s Conduit Bodies, or Thomas & Betts Corp.'s Conduit Bodies.
- D. Specific Purpose Outlet Boxes: As fabricated by manufacturers for mounting their equipment.
- E. Outlet Boxes and Related Products for Fire Rated Construction:

1. Parameters For Use of Listed Metallic Outlet or Device Boxes: UL Electrical Construction Equipment Directory - Metallic Outlet Boxes (QCIT).
2. Wall Opening Protective Materials: As listed in UL Fire Resistance Directory - Wall Opening Protective Materials (CLIV), or UL Electrical Construction Equipment Directory - Wall Opening Protective Materials (QCSN).

### **2.03 CONDUCTORS AND ACCESSORIES**

- A. Date of Manufacture: No insulated conductor over one year old when delivered to the site will be acceptable.
- B. Conductors: Annealed uncoated copper or annealed coated copper in conformance with the applicable standards for the type of insulation to be applied on the conductor.
- C. Types for Power and Class 1, 2 and 3 Circuits:
  1. Power Wiring:
    - a. General: Rated 600V, NFPA 70 Type FEP, THHN, THW, THW-2, THWN, THWN-2, XHH, XHHW, XHHW-2.
  2. Class 1 Wiring:
    - a. No. 18 and No. 16 AWG: Insulated copper conductors suitable for 600 volts, NFPA 70 types KF-2, KFF-2, PAFF, PF, PFF, PGF, PGFF, PTFE, SF-2, SFF-2, TF, TFF, TFN, TFFN, ZF, or ZFF.
    - b. Larger than No. 16 AWG: Insulated copper conductors suitable for 600 volts, in compliance with NFPA 70 Article 310.
    - c. Conductor with other types and thickness of insulation may be used if listed for Class 1 circuit use.
  3. Class 2 Wiring:
    - a. Multiconductor Cables: NFPA 70 Article 725, Types CL2P, CL2R, CL2.
    - b. Other types of cables may be used in accordance with NFPA 70 Table 725-61 "Cable Uses and Permitted Substitutions", as approved.
  4. Class 3 Wiring:
    - a. Single Conductors No. 18 and No. 16 AWG: Same as Class 1 No. 18 and No. 16 AWG conductors, except that:
      - 1) Conductors are also listed as CL3.
      - 2) Voltage rating not marked on cable except where cable has multiple listings and voltage marking is required for one or more of the listings.
    - b. Multiconductor Cables: NFPA 70 Article 725, Types CL3P, CL3R, CL3.
    - c. Other types of cables may be used in accordance with NFPA 70, Table 725-61 "Cable Uses and Permitted Substitutions", as approved.
- D. Types for Interior Communication Bus Circuits:

1. Number of conductors and conductor size as recommended by the Company producing the system, except that conductor size shall not be less than No. 18 AWG.
  2. Multiconductor Cables NEC Type PLTC:
    - a. Insulated copper conductors.
    - b. Cable shall have a voltage rating of not less than 300 volts.
  3. Conductors twisted, shielded and jacketed as recommended by the Company producing the system.
  4. All electrical characteristics shall meet the requirements of the Company producing the system (conductor to conductor capacitance, dc resistance, velocity of propagation, etc.).
- E. Connectors:
1. General: Connectors specified are part of a system. Furnish connectors and components, and use specific tools and methods as recommended by connector manufacturer to form complete connector system.
  2. Splices:
    - a. Spring Type:
      - 1) Rated 105° C, 600V; Buchanan/Ideal Industries Inc.'s B-Cap, Electrical Products Div./3M's Scotchlok Type Y, R, G, B, O/B+, R/Y+, or B/G+, or Ideal Industries Inc.'s Wing Nuts or Wire Nuts.
      - 2) Rated 150° C, 600V; Ideal Industries Inc.'s High Temperature Wire-Nut Model 73B, 59B.
    - b. Indent Type with Insulating Jacket:
      - 1) Rated 105° C, 600V; Buchanan/Ideal Industries Inc.'s Crimp Connectors, Ideal Industries Inc.'s Crimp Connectors, Penn-Union Corp.'s Penn-Crimps, or Thomas & Betts Corp.'s STA-KON.
    - c. Indent Type (Uninsulated): Anderson/Hubbell's Versa-Crimp, VERSAtile, Blackburn/T&B Corp.'s Color-Coded Compression Connectors, Electrical Products Div./3M's Scotchlok 10000, 11000 Series, Framatome Connectors/Burndy's Hydent, Penn-Union Corp.'s BCU, BBCU Series, or Thomas & Betts Corp.'s Compression Connectors.
    - d. Connector Blocks: NIS Industires Inc.'s Polaris System, or Thomas & Betts Corp.'s Blackburn AMT Series.
    - e. Resin Splice Kits: Electrical Products Div./3M's Scotchcast Brand Kit Nos. 82A Series, 82-B1 or 90-B1, or Scotchcast Brand Resin Pressure Splicing Method.
    - f. Heat Shrinkable Splices: Electrical Products Div./3M's ITCSN, Raychem Corp.'s Thermofit Type WCS, or Thomas & Betts Corp.'s SHRINK-KON Insulators.
    - g. Cold Shrink Splices: Electrical Products Div./3M's 8420 Series.
- F. Terminals: Nylon insulated pressure terminal connectors by Amp-Tyco/Electronics, Electrical Products Div./3M, Framatome Connectors/Burndy, Ideal Industries Inc., Panduit Corp., Penn-Union Corp., Thomas & Betts Corp., or Wiremold Co.
- G. Insulation Tapes:

1. Plastic Tape: Electrical Products Div./3M's Scotch Super 33+ or Scotch 88, Plymouth Rubber Co.'s Plymouth/ Bishop Premium 85CW.
  2. Rubber Tape: Electrical Products Div./3M's Scotch 130C, or Plymouth Rubber Co.'s Plymouth/Bishop W963 Plysafe.
- H. Moisture Sealing Tape: Electrical Products Div./3M's Scotch 2200 or 2210, or Plymouth Rubber Co.'s Plymouth/Bishop 4000 Plyseal-V.
- I. Wire Management Products: Cable clamps and clips, cable ties, spiral wraps, etc., by Catamount/T&B Corp., or Ideal Industries, Inc.

## **2.04 SUPPORTING DEVICES**

- A. "C" Beam Clamps:
1. For 1 Inch Conduit Maximum: B-Line Systems Inc.'s BG-8-C2, BP-8-C1 Series, or Caddy/Erico Products Inc.'s BC-8P and BC-8PSM Series.
  2. For 3 Inch Conduit Maximum: Appleton Electric Co.'s BH-500 Series beam clamp with H50WB Series hangers, Kindorf/T&B Corp.'s 500 Series beam clamp with 6HO-B Series hanger, or OZ/Gedney Co.'s IS-500 Series beam clamp with H-OWBS Series hanger.
  3. For 1/4 Inch Hanger Rods: B-Line Systems Inc.'s BC, Caddy/Erico Products Inc.'s BC, Kindorf/T&B Corp.'s 500, 510, or Unistrut Corp.'s P1648S, P2398S, P2675, P2676.
  4. For 3/8 Inch Hanger Rods: Caddy/Erico Products Inc.'s BC, Kindorf/T&B Corp.'s 231-3/8, 502, or Unistrut Corp.'s P1649AS, P2401S, P2675, P2676.
- B. Pipe Straps: Two hole steel conduit straps; Kindorf/T&B Corp.'s C-144 Series, or Unistrut Corp.'s P-2558 Series.
- C. Pipe Clamps: One hole malleable iron clamps; Kindorf/T&B Corp.'s HS-400 Series, or OZ/ Gedney Co.'s 14-G Series.
- D. Supporting Fastener (Metal Stud Construction): Metal stud supports, clips and accessories as produced by Caddy/Erico Products Inc.

## **PART 3 EXECUTION**

### **3.01 INSTALLATION, GENERAL**

- A. Provide wiring for the Direct Digital Building Control System.
1. Provide Class 1, 2, and 3 wiring, communication bus wiring and connections.
  2. Provide power wiring from DDC System equipment to nearest electrical panelboard connected to the emergency power supply and UPS System. Coordinate source with Electrical Work Contractor.

### **3.02 RACEWAY INSTALLATION**

- A. Conduit Installed Concealed:

1. Install conduit concealed unless otherwise indicated on the drawings.
  2. Existing Construction:
    - a. Run conduit in existing chases and hung ceilings.
    - b. If conduit cannot be installed concealed due to conditions encountered in the building, report such conditions and await approval in writing before proceeding.
    - c. Install conduit in concrete slabs, under slabs (on grade), or under slabs (above finished ceilings) as approved. Concrete slabs that are both ceilings and floors shall be treated as floor slabs.
      - 1) Conduit in Slab: Run 1/2 and 3/4 inch conduit in the slab where placement of reinforcement and slab thickness is sufficient to allow 1-1/2 inches of concrete cover over conduit, otherwise run conduit under slab. Run conduit one inch and larger in the slab in the specific location(s) where it is indicated on the drawing to be run in the slab, otherwise run conduit under slab.
        - a) Run conduit under reinforcement where reinforcement is in upper portion or middle of slab.
        - b) Run conduit over reinforcement where reinforcement is in lower portion of slab.
        - c) Run conduit between reinforcement where reinforcement is in upper and lower portions of slab.
        - d) Separate parallel conduits minimum of 2 inches so that each conduit will be enveloped in concrete.
        - e) Pass conduit over steel beams, if any, parallel with the reinforcement.
        - f) Tie down conduit to avoid movement during placement of concrete.
        - g) Demonstrate to the Director's Representative that conduit has been placed to allow minimum of 1-1/2 inches of concrete cover.
      - 2) Conduit Under Slab on Grade:
        - a) Run conduit under vapor barrier (if any).
        - b) Install equipment grounding conductor in each conduit. Bond at boxes and equipment to which conduit is connected.
      - 3) Conduit Under Slab, Above Finished Ceiling:
        - a) Attach conduit to bottom of slab or structure supporting the slab.
        - b) Firestop through-penetrations of the slab.
  3. If any portions of the conduit system cannot be installed concealed due to conditions encountered in the building, report such conditions and await approval in writing before proceeding.
- B. Conduits Penetrating Concrete Floor Slabs (Concrete slabs that are both ceilings and floors shall be treated as floor slabs):
1. Provide a minimum of 2 inches between conduits that vertically penetrate elevated concrete slabs.

2. Provide firestopping and spray on fireproofing at locations where conduits penetrate surface of floor slab and slab is part of fire rating required for construction.
- C. Conduit Installed Exposed:
1. Install conduit exposed where indicated on the drawings. If not indicated, conduit may be installed exposed, as approved, in:
    - a. Unfinished spaces, and finished spaces housing mechanical or electrical equipment that is generally accessible only to facility maintenance personnel.
    - b. Areas where existing conduits have been installed exposed.
    - c. Areas where conduit cannot be installed concealed.
  2. Install conduit tight to the surface of the building construction.  
Exceptions:
    - a. Where otherwise indicated or directed.
    - b. Where conduit is exposed in wet locations. Install entire wiring system including conduit, boxes, and fittings so that there is 1/4 inch air space between it and the wall or supporting surface.
  3. Install vertical runs perpendicular to the floor.
  4. Install runs on the ceiling perpendicular or parallel to the walls.
  5. Install horizontal runs parallel to the floor.
  6. Do not run conduits near heating pipes.
  7. Installation of conduit directly on the floor will not be permitted.
- D. Conduit Size: Not smaller than 1/2 inch electrical trade size.
- E. Conduit in Waterproofed Floors: Install conduit runs in waterproof floors to avoid penetrating the waterproofing. Avoid penetration of waterproofing with conduit risers so far as practicable.
1. Where it is necessary to puncture the waterproofing for a conduit riser, install a standard weight steel pipe sleeve extending one inch above the finished floor level. Flash the steel pipe sleeve to the waterproofing with 16 ounce copper. Construct the flashing with a copper tube extending the full height of the sleeve, soldered to a copper base extending 6 inches in all directions from the sleeve.
  2. The flashing will be integrated into the waterproofing by the Construction Contractor. Provide solid cast brass floor plates with chromium finish where pipe sleeves are exposed in rooms.
- F. Raceway Schedule:
1. Electrical Metallic Tubing:
    - a. May be installed concealed above suspended ceilings where conduit does not support equipment.
    - b. May be installed concealed in hollow areas in dry locations, including:
      - 1) Hollow concrete masonry units, except where cores are to be filled.
      - 2) Drywall construction with sheet metal studs, except where studs are less than 3-1/2 inches deep.



- c. May be installed exposed in dry non-hazardous locations at elevations over 10'-0" above finished floor where conduit does not support equipment.
2. Flexible Metal Conduit: Install equipment grounding conductor in the flexible metal conduit and bond at each box or equipment to which conduit is connected:
  - a. Use 1 to 3 feet of flexible metal conduit for final conduit connection to:
    - 1) Equipment subject to vibration (dry locations)
    - 2) Equipment requiring flexible connection for adjustment or alignment (dry locations).
  - b. Use above existing non-removable suspended ceilings where rigid type raceways cannot be installed due to inaccessibility of space above ceiling.
  - c. May be installed concealed in drywall construction with sheet metal studs, except where studs are less than 3-1/2 inches deep.
3. Liquid-tight Flexible Metal Conduit: Install equipment grounding conductor in liquid-tight flexible metal conduit and bond at each box or equipment to which conduit is connected:
  - a. Use 1 to 3 feet of liquid-tight flexible metal conduit (UL listed and marked suitable for the installation's temperature and environmental conditions) for final conduit connection to:
    - 1) Equipment subject to vibration (damp and wet locations).
    - 2) Equipment requiring flexible connection for adjustment or alignment damp and wet locations).
4. Surface Metal Raceway: Use as exposed raceway system in finished spaces at locations, when approved, where raceways cannot be installed concealed:
  - a. Use surface metal raceway system of size required for number of wires to be installed therein.
  - b. Do not run raceway through walls that have a plaster finish nor through masonry 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 door frames and other openings. Run raceway on ceiling or walls perpendicular to or parallel with walls and floors.
  - c. Secure raceway at intervals not exceeding 36 inches.
  - d. 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:
    - 1) 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.

- 2) Combination Finishing Collar/Outlet Box: Same finish and peripheral dimensions as the equipment base to be mounted thereon, gage or thickness of metal as required by National Electrical Code, including provision for mounting and knockouts for entrance of raceway.

G. Fittings and Accessories Schedule:

1. General:
  - a. Use zinc electroplate or hot dipped galvanized steel/malleable iron or cast alloy fittings and accessories in conjunction with ferrous raceways in dry and damp locations unless otherwise specified or indicated on the drawings.
  - b. Use malleable iron or cast iron alloy fittings and accessories having hot dipped/mechanically galvanized finish or other specified corrosion resistant finish in conjunction with ferrous raceways in wet locations unless otherwise specified or indicated on the drawings.
  - c. Use caps or plugs to seal ends of conduits until wiring is installed (to exclude foreign material).
  - d. Use insulated grounding bushings on the ends of conduits that are not directly connected to the enclosure (such as stub-ups under equipment, etc.) and bond between bushings and enclosure with equipment grounding conductor.
  - e. Use expansion fittings where raceways cross expansion joints.
  - f. Use deflection fittings where raceways cross expansion joints that move in more than one plane.
  - g. Use 2 locknuts and an insulated bushing on end of each conduit entering sheet metal cabinet or box in dry or damp locations.
    - 1) Plastic bushing may be used in lieu of insulated bushing on 1/2 and 3/4 inch conduit.
    - 2) Terminate conduit ends within cabinet/box at the same level.
  - h. Use watertight hub on end of each conduit entering cabinets or boxes (in wet locations) that are not constructed with integral threaded hubs.
2. For Rigid and Intermediate Metal Conduit: Use threaded fittings and accessories. Use 3 piece conduit coupling where neither piece of conduit can be rotated.
3. For Electrical Metallic Tubing: Use compression type connectors and couplings.
4. For Flexible Metal Conduit: Use flexible metal conduit connectors.
5. For Liquid-tight Flexible Metal Conduit: Use liquid-tight connectors.
6. For Surface Metal Raceway: Use raceway manufacturer's standard fittings and accessories.
7. For Wireways: Use wireway manufacturer's standard fittings and accessories.

### 3.03 OUTLET, JUNCTION AND PULLBOX INSTALLATION

A. Box Schedule For Concealed Conduit System:

1. Non-Fire Rated Construction:

- a. Depth: To suit job conditions and comply with NFPA 70 Article 370.
  - b. For Junction and Pull Boxes: Use galvanized steel boxes with flush covers.
  - c. For Devices:
    - 1) Plaster or Cast-In-Place Concrete Walls: Use 4 inch or 4-11/16 inch galvanized steel boxes with device covers.
    - 2) 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.
2. Recessed Boxes in Fire Rated (2 hour maximum) Bearing and Nonbearing Wood or Steel Stud Walls (Gypsum Wallboard Facings):
    - a. Use listed single and double gang metallic outlet and device boxes. The surface area of individual outlet or device boxes shall not exceed 16 square inches.
    - b. The aggregate surface area of the boxes shall not exceed 100 square inches per 100 square feet of wall surface.
    - c. Securely fasten boxes to the studs. Verify that the opening in the wallboard facing is cut so that the clearance between the box and the wallboard does not exceed 1/8 inch.
    - d. Separate boxes located on opposite sides of walls or partitions by a minimum horizontal distance of 24 inches. This minimum separation distance may be reduced when wall opening protective materials are installed according to the requirements of their classification.
    - e. Use wall opening protective material in conjunction with boxes installed on opposite sides of walls or partitions of staggered stud construction in accordance with the classification requirements for the protective material.
  3. Other Fire Rated Construction: Use materials and methods to comply with the listing requirements for the classified construction.
- B. Box Schedule For Exposed Conduit System:
1. Dry and Damp Locations: Use zinc electroplate or hot dipped galvanized threaded type malleable iron or cast iron alloy outlet, junction, and pullboxes or conduit bodies provided with a volume marking in conjunction with ferrous raceways unless otherwise specified or indicated on the drawings.
    - a. Galvanized steel boxes may be used in conjunction with conduit sizes over 1 inch in non-hazardous dry and damp locations.
    - b. Galvanized steel boxes may be used in conjunction with electrical metallic tubing where it is installed exposed as branch circuit conduits at elevations over 10'-0" above finished floor.
  2. 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.

- C. Specific Purpose Outlet Boxes: Use to mount equipment when available and suitable for job conditions. Unless otherwise specified, use threaded type boxes with finish as specified for exposed conduit system, steel (painted) for surface metal raceway system and galvanized steel for recessed installations.

### 3.04 CONDUCTOR INSTALLATION

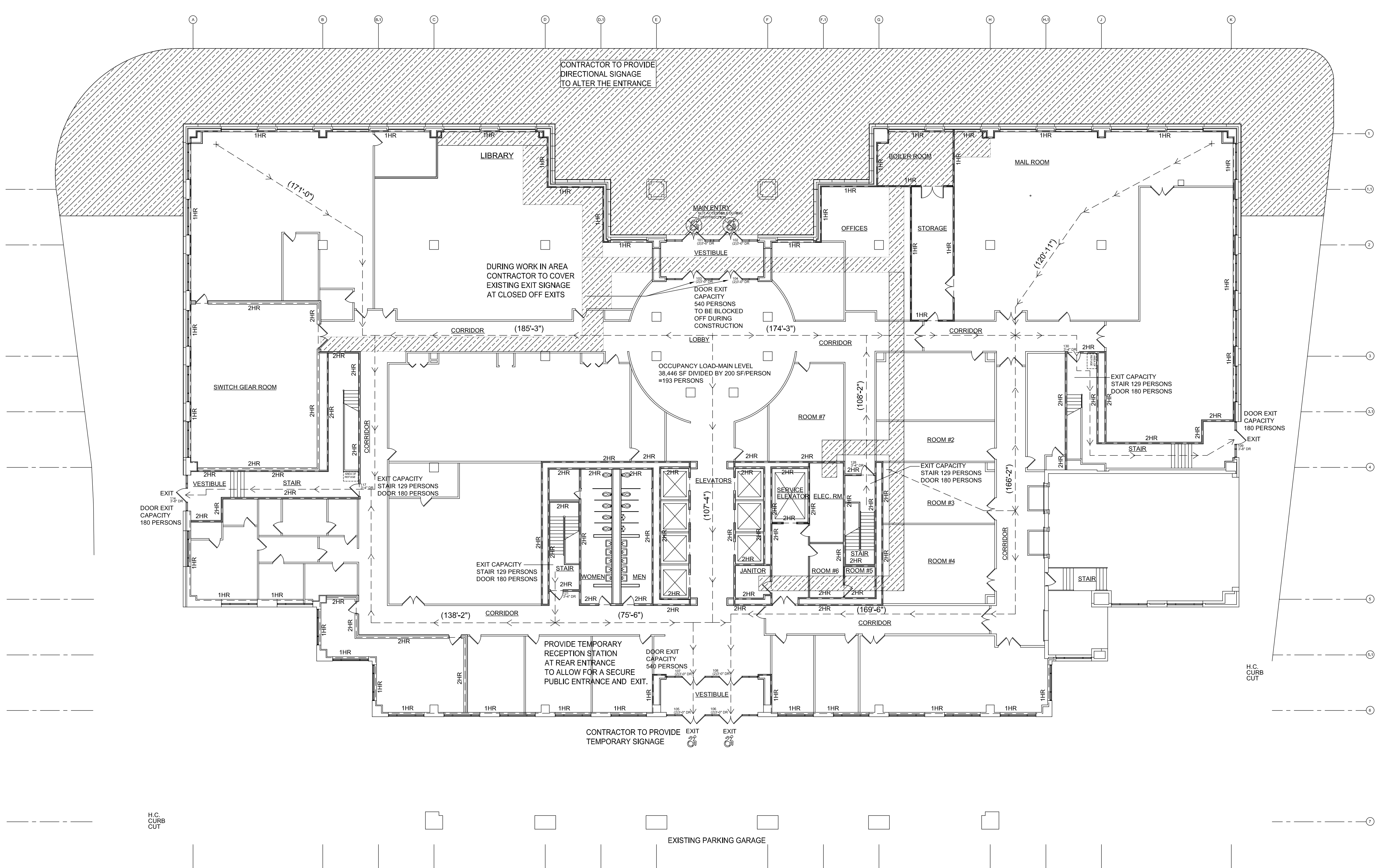
- A. Install conductors in raceways.
- B. Conductor Size: Install conductors of size shown on drawings or specified. Where conductor size is not indicated, the minimum size allowed is:
  - 1. For Power Circuits: No. 12 AWG.
  - 2. For Class 1 Circuits:
    - a. No. 18 and No. 16 AWG may be used provided they supply loads that do not exceed 6 amps (No. 18 AWG), or 8 amps (No. 16 AWG).
    - b. Larger than No. 16 AWG: Use to supply loads not greater than the ampacities given in NFPA 70 Section 310-15.
  - 3. For Class 2 Circuits: Any size to suit application.
  - 4. For Class 3 Circuits: No. 18 AWG.
  - 5. For Communication Bus Circuits: No. 18 AWG.
- C. Color Code for Wiring: In accordance with ICEA/NEMA WC-30 “Color Coding of Wires and Cables”. Other coding methods may be used, as approved.
- D. Use wire management products to bundle, route, and support wiring in junction boxes, pullboxes, wireways, gutters, channels, and other locations where wiring is accessible.
- E. Insulated Conductor Schedule:
  - 1. Power Circuits:
    - a. FEP, THHN, THW, THW-2, THWN, THWN-2, XHH, XHHW, or XHHW-2: Wiring in dry or damp locations (except where special type insulation is required).
    - b. THWN, THWN-2, XHHW, XHHW-2, USE, or USE-2: Wiring in wet locations (except where type USE or USE-2 insulated conductors are specifically required, or special type insulation is required).
  - 2. Class 1 Circuits: Use Class 1 wiring specified in Part 2 (except where special type insulation is required).
  - 3. Class 2 Circuits: Use Class 2 wiring specified in Part 2 (except where special type insulation is required).
  - 4. Class 3 Circuits: Use Class 3 wiring specified in Part 2 (except where special type insulation is required).

- F. Connector Schedule:
  - 1. Temperature Rating: Use connectors that have a temperature rating, equal to, or greater than the temperature rating of the conductors to which they are connected.
  - 2. Splices:
    - a. Dry Locations:
      - 1) For Conductors No. 8 AWG or Smaller: Use spring type pressure connectors, indent type pressure connectors with insulating jackets, or connector blocks (except where special type splices are required).
    - b. 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 or cold shrink splices are used).
  - 3. Terminations:
    - a. For Conductors No. 10 AWG or Smaller: Use terminals for connecting wiring to terminal strips, and to equipment designed for use with terminals.

### **3.05 SUPPORTING DEVICE INSTALLATION**

- A. Attachment of Conduit System:
  - 1. Wood Construction: Attach conduit to wood construction by means of pipe straps or pipe clamps and wood screws or lag bolts.
  - 2. Masonry Construction: Attach conduit to masonry construction by means of pipe straps or pipe clamps and masonry anchorage devices.
  - 3. Steel Beams: Attach conduit to steel beams by means of “C” beam clamps and hangers.
  - 4. Conduit Above Suspended Ceiling: Do not rest conduit directly on runner bars, T-bars, etc. Support conduit from ceiling supports or from construction above suspended ceiling.
- B. Metal Stud Construction: Attach raceways and boxes to metal studs by means of supporting fasteners manufactured specifically for the purpose.
  - 1. Support and attach outlet boxes so that they cannot torque/twist. Either:
    - a. Use bar hanger assembly, or:
    - b. In addition to attachment to the stud, also provide far side box support.

**END OF SECTION**



**1** FIRST FLOOR -CONSTRUCTION LIFE SAFETY PLAN  
 1/16" = 1'-0"

REVISED DRAWING 03/25/2024

- NOTES:
- COORDINATE FINAL EGRESS ROUTES WITH DIRECTORS REPRESENTATIVE DURING CONSTRUCTION.
  - ENSURE NO OTHER BUILDING EXITS ARE CLOSED DURING CONSTRUCTION.
  - BOTH EXITS AT MAIN ENTRY WITHIN THE CONSTRUCTION AREA MAY BE CLOSED ONE AT A TIME.
  - PROVIDE INTERIOR GUARDS SUFFICIENT TO LIMIT ACCESS TO DOORS DURING CONSTRUCTION. DO NOT SEAL DOORS.
  - TEMPORARY MEANS OF EGRESS APPROVED BY OGS PROVIDED AS REQUIRED BY N.Y.S. BUILDING CODE SECTION 3310.2

LEGEND:  
 -XXX-X- EGRESS PATH WITH DISTANCE FROM END POINT TO EXISTING EXIT. WITH SPRINKLER SYSTEM-DISTANCE NOT TO EXCEED 300'-0"  
 AREA OF WORK -REFER TO DWGS. FOR SCOPE

EXISTING BUILDING CODE NYS 2020	CODE SECTION	REQUIRED/ALLOWED	ACTUAL	COMMENTS
CHAPTER 6 - CLASSIFICATION OF WORK	803 ALTERATION-LEVEL 2	N/A	N/A	RENOVATION TO STORAGE ROOM TO ACCOMMODATE BOILER REQUIRED FOR HEATED SIDEWALK REMOVAL & REPLACEMENT OF FIXTURES & FINISHES. ALTERATIONS LEVEL 2 SECTION 803.1 & 801.1 RECONFIG. TO COMPLY W/ ADA REQUIREMENTS OF SECTION 305.7 AND CHAPTER 7

INFORMATION TAKEN FROM ORIGINAL CONTRACT DOCUMENTS DATED: REVISION NO. 2 09/17/09

BUILDING CLASSIFICATION	
OCCUPANCY	GROUP C1 BUSINESS
FIRE HAZARD	GROUP C1 LOW HAZARD
CONSTRUCTION	TYPE 1B FIRE RESISTIVE
FIRE RESISTANCE OF STRUCTURAL ELEMENTS	
EXTERIOR WALLS	
EXTERIOR LOAD BEARING WALLS	3 HR
EXTERIOR NON-LOAD BEARING WALLS	2 HR
PANEL AND CURTAIN WALLS	3/4 HR
INTERIOR WALLS	
INTERIOR FIRE WALLS	3 HR
PARTITIONS ENCLOSING STAIRWAYS, HOISTWAYS, SHAFTS, VERTICAL OPENINGS AND CORRIDORS	2 HR
COLUMNS/BEAMS/GIRDERS/TRUSSES SUPPORTING MORE THAN ONE FLOOR OR ONE FLOOR AND A ROOF	3 HR
COLUMNS/BEAMS/GIRDERS/TRUSSES SUPPORTING ONE FLOOR OR ROOF	2 HR
ROOF CONSTRUCTION INCLUDING, BEAMS AND ROOF TRUSSES	1 HR
FLOOR CONSTRUCTION	2 HR
BUILDING HEIGHT AND FIRE AREA FOR TYPE 1B CONSTRUCTION (GROUP C1 OCCUPANCY)	
BASIC FIRE AREA	UNLIMITED
TOTAL ALLOWABLE ACTUAL FIRE AREA	470,768 SF
BUILDING HEIGHT	15 STORY
ALLOWABLE HEIGHT IN FEET	UNLIMITED
ACTUAL HEIGHT	233'-2" SF

FLOOR 6, 7, 8, 9, 10, 11, 12 AND 13 EXITING CALCULATIONS	
EXIT STAIR CAPACITY (PER NYS CRR TABLE VIII - 765 AND 765.4a-8)	
2 EXIT UNITS PER STAIR PROVIDED (ACTUAL 44') (BASIC CAPACITY)	2 UNITS x 60 = 120 PERSONS
ALLOWABLE INCREASE FOR FLOOR HEIGHT IN EXCESS OF 10 FEET (14 FEET ACTUAL)	3 PERSONS
ALLOWABLE INCREASE FOR UNOBSTRUCTED FLOOR SPACE AT LANDINGS (32 SF)	6 PERSONS
TOTAL EXIT CAPACITY PER STAIR	129 PERSONS
STAIR DOOR EXIT CAPACITY (PER NYS CRR TABLE VIII - 765 AND 765.5a-5)	
2 EXIT UNITS PER DOOR PROVIDED (ACTUAL 40')	2 UNITS x 90 = 180 PERSONS
TOTAL FLOOR EXITING CAPACITY (GOVERNED BY STAIR CAPACITY)	129 PERSONS
ROOF EXITING CALCULATIONS	
EXIT STAIR CAPACITY (PER NYS CRR TABLE VIII - 765 AND 765.4a-8)	
2 EXIT UNITS PER STAIR PROVIDED (ACTUAL 44') (BASIC CAPACITY)	2 UNITS x 60 = 120 PERSONS
ALLOWABLE INCREASE FOR FLOOR HEIGHT IN EXCESS OF 10 FEET (14 FEET ACTUAL)	3 PERSONS
ALLOWABLE INCREASE FOR UNOBSTRUCTED FLOOR SPACE AT LANDINGS (32 SF)	6 PERSONS
TOTAL EXIT CAPACITY PER STAIR	129 PERSONS
STAIR DOOR EXIT CAPACITY (PER NYS CRR TABLE VIII - 765 AND 765.5a-5)	
2 EXIT UNITS PER DOOR PROVIDED (ACTUAL 40')	2 UNITS x 90 = 180 PERSONS
TOTAL FLOOR EXITING CAPACITY (GOVERNED BY STAIR CAPACITY)	129 PERSONS
EXIT AT STAIR A	129 PERSONS
EXIT AT STAIR B	129 PERSONS
EXIT AT STAIR C (at elevation 92.5)	129 PERSONS
EXIT AT STAIR D (at elevation 92.5)	129 PERSONS
TOTAL CAPACITY	516 PERSONS

MAIN FLOOR EXITING CALCULATION	
DOOR EXIT CAPACITY (PER NYS CRR TABLE V-765/VIII - 765 AND 765.5a-5)	
DOOR 101/102 - 1 1/2 UNITS PER LEAF PROVIDED (36" EACH)	3 UNITS x 90 = 270 PERSONS - NOT AVAILABLE DUE TO CONSTRUCTION
DOOR 103/104 - 1 1/2 UNITS PER LEAF PROVIDED (36" EACH)	3 UNITS x 90 = 270 PERSONS - NOT AVAILABLE DUE TO CONSTRUCTION
DOOR 105/106 - 1 1/2 UNITS PER LEAF PROVIDED (36" EACH)	3 UNITS x 90 = 270 PERSONS - ADA ACCESSIBLE EXIT TO EXTERIOR
DOOR 107/108 - 1 1/2 UNITS PER LEAF PROVIDED (36" EACH)	3 UNITS x 90 = 270 PERSONS - ADA ACCESSIBLE EXIT TO VESTIBULE
DOOR 109 - 2 UNITS PER LEAF PROVIDED (44" EACH)	2 UNITS x 90 = 180 PERSONS
DOOR 114 - 2 UNITS PER LEAF PROVIDED (44" EACH)	2 UNITS x 90 = 180 PERSONS
TOTAL EXIT CAPACITY	1440 PERSONS - DUE TO CONSTRUCTION = 900 PERSONS
TOTAL EXIT CAPACITY	OCCUPANCY LOAD MAIN LEVEL = 193 PERSONS
FLOOR 2, 3, 4 AND 5 EXITING CALCULATIONS	
EXIT STAIR CAPACITY (PER NYS CRR TABLE VIII - 765 AND 765.4a-8)	
2 EXIT UNITS PER STAIR PROVIDED (ACTUAL 44') (BASIC CAPACITY)	2 UNITS x 60 = 120 PERSONS
ALLOWABLE INCREASE FOR FLOOR HEIGHT IN EXCESS OF 10 FEET (14 FEET ACTUAL)	3 PERSONS
ALLOWABLE INCREASE FOR UNOBSTRUCTED FLOOR SPACE AT LANDINGS (32 SF)	6 PERSONS
TOTAL EXIT CAPACITY PER STAIR	129 PERSONS
TOTAL FLOOR EXITING CAPACITY (GOVERNED BY STAIR CAPACITY)	129 PERSONS
EXIT AT STAIR A	129 PERSONS
EXIT AT STAIR B	129 PERSONS
EXIT AT STAIR C	129 PERSONS
EXIT AT STAIR D	129 PERSONS
TOTAL CAPACITY	516 PERSONS
GENERAL NOTES	
1. ALL CONSTRUCTION SHALL COMPLY WITH REQUIREMENTS OF THE NEW YORK STATE FIRE PREVENTION AND UNIFORM BUILDING CODE, ADA-AG 1990, CABO/ANSI 117.1 AND 992 AND LOCAL GOVERNING AGENCIES	
NUMBER OF ACCESSIBLE EXIT REQUIRED: OCCUPANCY LOAD OF <math>f < 500 </math> = 1 EXIT	
NUMBER OF ACCESSIBLE EXITS PROVIDED = 4	

WARNING:  
 THE ALTERATION OF THIS MATERIAL IN ANY WAY, UNLESS DONE UNDER THE DIRECTION OF A COMPARABLE PROFESSIONAL, I.E. ARCHITECT FOR AN ARCHITECT, ENGINEER FOR AN ENGINEER OR LANDSCAPE ARCHITECT FOR A LANDSCAPE ARCHITECT, IS A VIOLATION OF THE NEW YORK STATE EDUCATION LAW AND/OR REGULATIONS AND IS A CLASS "A" MISDEMEANOR.

WE HEREBY AFFIRM THAT TO THE BEST OF OUR KNOWLEDGE, BELIEF, AND PROFESSIONAL JUDGEMENT, THESE PLANS AND SPECIFICATIONS ARE IN COMPLIANCE WITH THE 2020 ENERGY CONSERVATION CONSTRUCTION CODE OF NEW YORK STATE AND THE 2020 NEW YORK STATE UNIFORM BUILDING CODE.  
  
 REGISTRATION EXPIRES:

CONTRACT: CONSTRUCTION  
 TITLE: PROVIDE HEATED SIDEWALK  
 LOCATION: BROADWAY STATE OFFICE BUILDING  
 625 BROADWAY  
 ALBANY, NY  
 CLIENT: DEPARTMENT OF ENVIRONMENTAL CONSERVATION

PROJECT NUMBER:	47512	C
DESIGNED BY:	SK	
DRAWN BY:	SK	
FIELD CHECK:		
APPROVED:		
DRAWING TITLE:	FIRST FLOOR CONSTRUCTION LIFE SAFETY PLAN	
DRAWING NUMBER:	LS-100	
DRAWING 2	of 24	