The attention of bidders submitting proposals for the subject project noted above is called to the following Addendum to the Contract Forms and Specifications.

The items set forth herein, whether of omission, addition, substitution, or clarification are to be included in and form a part of the proposal submitted.

This Addendum consists of the following information:

Part 1 Division 00, Procurement and Contract Requirements

1) Section 011000 SUMMARY Attachment: Scope of Work for Prime Contractors
    a. G1 – Prime Contractor for General Construction
        i. Structural Metals for Masonry: ADD The Prime Contractor for Masonry (G3) shall provide anchors to the steel for masonry ties.
        ii. Firestopping: ADD The Prime Contractor for General Construction (G1) shall provide fire-rated expansion joints at the door openings in the firewalls.
        iii. ADD Parapets: The Prime Contractor for General Construction (G1) shall provide LGMF w/ mineral wool batt insulation and sheathing up, over and down the parapet. The Prime Contractor for Roof Work (G5) shall provide sheathing and suitable plywood substrate / 2x blocking for application of ACP coping. ACP coping shall be provided by the Roofing Prime Contractor (G5). The Prime Contractor for Masonry Work (G3) shall provide the fluid-applied membrane air & moisture barrier up and over the parapet.
        iv. ADD Light Fixture Type T: The Prime Contractor for General Construction (G1) shall provide Fabric Wrapped Acoustical Ceiling Panels & Baffles (exception: Ceiling panels in Practice Rooms shall be provided by the Prime Contractor for Electrical Work (E1).
        v. ADD Radiator Covers: The Prime Contractor for General Construction (G1) shall scrape & refurbish radiators covers on 1/A441.
        vi. ADD Lockers: This prime contractor shall provide painting of lockers.
    b. G3 – Prime Contractor for Masonry Work
        i. Structural Metals for Masonry: ADD The Prime Contractor for Masonry (G3) shall provide anchors to the steel for masonry ties.
        ii. ADD Parapets: The Prime Contractor for General Construction (G1) shall provide LGMF w/ mineral wool batt insulation and sheathing up, over and down the parapet. The Prime Contractor for Roof Work (G5) shall provide sheathing and suitable plywood substrate / 2x blocking for application of ACP coping. ACP coping shall be provided by the Roofing Prime Contractor (G5). The Prime Contractor for Masonry Work (G3) shall provide the fluid-applied membrane air & moisture barrier up and over the parapet.

c. G5 – Prime Contractor for Roofing Work
    i. ADD Parapets: The Prime Contractor for General Construction (G1) shall provide LGMF w/ mineral wool batt insulation and sheathing up, over and down the parapet. The Prime Contractor for Roof Work (G5) shall provide sheathing and suitable plywood substrate / 2x blocking for application of ACP coping. ACP coping shall be provided by the Roofing Prime Contractor (G5). The Prime Contractor for Masonry Work (G3) shall provide the fluid-applied membrane air & moisture barrier up and over the parapet.
    ii. ADD Cafeteria Sunshade: At Cafeteria sunshade, the Prime Contractor for General Construction (G1) shall provide the structural steel & decking (structural steel by G1 as changed in Addendum 4). The Roofing Prime Contractor (G5) shall provide the blocking, sheathing, ACP cladding, roofing and the through wall flashing (through wall flashing by G5 as changed in Addendum 5). The Plumbing Prime Contractor (P1) shall furnish & install the scupper drains, associated blocking & piping (roof drains provided & installed by PC as changed in Addendum 5). The Roofing Prime Contractor (G5) shall tie in roofing to scupper drains.
    iii. ADD The Prime Contractor for Plumbing Work shall provide roof drains “including associated blocking.”
d. G9 – Prime Contractor for Painting Work
    i. ADD This prime contractor shall provide painting of rooftop piping.
e. P1 – Prime Contractor for Plumbing Work
    i. ADD The Prime Contractor for Plumbing Work shall provide roof drains “including associated blocking.”
f. E1 – Prime Contractor for Electrical Work
    i. ADD Light Fixture Type T: The Prime Contractor for General Construction (G1) shall provide Fabric Wrapped Acoustical Ceiling Panels & Baffles (exception: Ceiling panels in Practice Rooms shall be provided by the Prime Contractor for Electrical Work (E1).

2) Section 012300 ALTERNATES
    a. A2 Corridor Terrazzo – CHANGE to read, “…for providing terrazzo flooring w/ 4” terrazzo base & terrazzo saddles. Base Bid includes LVT flooring, tile base & stone saddles as scheduled.
    b. A3 Cafeteria Terrazzo – CHANGE to read, “…for providing terrazzo flooring w/ 6” terrazzo base & terrazzo saddles. Base bid includes porcelain tile flooring, 6” tile base & stone saddles as scheduled.”

Part 2 Technical Changes, Architectural, Structural and Civil

1) Section 077200 ROOF ACCESSORIES – REMOVE Part 2.2 Plastic Skylights. See section 086300 for skylight.
2) Section 093100 CERAMIC TILING
    a. Article 2.3, Paragraph A - CHANGE to, “Refer to Attachment A “Tile Schedule” following this section for cross referencing Wall Tile Types (WT1 – WT5) noted on the Drawings (A450) with the corresponding finishes required for each Wall Tile Type. For all locations of tile, see spec.”
    b. Article 2.3
        i. Paragraphs H, I, & J – CHANGE 2. “Pattern: See WT8 on Drawing A450.”
        ii. Paragraph K - ADD “3. Pattern: See WT7 on Drawing A450.”

iii. Paragraph M – ADD “See WT6 on Drawing A450.”

c. Article 2.3, Paragraph P.3.a. – REMOVE duplicate “cafeteria” from locations. Cafeteria is correctly located under P.6.
d. REMOVE duplicate Attachment A (attachment A defines colors & sizes for WT1 - WT5. All patterns for WT1 - WT8 are defined on Drawing A450).

3) Section 312319 DEWATERING – CHANGE all references of “City of Yonkers” to “City of Middletown.“

Part 3 Technical Changes, Mechanical, Electrical and Plumbing

1) Specification 230993 – Replace entire section with the revised specification included with this addendum. Revisions to the specification are indicated by bold and italicized font. Deletions from the specification are indicated by text that has been stricken through.
2) Specification 236423 – Add the following paragraph to section “3.6 Startup Service”, “G. The factory authorized service representative shall be on site for manufacturer’s controls integration into the building management system and during the owner’s commissioning phase of the project.”
3) Specification 237413 – Add the following paragraph to section “3.5 Startup Service”, “D. The factory authorized service representative shall be on site for manufacturer’s controls integration into the building management system and during the owner’s commissioning phase of the project.”
4) Specification 237423.13 – Add the following paragraph to section “3.7 Startup Service”, E. The factory authorized service representative shall be on site for manufacturer’s controls integration into the building management system and during the owner’s commissioning phase of the project.”
5) Specification 237433 – Add the following paragraph to section “3.4 Startup Service”, “G. The factory authorized service representative shall be on site for manufacturer’s controls integration into the building management system and during the owner’s commissioning phase of the project.”
6) Specification 238416.13 – Add the following paragraph to section “3.9 Startup Service”, “G. The factory authorized service representative shall be on site for manufacturer’s controls integration into the building management system and during the owner’s commissioning phase of the project.”
7) Specification 261219 – Added specification section for Pad-Mounted, Liquid-Filled, Medium Voltage Transformers.
8) Section 265100 INTERIOR LIGHTING
    a. Attachment - Type T fixture – ADD “Provide Acoustic Ceiling Panels per 095416 Attachment & the Drawings.”

Part 4 Drawing Changes, Architectural, Civil and Landscape

1) Drawings A100-A103 – ADD Demo Note, “14. Existing window sills & shades shall remain where no new sills are indicated.”
2) Drawing A500 – At Elevator B, CHANGE floor finish to BE-2 (to match finish schedule).
3) Drawing A504 Finish Schedule
    a. Jan 172F - CHANGE floor finish to BE-2.
    b. C001, C002, G31, C003, C004, C007, 132, C104, C110, V110, C103a, C105, C107, C108, C113, C114, RC103, 232, C204, 332 – CHANGE floor base to PB-3 (all new corridors to receive wall tile shall receive tile base).

4) Drawing A531 Signage Schedule
    a. ADD “Note: Provide signage as indicated on A530, A531 and as indicated in spec.”
    b. OMIT Type T – Replace with Type A.
    c. TYPE Y shall be 6” ht by 8” wi exterior aluminum sign attached to cast stone façade by Loading Dock doors. Sign shall read *LOADING DOCK HOURS 7–2PM M-F.* Final text to be reviewed with owner.
    d. CHANGE G70k to type B.
    e. CHANGE G70v to type S.
    f. CHANGE G04 quantity to 2.
    g. CHANGE 102a quantity to 4.
    h. ADD OT/PT 106 – (1) type B.
    i. ADD T 322j – (1) type G.
    j. Artwork for Type W shall be by the contractor. Architect will provide a background of the floor plan.
5) Drawing A601-C
    a. At Recording Studio 161, CHANGE “duct liner” to “acoustic board.”
    b. At Recording Studio 161, ADD 30”x30” framed ceiling opening covered with 5/8” GWB to accommodate existing roof hatch, VIF.
6) ASK-03
    a. ADD deck infill details & Section at refrigeration curb. See attached documents.

Part 6 Drawing Changes, Mechanical, Electrical and Plumbing

1) Drawing FP601 – Revised “Fire Protection Riser Diagram” to add dual pressure regulating device. Renumbered “Seismic Hanger Details” from #1 to #2. Added detail #3 “Dual Pressure Regulating Device”. Refer to revised drawing included with addendum.
2) Drawing FP602 – Revised “Fire Pump Schematic” to delete discharge relief valve. Added notes with regards to extra heavy pattern and fire pump discharge flange. Refer to revised drawing included with addendum.
3) Drawing FP701 – Revise fire pump model number to read as H8x8x9.5F.
4) Drawing M604 – Delete “Zone Relative Humidity Adjust” from points list and schematic on detail #3 “Fan Coil Unit Points List”.
5) Drawing M701 – Add “General HVAC Note” #38 to read as follows: “Mechanical Contractor shall provide a factory authorized representative at equipment start-up, manufacturer’s controls integration with the building management system and during owner’s commissioning phase for the following equipment: all rooftop units (all tags RTU), all make-up air units (all tags MUA), energy recovery unit (ERV-1), and water to water heat pumps (all tags WF).”
6) Drawing E601 – Revised Demolition Power Schematic Keyed Note #1 to read “Conductors and associated conduit to remain”. Refer to revised drawing included with addendum.
7) Drawing E703 – Revised HP-K1 Panel Schedule as follows: “Enclosure: NEMA 4X Type 304 Stainless”. Refer to revised drawing included with addendum.
8) Drawing E709 – Revised LP-K1A & LP-K1B Panel Schedules as follows: “Enclosure: NEMA 4X Type 304 Stainless”. Revised LP-K1C Panel Schedule as follows: “Enclosure: NEMA 4X Type 304 Stainless”, Mains Type: “MCB”. Refer to revised drawing included with addendum.
9) Drawing FA601 – Revised “Fire Alarm Riser Diagram (1 of 3)” to add sprinkler tamper and pressure switches. Revised “Fire Alarm System Input/Output Matrix” to add pressure switch to System Input column. Refer to revised drawing included with addendum.

Part 7 Clarifications

1) To facilitate the Opening of Bids, please include the Contract No. (i.e. G1) on the front of each sealed Bid submission envelope.
2) Reference the Geotechnical Report within the Spec for information on soil conditions and reuse of existing spoils from cut areas.
3) Addendum 1 – Scope of Work for Prime Contractors – Firewall Clips: The “firewall clip system” shall mean the ”Fero Break-away” firewall clip system (slotted steel support angle with fusible nylon washer against a grooved edge) and shall include anchor bolts, bolts and washers as shown in the Structural Drawings. The Prime Masonry Contractor (G3) shall provide the firewall clip system. The Prime Contractor for General Construction (G1) shall provide the additional plates needed to extend to attach to structure.
4) Addendum 4 – Part 2, 11) Illuminated display cases – Electric lighting plans show the light fixtures.
5) Existing walls in Toilet room 163b & 163a are believed to be plaster, verify in field. Where suitable substrate does not exist at existing walls scheduled to receive wall tile, the contractor installing the tile (G8) shall provide appropriate tile backer as specified.
6) Section 012300 ALTERNATES
    a. All new roof drains shall be base bid.
    b. Roofing Contract (G5) & Mechanical Contract (M1) show identical alternates since there is roofing work associated with rooftop equipment that is being installed as part of an alternate. Roofing Contractor (G7) shall reference MEP Drawings to determine which work shall be included in the alternate.
    c. S1 PLAY AREAS (FIELD & COURTS) – G1 is involved since they will need to add additional infiltration system components.
    d. S2 COURTYARD IMPROVEMENTS – G1 shall do work shown on the C drawings, L1 shall do work shown on the L drawings.
    e. A1 CENTRAL PREP FITOUT – Piping shown on P401. P402, & P403 shall be base bid. RTU-25, MUA 1 & 2 are part of the Alternate.
    f. A2 CORRIDOR TERRAZZO – Alternate shall include 4” terrazzo wall base. Base bid shall include 4” Porcelain tile wall base. Terrazzo layout shall match finish layout of Corridors. Changes in LVT color shall translate to changes in terrazzo color. Corridors to be included in this alternate include: Lobby G31, C001, C002, C104, Vending 132, RC103, C105, C107, C108, C110, C113, C114, C204, C205, C206, Vending 232, RC203, C304, C305, C306, Vending 332, RC303.
    g. A3 CAFETERIA TERRAZZO – Alternate shall include 6” Terrazzo wall base. Base bid shall include 6” Porcelain tile wall base as scheduled. Terrazzo layout shall match finish layout shown on 1/A507. Changes in tile color shall translate to changes in terrazzo color.
    h. A2 & A3 TERRAZZO
        i. Underlayment is required. Ref Section 096623 in 2.2.H, 3.2.A.3 and 3.2.A.3. The floor shall be patched and leveled.
        ii. Waterproof membrane is required everywhere the terrazzo is to be installed. See 3.2.D.2 (crack suppression membrane is also a waterproofing membrane see 2.2.K.2).
        iii. Moisture vapor suppression system is required by 3.1.C.4, 3.1.D and 3.2.C.1 if the concrete fails the moisture testing.
    i. R2 PRE-ENGINEERING (TECH) AREA C – Base bid Corridor C006 floor finish shall be LVT-3.
    j. R4 CORRIDOR WALL TILE & WOOD TRIM – Corridor wall tile is intended to mean WT2, WT4 & WT5 wall tile types scheduled at existing corridor walls. The design intent of this alternate is to encapsulate all existing corridor & stair green glazed unit tile wainscotting

with new tile & solid wood trim as detailed & scheduled (notes 6 & 7 on Drawing A441 describes work included in the alternate). This alternate also includes providing continuous wall tile throughout the existing corridors where there is none due to past removals / wall infill. Scheduled wall tile at new toilet room corridors and new corridor walls in the existing building shall be base bid.

7) Section 098200 ACOUSTIC BOARD – Article 1.1, Paragraph A indicates this section shall apply to Recording Studio 161.
8) Existing As Built roof replacement drawings and warranties will be made available after bids are awarded. Existing 20 year roof warranties issued by Johns Manville shall be maintained when performing work.
    a. Existing building roof information:
        i. Area A (1987 Classroom Addition)
            1. PVC roof replacement completed in August 2017.
            2. 60 mil f.r. reinforced PVC, over ¼" gyp board, over tapered isocyanurate insulation, slope 1/8" per ft., over Metal deck
        ii. Area B (1975 Small Gym Addition)
            1. PVC roof replacement completed in August 2017.
            2. 60 mil f.r. reinforced PVC, over ¼" gyp board, over tapered isocyanurate insulation, slope 1/8" per ft., over Wood fiber plank
        iii. Area C & Auditorium
            1. PVC roof replacement completed in June 2020.
            2. 60 mil f.r. reinforced PVC, over ¼" gyp board, over tapered isocyanurate insulation (starting thickness 5-1/2"), slope 1/8" per ft over:
                a. Original 1939 building is Concrete deck.
                b. Original 1939 Auditorium is Gypsum plank.
                c. 1995 Kitchen Addition is Metal deck.
        iv. Areas N & S
            1. PVC roof replacement completed in August 2017.
            2. 60 mil f.r. reinforced PVC, over ¼" gyp board, over tapered isocyanurate insulation, slope 1/8" per ft., over Concrete deck (except original gym & auditorium which are Gypsum plank).
9) The science room sinks that are associated with the plumbing fixture P-10 faucet is within spec section 123553.19 WOOD LABORATORY CASEWORK and shall be provided by the contractor proving this casework (G1). Faucet P-10, fittings & accessories shall be provided by the Prime Contractor for Plumbing Work (P1).
10) Bid piping & fittings as specified.
11) Only the geothermal loop piping shall have 30% glycol. Contractor shall be responsible for calculating total system volume based on approved piping show drawings.
12) Pex and plastic piping is not acceptable for domestic water lines.
13) PVC piping for storm drains & above ground work is not acceptable.
14) The Demolition Notes list on Drawings A100-A103 are intended to apply to all spaces colored as Areas of Renovation work (light blue shading). All such general demolition work shall be by the (G1) contract which also includes flooring & mastic. Regarding flooring removals, note that there are some rooms in which flooring is to remain (recently renovated) and some rooms shown to be abated by the Abatement Prime Contractor (G2). Existing floors shall be removed everywhere that new flooring is called for in the Drawings & Specs, unless noted otherwise. All removals & protection shown on Drawings A100-A103 shall be by the Prime Contractor for General Construction (G1) except where work is specifically called out to be by another contract. Exterior door & frame assembly replacements shall be by the Prime Contractor for Windows (G6).

15) The laydown & parking area to the south of Twin Towers as shown on Drawing LP001 shall remain until the end of the project. Construction access for the proposed courts & play fields work of the Sitework Contractor (L1) is intended to be through this area.
16) Diversification plan applies to each prime contract, unless noted otherwise.
17) See 092216 NON-STRUCTURAL METAL FRAMING for interior deflection track, headers, & jambs. Provide boxed headers where indicated.
18) There is exposed concrete, mostly along the East Facade on site stair walls and for retaining walls, including any exposed foundation walls. All exposed to view concrete shall be treated as Architecturally finished, with voids & tie-holes patched - Class A and with a rubbed finish look.
19) Piping noted on ALT Plan C600 shall be included in Alternate S1. Both G1 & L1 contracts have responsibilities within this alternate. The infiltration system shall be installed as part fo the base bid and expanded as part of the Add Alt. Pipe sizes & sewer service are noted in the legend on Drawing C400.
20) L1 Contract shall provide base bid & alternate work as shown on the L Drawings. G1 Contract shall provide base bid & alternate work as shown on the C Drawings.
21) All piping shown on P200B, P401, P402 and P403 shall be included in base bid. Domestic cold and hot water and gas piping that serves food service equipment included in Alternate shall be terminated with Shut-off valve near piping drops. Refer to riser diagrams for locations.
22) Note that riser diagrams have been added and revised as part of addendums. Verify all addendums are being utilized, for instance there is a now a Riser Drawing P609. In some areas sanitary and vent piping is shown on floor plans.

Part 8 New Issues - List of Included Documents

Specification 230993 – Sequence of Operations for HVAC Controls	18 pages
Specification 261219 – Pad-Mounted, Liquid-Filled, Medium Voltage Transformers	10 pages
ASK-03 (11X17)	1 sheet
Drawing FP601 – FIRE PROTECTION: DETAILS	1 sheet
Drawing FP602 – FIRE PROTECTION: DETAILS	1 sheet
Drawing E601 – ELECTRICAL: DETAILS	1 sheet
Drawing E703 – ELECTRICAL: EQUIPMENT SCHEDULES	1 sheet
Drawing E709 – ELECTRICAL: EQUIPMENT SCHEDULES	1 sheet
Drawing FA601 – FIRE ALARM: DETAILS	1 sheet

End of Addendum

SECTION 230993 - SEQUENCE OF OPERATIONS FOR HVAC CONTROLS

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 control sequences for HVAC systems, subsystems, and equipment.

B. Related Sections include the following:

1. Division 23 Section, "HVAC Instrumentation and Control" for control equipment and devices and for submittal requirements.

1.3 DEFINITIONS

A. DDC: Direct digital control.

B. VAV: Variable air volume.

1.4 SUBMITTALS

A. Shop Drawings: Indicate mechanical system controlled and control system components.

1. Label with settings, adjustable range of control and limits. Include written description of control sequence.
2. Include flow diagrams for each control system, graphically depicting control logic.
3. Include draft copies of graphic displays indicating mechanical system components, control system components, and controlled function status and value.

1.5 CLOSEOUT SUBMITTALS

A. Project Record Documents: Record actual locations of components and set-points of controls, including changes to sequences made after submission of shop drawings.

1.6 QUALIFICATIONS

A. Installer: Company specializing in performing Work of this section with minimum three years documented experience approved by manufacturer.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION

3.1 GENERAL

A. All equipment listed below and indicated on drawings along with all associated control elements shall be graphically represented on the Building Management System (BMS).

B. For equipment listed below and indicated on drawings, manual override capabilities shall be provided through the BMS.

C. Refer to the points list on the drawings for BMS inputs and outputs.

D. All set-points indicated below shall be adjustable.

E. Thermostat Set-points:
   1. Occupied Heating Set-point: 70 degrees F
   2. Occupied Cooling Set-point: 75 degrees F
   3. Unoccupied Heating Set-point: 67 degrees F
   4. Unoccupied Cooling Set-point: 80 degrees F
   5. Deadband: 5 degrees F

3.3 DUCTLESS SPLIT SYSTEM AIR CONDITIONERS AND AIR-COOLED CONDENSING UNITS (AC-1/ACCU-1, AC-2/ACCU-2 AND AC-3/ACCU-3)

A. System shall be operated through factory wireless remote controller, capable of providing set-point adjustments and all programming for control sequences. The system shall cycle On/Off as required to maintain space set-point.

B. The Factory Installed controls shall be configured such that a Leak detector mounted in the indoor unit drain pan shall be arranged to shut-down the system when water is detected. BMS shall monitor condensate overflow and provide an alarm.

C. A BMS space temperature sensor shall be provided in each space to monitor space temperature and to provide a high temperature alarm.

3.4 SPLIT SYSTEM FAN COILS AND HEAT PUMP UNITS (FCU-A/HP-A, FCU-B/HP-B, FCU-C/HP-C AND FCU-D/HP-D)

A. System shall be operated through factory wireless remote controller, capable of providing set-point adjustments and all programming for control sequences. The system shall cycle On/Off as required to maintain space set-point.

B. The Factory Installed controls shall be configured such that a Leak detector mounted in the indoor unit drain pan shall be arranged to shut-down the system when water is detected. BMS shall monitor condensate overflow and provide an alarm.

C. When the system is in occupied mode, the fan coil unit supply fan shall be on and run continuously. When the system is in the unoccupied mode, the fan coil unit supply fan shall be off.

3.5 TWO PIPE FAN COIL UNITS ***(FCU-1, FCU-2A TO FCU-2F, FCU-3A TO FCU-3B, FCU-4, FCU-5, FCU-6A TO FCU-6B, FCU-7A TO FCU-7B, FCU-8A TO FCU-8C, AND FCU-9)***

A. Fan coil units are to be controlled by an application specific unitary DDC controller.

B. Unoccupied Operation: In the unoccupied mode, the supply fan shall be indexed off, the outside air damper shall modulate closed, the return air damper shall position open and the coil 3-way valve shall be modulated either closed (summer) or open (winter) based upon an adjustable outside air temperature. If the space temperature falls below the adjustable unoccupied heating set-point, the fan shall cycle on, the outside air damper shall remain closed and coil valve shall open. If the space temperature rises above the adjustable unoccupied cooling set-point and the outside air temperature is less than the space temperature, the fan shall be cycled on, the outside air damper shall be opened and the coil valve shall be closed. Upon a further call for unoccupied cooling the coil 3-way valve shall modulate open.

C. Morning Warm-up: When there is a call for heating and the zone temperature is two degrees off of set-point, a morning warm-up sequence shall be turned on, the outside air damper shall remain closed, the return air damper shall be full open and the coil valve shall open. When the zone reaches the heating set-point, the outside air damper shall go to minimum and the fan coil unit shall operate in the occupied mode.

D. Morning Cool-down: When a morning cool-down is initiated the unit shall operate in the airside-economizing mode, and fan shall be indexed on. If economizer mode is not available, the outside air damper shall remain closed, the return air damper shall be full open and the coil valve shall open. When the zone temperature reaches the cooling set-point, the outside air damper shall go to minimum and the fan coil unit shall operate in the occupied mode.

E. Occupied Operation:
   1. When the fan coil unit is in the heating mode and the system has hot water, a call for heating shall open the outside air damper to minimum position for ventilation and modulate the coil 3-way valve to maintain the space temperature set point. When the fan coil unit is in the cooling mode and the system has chilled water, a call for cooling shall open the outside air damper to minimum position for ventilation and modulate the coil 3-way valve to maintain the space temperature set point.
   2. The fan coil unit fan shall run continuously, while in the occupied mode.

F. Low Temperature Thermostat (Freezestat): Shall be provided to protect the coil from freezing. When activated, the fan coil unit fan shall shutdown, outside air damper shall close, coil valve shall position to full open, and alarm shall be provided to the BMS. The set point for freezestat operation shall be adjustable. Reset shall be manual.

G. Discharge Air Limit Control: Provide an averaging type sensor in the discharge air stream arranged to override the temperature controls and prevent the discharge air temperature from dropping below 65° F (adjustable) and rising above 110°F (adjustable) during heating mode. Adjustments shall be made to outside air damper and coil valve to keep discharge air between limits.

H. Space Temperature Set-point: The space temperature heating/cooling set-point shall be programmable and adjustable at the BMS.

I. General:
   1. Provide a condensate overflow switch in the secondary drip pan that will open when the pan is full of condensate. The fan shall be shut-down, cooling shall be deactivated (for the affected unit) and an alarm shall be provided at the BMS.
   2. Minimum outside air damper position shall be determined, recorded and set in field during testing and balancing by the Testing and Balancing Contractor. This position shall be coordinate with the Controls Contractor.

3.6 KITCHEN HOOD EXHAUST FAN AND MAKE-UP AIR UNIT (EF-1/MUA-1, EF-2/MUA-2 AND EF-3/MUA-3)

A. The exhaust fan and make-up air unit operation shall be operated by a factory control panel mounted within the kitchen exhaust hood assembly. Whenever the hood panel is indexed on, the associated exhaust fan and the associated make-up air unit shall operate. The gas burner in the make-up air unit shall fire to maintain discharge air set-point. When the make-up air unit is on, the intake motorized damper shall be open. When the make-up air unit is off, the intake motorized damper shall be closed. Provide all controls, contacts, relays, switches, wiring, conduit, and etc. as required to tie the exhaust fan and make-up air unit operation to the exhaust hood operation.

B. General:
   1. Whenever the system is shut-down the outside air shall remain closed.
   2. Provide a low limit sensor in the unit discharge arranged to prevent winter discharge temperature from dropping below 50ºF (adjustable).

3. Provide a high limit sensor in the unit discharge arranged to prevent winter discharge temperature from rising above 120 ºF (adjustable).
4. Provide fan shut-down interlocked with the fire alarm system for exhaust fans greater than 1,000 CFM.
5. ***The manufacturer furnished make-up unit controls shall be programmed and commissioned in accordance with the operating sequences noted above. The Siemens building automation system shall be utilized for monitoring, set-point adjustments and mode scheduling as permitted through the manufacturer's furnished BACnet interface. The Siemens building automation system will graphically depict up to 25 (final number to be coordinated) BACnet interface parameters including all the make-up air unit points indicated on the drawings, provide equipment scheduling and alarms provided through the BACnet interface. The make-up air units manufacturer's representative shall be made available for control interface start-up and owner commissioning for the make-up air units sequences and operations.***

3.7 KITCHEN HOOD EXHAUST FAN (EF-4 AND EF-5)

A. The exhaust fan operation shall be operated by a factory control panel mounted within the pizza exhaust hood assembly. Whenever the hood panel is indexed on, the exhaust fan shall operate. Whenever the hood panel is indexed off, the exhaust fan shall stop. Provide all controls, contacts, relays, switches, wiring, conduit, and etc. as required to tie the exhaust fan and make-up air unit operation to the exhaust hood operation.
B. Exhaust fan EF-4 shall be interlocked with RTU-25.
C. Exhaust fan EF-5 shall be interlocked with RTU-24.
D. Provide fan shut-down interlocked with the fire alarm system for exhaust fans greater than 1,000 CFM.

3.8 DISHWASHER HOOD EXHAUST FAN (EF-6)

A. Exhaust fan shall operate when the dishwasher(s) is activated. Local controls within the dishwasher(s) assembly shall turn on/off the exhaust fan. When the fan turns on the motorized damper shall open. When the fan turns off the motorized damper shall close. Provide all controls, contacts, relays, switches, wiring, conduit, and etc. as required to tie the exhaust fan operation to the dishwasher(s) assembley operation.
B. Exhaust fan operation shall be interlocked with RTU-25.
C. Provide fan shut-down interlocked with the fire alarm system for exhaust fans greater than 1,000 CFM.

3.9 GENERAL EXHAUST FANS (EF-7, EF-8 AND EF-12)

A. Exhaust fans shall be sequenced on by the BMS during programmed “occupied” time periods. The fans shall be shut-down during “unoccupied” time periods. Each fan shall have individual scheduling capability. When the exhaust fan is called to activate the associated motorized damper shall open and then the fan shall turn on. Whenever the exhaust fan is shut-down the associated motorized damper shall be closed.
B. Provide fan shut-down interlocked with the fire alarm system for exhaust fans greater than 1,000 CFM. Fire alarm system shall shut-down exhaust fan.
C. Refer to “General Roof Exhaust Fan Controls Schematic” on drawings.

3.10 ELEVATOR SHAFT EXHAUST FAN (EF-9)

A. Elevator shaft exhaust fan shall be commanded on based on space temperature set-point. On a rise in space temperature above set-point the motorized damper associated with the exhaust fan shall open and then the exhaust fan shall turn on. The exhaust fan shall continue to run until space temperature falls below set-point, at which point the fan shall stop and the motorized damper shall close. Whenever the exhaust fan is shut-down the associated motorized damper shall be closed.

B. Provide fan shut-down interlocked with the fire alarm system for exhaust fans greater than 1,000 CFM.

3.11 LASER ENGRAVER EXHAUST FANS (EF-10 AND EF-11)

A. A manual wall mounted switch with pilot light, located on wall by each laser engraver, shall turn the fan on and off. When the exhaust fan is commanded on: the motorized damper at the exhaust fan and in the transfer duct between the Laser Room and Pre-Engineering Lab shall open; and the motorized damper in the Pre-Engineering Lab exhaust duct shall close; and then the exhaust fan shall turn on. Whenever the exhaust fan is shut-down: the motorized damper at the exhaust fan and in the transfer duct between the Laser Room and Pre-Engineering Lab shall close; and the motorized damper in the Pre-Engineering Lab exhaust duct shall open. If the exhaust fan does not turn an alarm shall be generated at the BMS and a local alarm audible/visual alarm shall be activated near the laser engraver.

B. Provide fan shut-down interlocked with the fire alarm system for exhaust fans greater than 1,000 CFM.

3.12 KILN HOOD EXHAUST FANS (EF-13)

A. A manual wall mounted switch with pilot light, located on wall by the kiln hood, shall turn the fan on and off. When the exhaust fan is commanded on: the motorized damper at the exhaust fan and in the transfer duct between the Kiln Room and 3D Art & Ceramics shall open; and the motorized damper in the 3D Art & Ceramics exhaust duct shall close; and then the exhaust fan shall turn on. Whenever the exhaust fan is shut-down: the motorized damper at the exhaust fan and in the transfer duct between the Kiln Room and 3D Art & Ceramics shall close; and the motorized damper in the 3D Art & Ceramics exhaust duct shall open. If the exhaust fan does not turn an alarm shall be generated at the BMS and a local alarm audible/visual alarm shall be activated near the laser engraver.

B. Provide fan shut-down interlocked with the fire alarm system for exhaust fans greater than 1,000 CFM.

3.13 RANGE HOOD EXHAUST FAN (EF-14)

A. A manual wall mounted switch with pilot light, located on wall near the exhaust hood, shall turn the fan on and off. When the exhaust fan is commanded on, the associated motorized damper located at the exhaust fan shall open and then the exhaust fan shall turn on. Whenever the exhaust fan is shut-down the associated motorized damper shall be closed. If the exhaust fan does not turn an alarm shall be generated at the BMS and a local alarm audible/visual alarm shall be activated near the exhaust hood.

B. Exhaust fan operation shall be interlocked with RTU-25.

C. Provide fan shut-down interlocked with the fire alarm system for exhaust fans greater than 1,000 CFM.

3.14 PIZZA HOOD EXHAUST FAN (EF-15)

A. The exhaust fan operation shall be operated by a factory control panel mounted within the pizza exhaust hood assembly. Whenever the hood panel is indexed on, the exhaust fan shall operate. Whenever the hood panel is indexed off, the exhaust fan shall stop. Provide all controls, contacts, relays, switches, wiring, conduit, and etc. as required to tie the exhaust fan and make-up air unit operation to the exhaust hood operation.

B. Provide fan shut-down interlocked with the fire alarm system for exhaust fans greater than 1,000 CFM.

3.15 ELECTRIC HEATERS ***(EH-A, EH-B, AND EH-C)***

A. Factory thermostat shall energize electric heating element as required to maintain space set-point. Whenever electric heating element is energized the unit fan shall be operational.

3.16 GEOTHERMAL PUMPS ***(P-1A/P-1B)***

A. Geothermal pumps shall be enabled on/off by the central plant heat pump controller or by any of the water source heat pump rooftop units.

B. The BMS shall select and alternate the lead and lag pump. The lead pump shall alternate to the lag pump after a programmable time period to accomplish equal hours of run time on each pump. If the lead pump fails an alarm shall be provided by the BMS and the lag pump shall be automatically activated in place of the scheduled lead pump.

C. A flow sensor at the pump set shall proof flow prior to heat pump ***(central plant or rooftop units)*** operation and generate an alarm at the BMS in the event of a no flow condition. If flow is not established at the lead pump, the BMS shall switch to the lag pump.

D. Each pump shall be provided with a VFD for speed control arranged to vary pump output in response to load. ~~Pump speed shall be controlled via the heat pump controller.~~ ***A differential pressure pressure sensor shall be installed in the piping system 2/3 of the distance away from the pumps, based upon the farthest piped unit. The pressure sensor shall control the pump drive to maintain an acceptable pressure differential. Differential set-point shall be determined in field during testing and balancing by the Testing and Balancing Contractor.***

E. Pump by-pass valve shall be sized for 30% system flow. Valve shall modulate open/closed based on loop differential pressure as required to maintain pump minimum flow rate.

F. Well field by-pass control valve shall operate in two position control. The valve shall by-pass the well field when both the building heat pump (load side) and rooftop unit heat pump loop water return temperature is +/- 2 degrees F from the building heat pump water supply temperature. The valve shall be positioned to full flow through the well field at all other conditions.

G. Diverter valves (3 total) located in the geothermal piping to the water-to-water heat pump system, water source heat pump rooftop units and the plate and frame heat exchanger shall open and close based on a call for geothermal water in each piping loop.

3.17 DUAL TEMPERATURE WATER PRIMARY PUMPS ***(P-2A/P-2B)***

A. The BMS shall sequence the lead primary pump on whenever the central plant heat pump system is making heating hot water or cooling chilled water. The lead pump

shall run continuously and the stand-by pump shall remain off. Whenever the central plant is not operational the lead primary pump shall be shut-down.

B. The BMS shall select and alternate the lead and lag pump. The lead pump shall alternate to the lag pump after a programmable time period to accomplish equal hours of run time on each pump. If the lead pump fails an alarm shall be provided by the BMS and the lag pump shall be automatically activated in place of the scheduled lead pump.

3.18 DUAL TEMPERATURE WATER SECONDARY PUMPS ***(P-3A/P-3B, P-4A/P-4B & P-5A/P-5B)***

A. When chilled or hot water is available from the central plant heat pump system, the BMS shall sequence the lead pump on, when the outside air temperature rises above (summer) or below (winter) a programmable set-point (as sensed by an outdoor air temperature sensor/transmitter); the lead pump shall run continuously and the stand-by pump shall remain off. When the outside air temperature falls below (summer) or rises above (winter) the programmable set-point the lead pump shall shutdown.

B. The BMS shall select and alternate the lead and lag pump. The lead pump shall alternate to the lag pump after a programmable time period to accomplish equal hours of run time on each pump. If the lead pump fails an alarm shall be provided by the BMS and the lag pump shall be automatically activated in place of the scheduled lead pump.

C. Each pump shall be provided with a VFD for speed control arranged to vary pump output in response to load. Provide pressure sensors in the mains arranged to signal the VFD and vary pump speed. VFD shall modulate to maintain system differential pressure set-point. ~~Differential set-point shall be determined in field during project commissioning phase.~~ ***A differential pressure pressure sensor shall be installed in the piping system 2/3 of the distance away from the pumps, based upon the farthest piped unit. Differential set-point shall be determined in field during testing and balancing by the Testing and Balancing Contractor.***

D. Pump by-pass valve shall be sized for 30% system flow. Valve shall modulate open/closed based on loop differential pressure as required to maintain pump minimum flow rate.

3.19 DOAS AIR SOURCE HEAT PUMP ROOFTOP UNITS (RTU-1 THROUGH RTU-14)

A. The system shall be automatically operated through the BMS when control panel mounted “On-Auto-Off” switch and “Summer-Auto-Winter” switch are indexed to the “Auto” position. ***Winter Mode (heating) shall be enabled when the outside air temperature is below 60 degrees F (adjustable) and Summer Mode (cooling) shall be enabled when the outside air temperature is above 65 degrees F (adjustable).***

B. Occupied Cycle:

1. Summer Operation: Unit supply and exhaust fans shall run continuously with the control circuit energized. The outside air damper shall open, the return damper shall be full open and exhaust damper shall open. Provide a duct sensor in the supply fan discharge reset by a return air sensor (master/sub-master) arranged to modulate DX cooling and modulate hot gas reheat as required to maintain temperature and humidity set-point.
2. Winter Operation: Unit supply and exhaust fans will operate continuously with control circuits energized. The outside air intake and exhaust air dampers shall open with the return air damper open to the maximum position. The discharge air sensor shall modulate heat pump heating as required to maintain an adjustable discharge temperature set-point. ~~For RTU-24 only, on a further call~~

~~for heating, the gas fired furnace shall modulate as required to maintain discharge temperature set-point.~~

3. Economizer Operation: On a call for cooling when outdoor air conditions permit (temperature and differential enthalpy) the system shall operate in economizer mode. The building management system shall modulate the outside air intake, exhaust and return air dampers, to maintain discharge air set-point. Discharge air temperature set-point shall be reset by return air sensor. Control action shall be that on a rise in discharge temperature above set-point the outside air damper and exhaust damper shall modulate towards the open position and the return damper shall modulate towards the closed position. When the outside air damper reaches full open position and upon a further call for cooling the system shall revert to normal Summer Operation and DX cooling shall begin. When ambient conditions are no longer suitable for economizer operation the unit controls shall revert to normal Summer Operation. Economizer operation shall be available during both “occupied” and “unoccupied” modes.

C. Unoccupied Cycle: When operating in winter mode the system shall cycle the unit supply and exhaust fans and modulate heat pump heating to maintain a setback temperature of 67º (adjustable). When operating in summer mode the system shall cycle the supply and exhaust fans and modulate DX cooling (unless economizer operation is available) to maintain a setback temperature of 80º (adjustable). During this cycle the outside air and exhaust air dampers shall remain closed, the return air damper shall be open.

D. Warm-up Cycle: When operating in the winter mode the unit shall start and operate on 100% recirculation with modulating heat pump heating during the warm-up periods programmed by the building management System. Upon reaching normal occupied space temperatures as determined through the return air sensor the system shall revert back to normal winter operation.

E. Morning Cool-Down: When operating in the summer mode the system shall start and operate on 100% recirculation (unless economizer operation is available) during the cool-down periods programmed by the BMS. DX cooling shall modulate as required to achieve set-point. Upon reaching normal occupied space temperatures as determined through the return air sensor the system shall revert back to normal summer operation.

F. General:
   1. Whenever the system is shut-down the outside air and relief air dampers shall remain closed and return air damper shall be open.
   2. Provide a low limit sensor in the unit discharge arranged to prevent winter discharge temperature from dropping below 50ºF (adjustable).
   3. Provide a high limit sensor in the unit discharge arranged to prevent winter discharge temperature from rising above 120 ºF (adjustable).
   4. Provide supply fan shut-down interlocked with the fire alarm system on systems greater than 1000 CFM.
   5. Systems larger than 2000 CFM shall shut-down upon detection of smoke as sensed by duct mounted smoke detector.
   6. Provide an airflow monitoring station in the outside air intake tied into the damper controls of the unit to maintain a constant flow rate of ventilation air. The BMS shall monitor and record airflow readings.
   7. Minimum outside air damper position shall be determined, recorded and set in field during testing and balancing by the Testing and Balancing Contractor. This position shall be coordinate with the Controls Contractor.

8. The manufacturer furnished rooftop unit controls shall be programmed and commissioned in accordance with the operating sequences noted above. The Siemens building automation system shall be utilized for monitoring, set-point adjustments and mode scheduling as permitted through the manufacturer's furnished BACnet interface. The Siemens building automation system will graphically depict up to 25 (final number to be coordinated) BACnet interface parameters including all the rooftop unit points indicated on the drawings, provide equipment scheduling and alarms provided through the BACnet interface. The rooftop units manufacturer's representative shall be made available for control interface start-up and owner commissioning for the rooftop units sequences and operations.

3.20 GAS FIRED PACKAGED ROOFTOP UNIT (RTU-24 & RTU-25)

A. The system shall be automatically operated through the BMS when control panel mounted "On-Auto-Off" switch and "Summer-Auto-Winter" switch are indexed to the "Auto" position. ***Winter Mode (heating) shall be enabled when the outside air temperature is below 60 degrees F (adjustable) and Summer Mode (cooling) shall be enabled when the outside air temperature is above 65 degrees F (adjustable).***

B. Occupied Cycle:

1. Summer Operation: Unit supply fan shall run continuously with the control circuit energized. The outside air damper shall open to minimum position, the return damper shall be full open and relief damper shall open to the minimum position. Provide a duct sensor in the supply fan discharge reset by a return air sensor (master/sub-master) arranged to modulate DX cooling and modulate hot gas reheat as required to maintain temperature and humidity set-point as required to maintain set-point.
2. Winter Operation: Unit supply fan will operate continuously with control circuits energized. The outside air intake and relief air dampers shall open to minimum position with the return air damper open to the maximum position. The discharge air sensor shall modulate gas heating as required to maintain an adjustable discharge temperature set-point.
3. Economizer Operation: On a call for cooling when outdoor air conditions permit (temperature and differential enthalpy) the system shall operate in economizer mode. The building management system shall modulate the outside air intake, relief and return air dampers, to maintain discharge air set-point. Discharge air temperature set-point shall be reset by return air sensor. Control action shall be that on a rise in discharge temperature above set-point the outside air damper and relief damper shall modulate towards the open position and the return damper shall modulate towards the closed position. When the outside air damper reaches full open position and upon a further call for cooling the system shall revert to normal Summer Operation and DX cooling shall begin. When ambient conditions are no longer suitable for economizer operation the unit controls shall revert to normal Summer Operation. Economizer operation shall be available during both "occupied" and "unoccupied" modes.

C. Unoccupied Cycle: When operating in winter mode the system shall cycle the unit fan and modulate gas heating to maintain a setback temperature of 67º (adjustable). When operating in summer mode the system shall cycle the unit fan and stage DX cooling (unless economizer operation is available) to maintain a setback temperature of 80º

(adjustable). During this cycle the outside air and relief air dampers shall remain closed, the return air damper shall be open.

D. Warm-up Cycle: When operating in the winter mode the unit shall start and operate on 100% recirculation with modulating gas heating during the warm-up periods programmed by the building management System. Upon reaching normal occupied space temperatures as determined through the return air sensor the system shall revert back to normal winter operation.

E. Morning Cool-Down: When operating in the summer mode the system shall start and operate on 100% recirculation (unless economizer operation is available) during the cool-down periods programmed by the BMS. DX cooling shall cycle on in stages as required to achieve set-point. Upon reaching normal occupied space temperatures as determined through the return air sensor the system shall revert back to normal summer operation.

F. General:
   1. Whenever the system is shut-down the outside air and relief air dampers shall remain closed and return air damper shall be open.
   2. Provide a low limit sensor in the unit discharge arranged to prevent winter discharge temperature from dropping below 50ºF (adjustable).
   3. Provide a high limit sensor in the unit discharge arranged to prevent winter discharge temperature from rising above 120 ºF (adjustable).
   4. Provide supply fan shut-down interlocked with the fire alarm system on systems greater than 1000 CFM.
   5. Systems larger than 2000 CFM shall shut-down upon detection of smoke as sensed by duct mounted smoke detector.
   6. Provide an airflow monitoring station in the outside air intake tied into the damper controls of the unit to maintain a constant flow rate of ventilation air. The BMS shall monitor and record airflow readings.
   7. Minimum outside air damper position shall be determined, recorded and set in field during testing and balancing by the Testing and Balancing Contractor. This position shall be coordinate with the Controls Contractor.
   8. The manufacturer furnished rooftop unit controls shall be programmed and commissioned in accordance with the operating sequences noted above. The Siemens building automation system shall be utilized for monitoring, set-point adjustments and mode scheduling as permitted through the manufacturer's furnished BACnet interface. The Siemens building automation system will graphically depict up to 25 (final number to be coordinated) BACnet interface parameters including all the rooftop unit points indicated on the drawings, provide equipment scheduling and alarms provided through the BACnet interface. The rooftop units manufacturer's representative shall be made available for control interface start-up and owner commissioning for the rooftop units sequences and operations.

~~3.21 FINNED TUBE RADIATION (EXISTING)~~

~~A. In occupied mode the finned tube radiation shall work with associated VAV box to maintain space set-point. The 2-way control valve installed at the element shall modulate open/closed as required to maintain set-point.~~

~~B. In the unoccupied mode, the 2-way control valve installed on the finned tube radiation shall modulate open/closed as required to maintain night set-back set-point. Upon a~~

further call for heating in unoccupied mode the associated HVAC system shall be energized.

3.22 CABINET UNIT HEATERS (EXISTING)

A. Provide a space sensor arranged to open and close the 2-way motorized zone valve as required to maintain occupied or unoccupied space set-point. The space sensor shall also cycle the unit fan on and off.

B. Provide a strap-on aquastat arranged to prevent the fan from cycling on when the water temperature drops below the aquastat setting.

3.23 AUDITORIUM CONSTANT VOLUME AIR HANDLER (EXISTING)

A. The system shall be automatically operated through the BMS when control panel mounted "On-Auto-Off" switch and "Summer-Auto-Winter" switch are indexed to the "Auto" position.

B. Occupied Cycle:

1. Summer Operation: Unit supply fan and associated remote exhaust fan shall run continuously with the control circuit energized. The outside air dampers shall open to minimum position, the return damper shall be full open and relief damper (at the remote exhaust fan) shall be in minimum position. Provide a duct sensor in the supply fan discharge reset by a return air sensor (master-submaster) arranged to cycle the DX cooling coil and air cooled condensing unit in stages to maintain set-point.

2. Winter Operation: Unit supply fan and remote exhaust fan will operate continuously with control circuits energized. The outside air intake, and relief air dampers shall open to minimum position with the return air damper open to the maximum position. The discharge air sensor shall modulate the 3-way control valve for the hot water heating coil to maintain an adjustable discharge temperature set-point. On a drop in discharge air temperature below set-point the coil 3-way valve shall modulate open, the reverse shall occur when discharge air temperature increases above set-point.

3. Economizer Operation: On a call for cooling when outdoor air conditions permit (temperature and differential enthalpy) the system shall operate in economizer mode. The building management system shall modulate the outside air intake, relief and return air dampers, to maintain discharge air set-point. Discharge air temperature set-point shall be reset by return air sensor. Control action shall be that on a rise in discharge temperature above set-point the outside air damper and relief damper shall modulate towards the open position and the return damper shall modulate towards the closed position. When the outside air damper reaches full open position and upon a further call for cooling the system shall revert to normal Summer Operation and DX cooling shall begin. When ambient conditions are no longer suitable for economizer operation the unit controls shall revert to normal Summer Operation.

C. Unoccupied Cycle: When operating in winter mode and when the local finned tube radiation cannot maintain unoccupied set-points the system shall cycle the unit fans and open the heating coil valves for full flow through the coil to maintain a setback temperature of 55º (adjustable). During this cycle the outside air and relief air dampers shall remain closed, the return air damper shall be open.

D. Warm-up Cycle: When operating in the winter mode the unit shall operate on 100% recirculation with the heating coil valves open during the warm-up periods pro-

~~grammed by the BMS. Upon reaching normal occupied space temperatures as determined through the return air sensor the system shall revert back to normal winter operation.~~

E. ~~Morning Cool-Down: When operating in the summer mode the system shall start and operate on 100% recirculation during the cool-down periods programmed by the BMS. DX cooling shall cycle to maintain set-point. Upon reaching normal occupied space temperatures as determined through the return air sensor the system shall revert back to normal summer operation.~~

G. ~~General:~~

1. ~~Whenever the system is shut-down the outside air and relief air dampers shall remain closed and return air damper shall be open. Three-way valve shall position to full flow through the coil.~~
2. ~~Provide a low limit sensor in the unit discharge arranged to prevent winter discharge temperature from dropping below 60ºF (adjustable).~~
3. ~~Provide a freeze protection thermostat in the unit heating coil plenum arranged to shut down the unit in the event air temperature drops below 35ºF. Thermostat shall be manual reset type.~~
4. ~~Provide supply and return fan shut-down interlocked with the fire alarm system on systems greater than 1,000 CFM.~~
5. ~~System larger than 2,000 CFM shall shut-down upon detection of smoke as sensed by duct mounted smoke detector.~~
6. ~~Provide an airflow monitoring station in the outside air intake ductwork tied into the damper controls of the unit to maintain a constant flow rate of ventilation air. The BMS shall monitor and record airflow readings.~~

3.24 BOILER PLANT (EXISTING)

A. The existing boiler plant sequence of operations below is provided for reference only and is to be used as part of the project's commissioning phase.

B. Hot Water Boilers: The hot water boilers shall be enabled to operate under their on-board boiler controller by the BAS. The BAS shall enable each boiler on and off, in-sequence based on the hot water return water temperature. When enabled to operate the individual boiler controller shall enable the local boiler hot water circulator pump and control the boiler combustion air intake dampers. A flow switch shall be provided to proof flow. The BAS shall signal each boiler with a hot water set-point adjusted based on an outside air reset schedule.

1. Main header supply and return water temperature shall be monitored by the BAS
2. Running status and general alarm shall be monitored for each boiler
3. Alarms available from each boiler controller shall be transmitted/wired into the BAS. All boiler controller points shall be fully integrated to the BAS.
4. An open protocol interface/gateway shall be provided to each boiler control panel, for Modbus or BACnet MSTP.
5. Common supply and return header temperature sensors shall be used to determine heating load. A control point for future flowmeter located in the main building heating hot water supply header shall be provided, as requested by the District.
6. The internal boiler controls shall protect the boiler against low flow / no flow condition, low water condition, combustion air failure, flame failure, gas pressure limits, and other ASME CSD-1 safeties. Boiler alarms shall be annunciated

locally and at the BAS. Where manual restarts are required, they shall be at the individual control devices within the boiler room, or at the individual boiler controller.

C. Boiler Room Combustion Air Damper: The boiler room combustion air damper shall open whenever the boilers or domestic water heater are started. The boiler room combustion air damper shall be wired to the boiler and water heater controllers through isolation relays, and an end switch on the boiler room combustion air damper. The end switch shall be hardwired and interlocked to the boiler and water heater controllers to prevent either from firing until the damper is opened.

D. Heating Control: At the beginning of the heating season, as defined by the heating system enable point being energized (manually by the operator or by program function (i.e., Time-Of-Day)), Siemens BAS shall enable the hot water plant to start. At the end of the heating season (heating system enable point is de-energized) the Siemens BAS shall disable the hot water boiler plant.

E. Boiler Pumps: Boiler circulator pumps shall be enabled on/off by the associated boiler's individual controller. A flow switch at each pump shall proof flow prior to boiler operation and generate an alarm at the BAS in the event of a no flow condition. If flow is not established at the lead boiler/pump combination, the BAS shall switch to the lag combination.

F. Heating Hot Water Distribution Pumps: The building heating hot water system consists of heating hot water distribution pumps with VFDs and differential pressure sensors. A building heating hot water flow meter shall be installed in the future as directed by the District.

1. The proper differential pressure set point shall be determined in the field during project the commissioning phase. The building heating hot water pump VFD shall modulate to maintain the system differential pressure set-point. Minimum and Maximum building heating hot water flowrates shall be adjustable through the VFD's, and shall be determined in the field.
2. The BAS shall utilize flow switches to confirm the lead building heating hot water pump is in the desired state (i.e. on or off) and generates an alarm if status deviates from BAS start/stop control. If the lead pump goes into alarm, the lag pump will automatically start.

G. Miscellaneous BAS Alarm Points and Monitoring:

1. Boiler Room Flood Alarm: The BAS shall monitor and alarm the water level in the existing boiler room sump. If the water level in the existing sump, reaches a high level, as sensed by a float or probe type device, an alarm shall be generated at the BAS.
2. Outside air temperature and humidity shall be monitored by the BAS.
3. The BAS shall monitor the emergency boiler/water heater shutdown circuit, and shall alarm at the BAS if the emergency shutdown circuit is activated.
4. Makeup water connection (both boiler and domestic water heater systems): A flow switch shall sense makeup water flow, and alarm at the BAS. Upon predetermined time period, the BAS shall activate an electric solenoid valve to shut off makeup water.

~~H. Domestic Hot Water System: The domestic hot water system consists of a high efficiency gas fired condensing package system with double wall indirect heat exchanger, pumps and controls, two domestic hot water storage tanks, two building domestic hot water recirculation pumps, and a central tempering valve.~~

1. The BAS shall monitor the building domestic hot water supply temperature via well type temperature sensor furnished by the BAS contractor and installed by the mechanical contractor.
2. The domestic water heater shall be enabled to operate under its on-board controller by the BAS. The BAS shall enable the domestic water heater on and off, based on building occupancy schedule, as determined by the District. When enabled to operate, the domestic water heater controller shall enable the internal circulator pump, heater, and control the water heater combustion air intake damper. A flow switch shall be provided to prove flow.
3. Running status and alarms available from the water heater controller shall be transmitted/wired into the BAS. All domestic water heater controller points shall be fully integrated to the BAS.
4. An open protocol interface/gateway shall be provided for the water heater control panel, for Modbus or BACnet MSTP.
5. A control point for future flowmeter to be located in the main building domestic water service near the existing water meter shall be provided, as requested by the District.
6. The internal water heater controls shall protect the water heater against low flow / no flow condition, low water condition, combustion air failure, flame failure, gas pressure limits, and other ASME CSD-1 safeties. Water heater alarms shall be annunciated locally and at the BAS. Where manual restarts are required, they shall be at the individual control devices within the boiler room, or at the individual water heater controller.

I. Domestic Hot Water Recirculation Pumps: The domestic hot water system has two individual recirculation pumps. The BAS shall monitor pump status, and shall enable the recirculation pumps based on building occupancy schedule, as determined by the District. In addition, an aquastat wired in series with the pump enable circuit, shall shutdown recirculation pump when DHWR temp reaches aquastat setpoint. Flow switches shall be used to confirm recirculation pump operation, pump failure shall be alarmed at the BAS.

J. Domestic Hot Water Storage Tanks: Domestic Water Storage tank temperature shall be monitored and alarmed by the BAS. Alarm points shall be high temp and low temp, with adjustable setpoints for each.

3.25 WATER TO WATER HEAT PUMPS (WF)

A. The water to water heat pumps shall be controlled through the manufacturer's furnished control system which sequences all functions and modes of operation. The water to water heat pumps shall be enabled to operate by the manufacturer's controller by the Siemens building automation system.

B. The manufacturer furnished controls shall be programmed and commissioned in accordance with the manufacturer's sequences of operations. The Siemens building automation system shall be utilized for monitoring, set-point adjustments and mode scheduling as permitted through the manufacturer's furnished BACnet interface. The Siemens building automation system will graphically depict up to 25 (final number to be coordinated) BACnet interface parameters including all the points indicated on the drawings, provide equipment scheduling and alarms provided through the BACnet interface. The water to water heat pump units manufacturer's representative shall be made available for control interface start-up and owner commissioning for the units sequences and operations.

C. At the beginning of either the heating or cooling season, as defined by the system enable point being energized (manually or by program function (i.e., Time-Of-Day), the Siemens building automation system shall enable the plant to start.

a. Winter Mode (heating) shall be enabled when the outside air temperature is below 60 degrees F (adjustable) and Summer Mode (cooling) shall be enabled when the outside air temperature is above 65 degrees F (adjustable).

3.26 PLATE AND FRAME HEAT EXCHANGER (HX)

A. The hot water plate and frame heat exchanger is provided to supplement the geothermal well field and is connected to the existing hot water boiler system. When the water temperature out of the geothermal well field is 36 degrees F or less, the existing boiler plant shall be enabled to run, the existing hot water pumps shall turn on and the 2-way control valve located on the hot water supply to the plate and frame heat exchanger shall modulate open and closed as required, additionally the 3-way diverter valve on the geothermal well field piping side shall modulate open and closed.

3.27 AIR CURTAINS (ARC-1 AND ARC-2)

A. The air curtains shall be controlled through the manufacturer's furnished control system which sequences all functions and modes of operation.

3.28 WATER SOURCE HEAT PUMP ROOFTOP UNITS (RTU-15 THROUGH RTU-23)

A. The system shall be automatically operated through the BMS when control panel mounted "On-Auto-Off" switch and "Summer-Auto-Winter" switch are indexed to the "Auto" position. ***Winter Mode (heating) shall be enabled when the outside air temperature is below 60 degrees F (adjustable) and Summer Mode (cooling) shall be enabled when the outside air temperature is above 65 degrees F (adjustable).***

B. Occupied Cycle:

1. Summer Operation: Unit supply and exhaust fans shall run continuously with the control circuit energized. The outside air damper shall open, the return damper shall be full open and exhaust damper shall open. Provide a duct sensor in the supply fan discharge reset by a return air sensor (master/sub-master) arranged to modulate DX cooling (by opening and closing the factory provided 2-way valve connected to the geothermal well field piping loop) and modulate hot gas reheat as required to maintain temperature and humidity set-point.
2. Winter Operation: Unit supply and exhaust fans will operate continuously with control circuits energized. The outside air intake and exhaust air dampers shall open with the return air damper open to the maximum position. The discharge air sensor shall modulate heat pump heating (by opening and closing the factory provided 2-way valve connected to the geothermal well field piping loop) as required to maintain an adjustable discharge temperature set-point.
3. Economizer Operation: On a call for cooling when outdoor air conditions permit (temperature and differential enthalpy) the system shall operate in economizer mode. The building management system shall modulate the outside air intake, exhaust and return air dampers, to maintain discharge air set-point. Discharge air temperature set-point shall be reset by return air sensor. Control action shall be that on a rise in discharge temperature above set-point the outside air damper and exhaust damper shall modulate towards the open position and the return

damper shall modulate towards the closed position. When the outside air damper reaches full open position and upon a further call for cooling the system shall revert to normal Summer Operation and DX cooling shall begin. When ambient conditions are no longer suitable for economizer operation the unit controls shall revert to normal Summer Operation. Economizer operation shall be available during both “occupied” and “unoccupied” modes.

C. Unoccupied Cycle: When operating in winter mode the system shall cycle the unit supply and exhaust fans and modulate heat pump heating (by opening and closing factory 2-way valve) to maintain a setback temperature of 67º (adjustable). When operating in summer mode the system shall cycle the supply and exhaust fans and modulate DX cooling (unless economizer operation is available) (by opening and closing factory 2-way valve) to maintain a setback temperature of 80º (adjustable). During this cycle the outside air and exhaust air dampers shall remain closed, the return air damper shall be open.

D. Warm-up Cycle: When operating in the winter mode the unit shall start and operate on 100% recirculation with modulating heat pump heating (by opening and closing the factory 2-way valve) during the warm-up periods programmed by the building management System. Upon reaching normal occupied space temperatures as determined through the return air sensor the system shall revert back to normal winter operation.

E. Morning Cool-Down: When operating in the summer mode the system shall start and operate on 100% recirculation (unless economizer operation is available) during the cool-down periods programmed by the BMS. DX cooling (by opening and closing factory 2-way valve) shall modulate as required to achieve set-point. Upon reaching normal occupied space temperatures as determined through the return air sensor the system shall revert back to normal summer operation.

F. General:
   1. Whenever the system is shut-down the outside air and relief air dampers shall remain closed and return air damper shall be open.
   2. Provide a low limit sensor in the unit discharge arranged to prevent winter discharge temperature from dropping below 50ºF (adjustable).
   3. Provide a high limit sensor in the unit discharge arranged to prevent winter discharge temperature from rising above 120 ºF (adjustable).
   4. Provide supply fan shut-down interlocked with the fire alarm system on systems greater than 1000 CFM.
   5. Systems larger than 2000 CFM shall shut-down upon detection of smoke as sensed by duct mounted smoke detector.
   6. Provide an airflow monitoring station in the outside air intake tied into the damper controls of the unit to maintain a constant flow rate of ventilation air. The BMS shall monitor and record airflow readings.
   7. Minimum outside air damper position shall be determined, recorded and set in field during testing and balancing by the Testing and Balancing Contractor. This position shall be coordinate with the Controls Contractor.
   8. The manufacturer furnished rooftop unit controls shall be programmed and commissioned in accordance with the operating sequences noted above. The Siemens building automation system shall be utilized for monitoring, set-point adjustments and mode scheduling as permitted through the manufacturer's furnished BACnet interface. The Siemens building automation system will graphically depict up to 25 (final number to be

coordinated) BACnet interface parameters including all the rooftop unit points indicated on the drawings, provide equipment scheduling and alarms provided through the BACnet interface. The rooftop units manufacturer's representative shall be made available for control interface start-up and owner commissioning for the rooftop units sequences and operations.

3.29 ENERGY RECOVERY ROOFTOP UNIT (ERV-1)

A. The system shall be automatically operated through the BMS when control panel mounted "On-Auto-Off" switch and "Summer-Auto-Winter" switch are indexed to the "Auto" position. Winter Mode (heating) shall be enabled when the outside air temperature is below 60 degrees F (adjustable) and Summer Mode (cooling) shall be enabled when the outside air temperature is above 65 degrees F (adjustable).

B. Occupied Cycle:

1. Summer Operation: Unit supply fan shall run continuously with the control circuit energized. The outside air damper shall open, the return damper shall be full open and exhaust damper shall open. Provide a duct sensor in the supply fan discharge reset by a return air sensor (master/sub-master) arranged to modulate DX cooling and modulate hot gas reheat as required to maintain temperature and humidity set-point.

2. Winter Operation: Unit supply fan will operate continuously with control circuits energized. The outside air intake and exhaust air dampers shall open with the return air damper open to the maximum position. The discharge air sensor shall modulate heat pump heating as required to maintain an adjustable discharge temperature set-point. On a further call for heating, the gas fired furnace shall modulate as required to maintain discharge temperature set-point.

3. Economizer Operation: On a call for cooling when outdoor air conditions permit (temperature and differential enthalpy) the system shall operate in economizer mode. The building management system shall modulate the outside air intake, exhaust and return air dampers, to maintain discharge air set-point. Discharge air temperature set-point shall be reset by return air sensor. Control action shall be that on a rise in discharge temperature above set-point the outside air damper and exhaust damper shall modulate towards the open position and the return damper shall modulate towards the closed position. When the outside air damper reaches full open position and upon a further call for cooling the system shall revert to normal Summer Operation and DX cooling shall begin. When ambient conditions are no longer suitable for economizer operation the unit controls shall revert to normal Summer Operation. Economizer operation shall be available during both "occupied" and "unoccupied" modes.

C. Unoccupied Cycle: When operating in winter mode the system shall cycle the unit supply and exhaust fans and modulate heat pump heating to maintain a setback temperature of 67º (adjustable). When operating in summer mode the system shall cycle the supply and exhaust fans and modulate DX cooling (unless economizer operation is available) to maintain a setback temperature of 80º (adjustable). During this cycle the outside air and exhaust air dampers shall remain closed, the return air damper shall be open.

D. Warm-up Cycle: When operating in the winter mode the unit shall start and operate on 100% recirculation with modulating heat pump heating (and gas heating when required) during the warm-up periods programmed by the building management System. Upon reaching normal occupied space temperatures as determined through the return air sensor the system shall revert back to normal winter operation.

E. Morning Cool-Down: When operating in the summer mode the system shall start and operate on 100% recirculation (unless economizer operation is available) during the cool-down periods programmed by the BMS. DX cooling shall modulate as required to achieve set-point. Upon reaching normal occupied space temperatures as determined through the return air sensor the system shall revert back to normal summer operation.

F. General:

1. ***Whenever the system is shut-down the outside air and relief air dampers shall remain closed and return air damper shall be open.***
2. ***Provide a low limit sensor in the unit discharge arranged to prevent winter discharge temperature from dropping below 50ºF (adjustable).***
3. ***Provide a high limit sensor in the unit discharge arranged to prevent winter discharge temperature from rising above 120 ºF (adjustable).***
4. ***Provide supply fan shut-down interlocked with the fire alarm system on systems greater than 1000 CFM.***
5. ***Systems larger than 2000 CFM shall shut-down upon detection of smoke as sensed by duct mounted smoke detector.***
6. ***Provide an airflow monitoring station in the outside air intake tied into the damper controls of the unit to maintain a constant flow rate of ventilation air. The BMS shall monitor and record airflow readings.***
7. ***Minimum outside air damper position shall be determined, recorded and set in field during testing and balancing by the Testing and Balancing Contractor. This position shall be coordinate with the Controls Contractor.***
8. ***The manufacturer furnished rooftop unit controls shall be programmed and commissioned in accordance with the operating sequences noted above. The Siemens building automation system shall be utilized for monitoring, set-point adjustments and mode scheduling as permitted through the manufacturer's furnished BACnet interface. The Siemens building automation system will graphically depict up to 25 (final number to be coordinated) BACnet interface parameters including all the rooftop unit points indicated on the drawings, provide equipment scheduling and alarms provided through the BACnet interface. The rooftop units manufacturer's representative shall be made available for control interface start-up and owner commissioning for the rooftop units sequences and operations.***

END OF SECTION 230993

SECTION 261219 - PAD-MOUNTED, LIQUID-FILLED, MEDIUM-VOLTAGE TRANSFORMERS

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. Pad-mounted, liquid-filled, medium-voltage transformers.
B. Related Requirements:
   1. Section 260519 "Low-Voltage Electrical Power Conductors and Cables" specifies installation of low-voltage wiring.
   2. Section 260526 "Grounding and Bonding for Electrical Systems" specifies grounding and bonding referenced by this Section.
   3. Section 260529 "Hangers and Supports for Electrical Systems" specifies hangers, supports, and concrete bases referenced by this Section.
   4. Section 260548 "Vibration and Seismic Controls for Electrical Systems" specifies vibration isolation and seismic control devices referenced by this Section.
   5. Section 260553 "Identification for Electrical Systems" specifies electrical equipment labels and warning signs referenced by this Section.

1.3 DEFINITIONS

A. Bushing: An insulating structure including a central conductor, or providing a central passage for a conductor, with provision for mounting on a barrier, conducting or otherwise, for the purpose of insulating the conductor from the barrier and conducting current from one side of the barrier to the other.
B. Bushing Elbow: An insulated device used to connect insulated conductors to separable insulated connectors on dead-front, pad-mounted transformers and to provide a fully insulated connection. This is also called an "elbow connector."
C. Bushing Insert: That component of a separable insulated connector that is inserted into a bushing well to complete a dead-front, load break or nonload break, separable insulated connector (bushing).
D. Bushing Well: A component of a separable insulated connector, either permanently welded or clamped to an enclosure wall or barrier, having a cavity that receives a replaceable component (bushing insert) to complete the separable insulated connector (bushing).
E. Elbow Connector: See "bushing elbow" above.

1.4 PREINSTALLATION MEETINGS

A. Preinstallation Coordination Meeting(s): Conduct meeting(s) at project site before installation.
   1. Attendees: Installers, fabricators, representatives of manufacturers, and administrants for field tests and inspections. Notify Architect, Construction Manager, and Owner's Commissioning Authority of scheduled meeting dates.

1.5 ACTION SUBMITTALS

A. Product Data: For each type of product.
   1. Product Listing: Include copy of unexpired approval letter, on letterhead of qualified electrical testing agency, certifying product's compliance with specified listing criteria.
      a. If listed manufacturer differs from selling manufacturer, indicate relationship between entities on submittal. Clearly indicate which entity warrants product performance and fitness for purpose.
      b. Listing criteria identified in approval letter must match specified listing criteria. UL label indicating approval of equipment's enclosure is not considered approval of equipment for intended application.
      c. Product identification in approval letter must match product branding and model numbers in submittal. Approval letters for discontinued or superseded products are unacceptable for submitted product.
   2. Product Certificates: Include product certificate stating compliance with IEEE C57.12.00, signed by manufacturer or fabricator.

B. Factory test reports.

C. Shop Drawings: Prepare and submit the following:
   1. Plans and elevations showing major components and features.
      a. Plan view and cross section of equipment base, showing clearances, required workspace, and locations of penetrations for grounding and conduits.
   2. Details of equipment assemblies and indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of field connections.
   3. Single-line diagram.
   4. List of materials.
   5. Nameplate data.
   6. Manufacturer's published time-current curves of transformer line-side fuses, with transformer damage curve, inrush curve, and thru fault current indicated.

D. Field quality-control reports.

1.6 INFORMATIONAL SUBMITTALS

A. Manufacturer's published instructions.

B. Manufacturer's field reports for field quality-control support.

C. Field reports for voltage monitoring and adjusting.

D. Field reports for infrared scanning.

1.7 QUALIFICATIONS

A. Electrical Power Testing (EPT) Technician III: Possessing active NICET EPT Level III certification. Able to manage switching procedures, conduct tests of complex equipment, analyze test and equipment data, plan a job, and lead a team. Has experience performing NFPA 70B, IEEE, and NETA electrical tests.

B. Electrical Power Testing (EPT) Technician IV: Possessing active NICET EPT Level IV certification. Able to conduct tests of complex metering and relay systems; evaluate tests, test equipment, test results, and power system performance; recommend actions to maintain or improve system performance; and lead multi-team projects.

C. Electrical Power Testing and Inspecting Agency: Entities possessing active credentials from a qualified electrical testing laboratory recognized by authorities having jurisdiction.

1. On-site electrical testing supervisors must possess active NICET EPT Technician III certification.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Delivery:
1. Upon delivery of transformers and prior to unloading, inspect equipment for damage that may have occurred during shipment or storage.
2. Verify that tie rods and chains are undamaged and tight, and that blocking and bracing is tight. Verify that there is no evidence of load shifting in transit, and that readings from transportation shock recorders, if equipped, are within manufacturer's recommendations.
3. Verify that there is no indication of external damage and no dents or scratches in doors and sill, tank walls, radiators and fins, or termination provisions.
4. Verify that there is no evidence of insulating-liquid leakage on transformer surfaces, at weld seams, on line- or load-side bushing parts, and at transformer base.
5. Verify that there is positive pressure or vacuum on tank. Check pressure gauge; it is required to read other than zero.
6. Compare transformers and accessories received with bill of materials to verify that shipment is complete. Verify that transformers and accessories conform with manufacturer's quotation and shop drawings. If shipment is incomplete or does not comply with Project requirements, notify manufacturer in writing immediately.
7. Verify presence of polychlorinated biphenyl content labeling.
8. Unload transformers carefully, observing packing label warnings and handling instructions.
9. Open termination compartment doors and inspect components for damage or displaced parts, loose or broken connections, cracked or chipped insulators, bent mounting flanges, dirt or foreign material, and water or moisture.

B. Storage:
1. Store transformers in accordance with manufacturer's recommendations.
2. Transformers may be stored outdoors. If possible, store transformers at final installation locations on concrete pads. If dry concrete surfaces are unavailable, use pallets of adequate strength to protect transformers from direct contact with ground. Ensure that transformer is level.
3. Ensure that transformer storage location is clean and protected from severe conditions. Protect transformers from dirt, water, contamination, and physical damage. Do not store transformers in the presence of corrosive or explosive gases. Protect transformers from weather when stored for more than three months.
4. Store transformers with compartment doors closed.
5. Regularly inspect transformers while in storage and maintain documentation of storage conditions, noting discrepancies or adverse conditions. Verify that effective pressure seal is maintained using pressure gauges. Visually check for insulating-liquid leaks and rust spots.

C. Handling:
1. Handle transformers carefully, in accordance with manufacturer's recommendations, to avoid damage to enclosure, termination compartments, base, frame, tank, and internal components. Do not subject transformers to impact, jolting, jarring, or rough handling.

2. Protect transformer termination compartments against entrance of dust, rain, and snow.
3. Transport transformers upright, to avoid internal stresses on core and coil mounting assembly and to prevent trapping air in windings. Do not tilt or tip transformers.
4. Verify that transformer weights are within rated capacity of handling equipment.
5. Use only manufacturer-recommended points for lifting, jacking, and pulling. Use lifting lugs when lifting transformers.
6. Use jacks only at corners of tank base plate.
7. Use nylon straps of same length to balance and distribute weight when handling transformers with crane.
8. Use spreaders or lifting beam to obtain vertical lift and to protect transformer from straps bearing against enclosure. Lifting cable pull angles may not be greater than 15 degrees from vertical.
9. Exercise care not to damage tank base structure when handling transformer using skids or rollers. Use skids to distribute stresses over tank base when using rollers under large transformers.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Regulatory Requirements: Products or components listed and labeled in accordance with NFPA 70, by a qualified electrical testing laboratory recognized by authorities having jurisdiction, and marked for intended location and application.

2.2 PAD-MOUNTED, LIQUID-FILLED, MEDIUM-VOLTAGE TRANSFORMERS

A. Three-Phase, Pad-Mounted Transformers: 3750kVA:
   1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
      a. Howard Industries, Inc.
      b. Prolec GE; A Xignux and General Electric Company Joint Venture.
      c. Square D.
      d. VanTran Transformers.
   2. Listing Criteria: Investigated, labeled, and marked by qualified electrical testing laboratory in accordance with guide information and standards specified for the following UL product categories:
      a. Transformers, Distribution, Liquid-Filled Type, Over 600 V: UL CCN XPLH; including IEEE C57.12.00 and IEEE C57.12.28.
   3. Standard Features:
      a. Oil filled, two-winding, 60 Hz, 65 deg C rise above 30 deg C average ambient, self-cooled transformer.
      b. Reference Standards: IEEE C2 and IEEE C57.12.26.
      c. Windings Material: Aluminum.
      d. Surge Arresters: Comply with IEEE C62.11, Distribution Class; metal-oxide-varistor type, fully shielded, separable-elbow type, suitable for plugging into inserts provided in line-side section of transformer. Connected in each phase of incoming circuit and ahead of disconnecting device.
      e. Winding Connections: Connection of windings and terminal markings must comply with IEEE C57.12.70.

f. Efficiency: Comply with 10 CFR 431, Subpart K.
g. Insulation: Transformer kVA rating must be as follows: Average winding temperature rise above 30 deg C ambient temperature must not exceed 65 deg C and 80 deg C hottest-spot temperature rise at rated kVA when tested in accordance with IEEE C57.12.90, using combination of connections and taps that give highest average winding temperature rise.
h. Tap Changer: External handle, for de-energized operation.
i. Tank: Sealed, with welded-on cover.
j. Enclosure Integrity: Comply with IEEE C57.12.28 for pad-mounted enclosures that contain energized electrical equipment in excess of 600 V that may be exposed to public.
k. Mounting: Integral skid mounting frame, suitable to allow skidding or rolling of transformer in any direction, and with provision for anchoring frame to pad.
l. Insulating Liquids:
    1) Mineral Oil: ASTM D3487, Type II, and tested for compliance with ASTM D117.
m. Sound level must comply with NEMA TR 1 requirements.
n. Corrosion Protection:
    1) Transformer coating system must be factory applied, complying with requirements of IEEE C57.12.28, in manufacturer's standard color green.
o. Compartment Construction:
    1) Double-Compartment Construction: Individual compartments for line- and load-side sections, formed by steel isolating barriers that extend full height and depth of compartments, with hinged, lift-off doors and three-point latching, with stop in open position and provision for padlocking.
p. Line-Side Section: Dead-front design.
    1) To connect primary cable, use separable insulated connectors; coordinated with and complying with requirements of Section 260513 "Medium-Voltage Cables." Bushings must be one-piece units, with ampere and BIL ratings same as connectors.
    2) Bushing inserts:
        a) Conform to requirements of IEEE 386.
        b) Rated at 200 A, with voltage class matching connectors. Provide parking stand near bushing wells. Parking stands must be equipped with insulated standoff bushings for parking of energized load-break elbow connectors on parking stands.
        c) Provide insulated protective caps for insulating and sealing out moisture from unused bushing inserts and insulated standoff bushings].
    3) Access to liquid-immersed fuses.
    4) Dead-front surge arresters.
    5) Tap-changer operator.
    6) Ground pad.
q. Load-Side Section:
    1) Bushings with spade terminals drilled for terminating number of conductors indicated on the Drawings, and lugs that comply with

requirements of Section 260519 "Low-Voltage Electrical Power Conductors and Cables."

r. Capacities and Characteristics:
   1) Power Rating: 3750 kVA.
   2) Voltage Ratings: 13200/GRDY/7620V – 480Y/277V. Contractor shall verify available primary voltage with utility company prior to purchase.
   3) Taps: +-2-2.5%
   4) Transformer BIL (kV): 60
   5) Minimum Tested Impedance (Percent) at 85 deg C: 5.75
   6) Comply with FM Global Class No. 3990.

s. Transformer Accessories:
   1) Drain and filter connection.
   2) Filling and top filter press connections.
   3) Pressure-vacuum gauge.
   4) Dial-type analog thermometer
   5) Magnetic liquid level indicator.
   6) Automatically resetting pressure-relief device. Device flow must be as recommended by manufacturer.
   7) Stainless steel ground connection pads.
   8) Machine-engraved nameplate, made of anodized aluminum or stainless steel.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas and space conditions for compliance with requirements for pad-mounted, liquid-filled, medium-voltage transformers and other conditions affecting performance of the Work.

B. Examine roughing-in of conduits and grounding systems to verify the following:
   1. Wiring entries comply with layout requirements.
   2. Entries are within conduit-entry tolerances specified by manufacturer, and no feeders will cross section barriers to reach load or line lugs.

C. Examine concrete bases for suitable conditions for transformer installation.

D. Preinstallation Checks:
   1. Verify removal of shipping bracing after placement.
   2. Remove sample of insulating liquid in accordance with ASTM D923. Insulating-liquid values must comply with NETA ATS, Table 100.4. Sample must be tested for the following:
      a. Dielectric Breakdown Voltage: ASTM D877 or ASTM D1816.
      b. Acid Neutralization Number: ASTM D974.
      c. Interfacial Tension: ASTM D971.
      d. Color: ASTM D1500.
      e. Visual Condition: ASTM D1524.

E. Verify that grounding and bonding connections are in place. Ground (Earth) resistance may not exceed 5 Ω at transformer location.

F. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Comply with manufacturer's published instructions.

B. Reference Standards for Installation: Unless more stringent installation requirements are specified in the Contract Documents or manufacturer's published instructions, comply with the following:
   1. Electrical Construction: ICC IBC, ICC IFC, NFPA 1, NFPA 70, and NECA NEIS 1.
   2. Electrical Maintenance: NFPA 70B.
   3. Electrical Safety: NFPA 70E.
   4. Commissioning of Electrical Systems: NECA NEIS 90.
   5. Grounding and Bonding: NECA NEIS 331 and Article 250 of NFPA 70.
   6. Communications Work: BICSI N1.
   7. Emergency and Standby Power Work: NFPA 110, NFPA 111, and NECA NEIS 416.
   8. Work in Confined Spaces: NFPA 350.
   9. Work in Basements and Other Developed Subterranean Spaces: NFPA 520.
   10. Consult Architect for resolution of conflicting requirements.

C. Special Installation Techniques:
   1. Install transformers on cast-in-place concrete equipment base(s).
   2. Transformer must be installed level and plumb and must tilt less than 1.5 degrees while energized.
   3. Maintain minimum clearances and workspace at equipment in accordance with manufacturer's published instructions and IEEE C2.

D. Grounding and Bonding:
   1. For counterpoise, use tinned bare copper cable not smaller than 4/0 AWG, buried not less than 30 inch below grade interconnecting grounding electrodes. Bond surge arrester and neutrals directly to transformer enclosure and then to grounding electrode system with bare copper conductors, sized as shown. Keep lead lengths as short as practicable, with no kinks or sharp bends.
   2. Make joints in grounding conductors and loops by exothermic weld or compression connector.
   3. Terminate grounding and bonding conductors on common equipment grounding terminal on transformer enclosure.
   4. Complete transformer tank grounding and lightning arrester connections prior to making other electrical connections.

E. Connect low-voltage wiring.
   1. Maintain air clearances between energized live parts and between live parts and ground for exposed connections in accordance with manufacturer recommendations.
   2. Bundle associated phase, neutral, and equipment grounding conductors together within transformer enclosure. Arrange conductors such that there is not excessive strain that could cause loose connections. Allow adequate slack for expansion and contraction of conductors.

F. Terminate medium-voltage cables in incoming section of transformers.

G. Interfaces with Other Work:
   1. Identification: Provide labels for transformers and associated electrical equipment.
      a. Identify field-installed conductors, interconnecting wiring, and components.
      b. Label each enclosure with engraved metal or laminated-plastic nameplate.
      c. Provide warning signs and arc-flash hazard warning labels for electrical equipment.
   2. Install transformers on cast-in-place concrete equipment base(s).

3. Provide vibration isolation and seismic control devices.

3.3 FIELD QUALITY CONTROL

A. Administrant for Electrical Power Tests and Inspections:
   1. Engage factory-authorized service representative to administer and perform tests and inspections on components, assemblies, and equipment installations, including connections.

B. Tests and Inspections:
   1. General Field-Testing Requirements:
      a. Comply with provisions of "Testing and Test Methods" Chapter in NFPA 70B.
      b. Perform visual and mechanical inspections and electrical tests. Certify compliance with test parameters.
      c. After installing transformer but before primary is energized, verify that grounding system at transformer is tested at specified value or less.
      d. After installing transformer and after electrical circuitry has been energized, test for compliance with requirements.
      e. Visual and Mechanical Inspection:
         1) Verify equipment nameplate data complies with the Contract Documents.
         2) Inspect bolted electrical connections for high resistance using one of the following two methods:
            a) Use low-resistance ohmmeter to compare bolted connection resistance values to values of similar connections. Investigate values that deviate from those of similar bolted connections by more than 50 percent of lowest value.
            b) Verify tightness of accessible bolted electrical connections by calibrated torque-wrench method in accordance with manufacturer's published data or NETA ATS, Table 100.12. Bolt-torque levels must be in accordance with manufacturer's published data. In absence of manufacturer's published data, use NETA ATS, Table 100.12.
   2. Liquid-Filled Transformer Field Tests:
      a. Visual and Mechanical Inspection:
         1) Test dew point of tank gases if applicable.
         2) Inspect anchorage, alignment, and grounding.
         3) Verify bushings are clean.
         4) Verify that alarm, control, and trip settings on temperature and level indicators are set and operate within manufacturer's recommended settings.
         5) Verify that liquid level in tanks is within manufacturer's published tolerances.
         6) Perform specific inspections and mechanical tests recommended by manufacturer.
         7) Verify presence of transformer surge arresters and that their ratings are as specified.
         8) Verify that as-left tap connections are as specified.
      b. Electrical Tests:
         1) Perform insulation-resistance tests winding-to-winding and windings-to-ground. Apply voltage in accordance with manufacturer's

published data. In absence of manufacturer's published data, comply with NETA ATS, Table 100.5. Calculate polarization index; value of index may not be less than 1.0.

2) Perform power-factor or dissipation-factor tests on windings in accordance with test equipment manufacturer's published data. Maximum winding insulation power-factor/dissipation-factor values must be in accordance with manufacturer's published data. In absence of manufacturer's published data, comply with NETA ATS, Table 100.3.

3) Measure core insulation resistance at 500 V(dc) if core is insulated and core ground strap is removable. Core insulation-resistance values may not be less than 1 MΩ at 500 V(dc).
   a)

4) Verify correct secondary voltage, phase-to-phase and phase-to-neutral, after energization and prior to loading.

5) Remove sample of insulating liquid in accordance with ASTM D923, and perform dissolved-gas analysis in accordance with IEEE C57.104 or ASTM D3612.

C. Nonconforming Work:
   1. Equipment and devices will be considered defective if they do not pass tests and inspections.
   2. Remove and replace malfunctioning units and retest.

D. Field Quality-Control Reports: Collect, assemble, and submit test and inspection reports. Record as-left set points of adjustable devices.

E. Manufacturer Services: Engage factory-authorized service representative to support field tests and inspections.
   1. Manufacturer's Field Reports for Field Quality-Control Support: Prepare and submit report after each visit by factory-authorized service representative, documenting activities performed at the Project site.

3.4 PROTECTION

A. After installation, protect transformer from construction activities. Remove and replace items that are contaminated, defaced, damaged, or otherwise caused to be unfit for use prior to acceptance by Owner.

3.5 MAINTENANCE

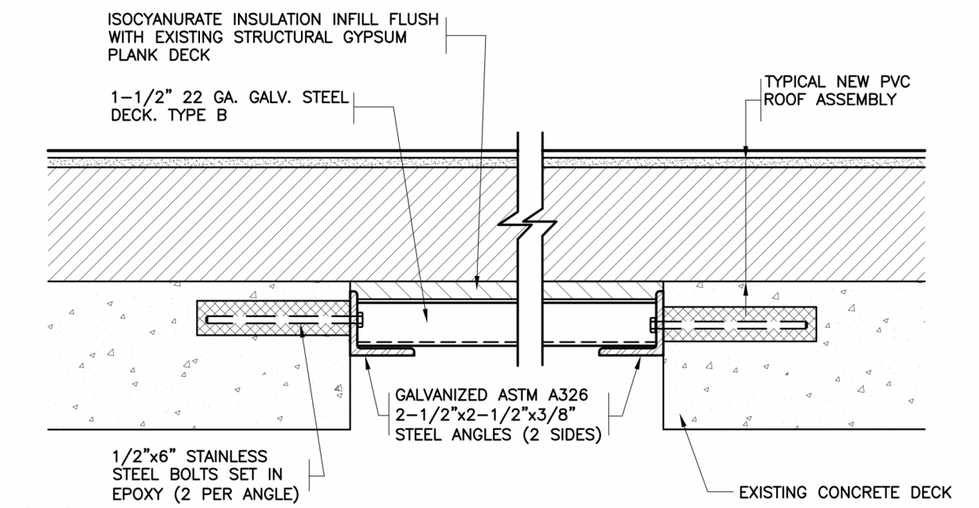
A. Infrared Scanning of Transformers: Perform survey during periods of maximum possible loading. Remove necessary covers prior to inspection.
   1. After Substantial Completion, but not more than 60 days after Final Acceptance, perform infrared inspection of transformer's electrical power connections. Remove covers so joints and connections are accessible to portable scanner. Take visible light photographs at same locations and orientations as infrared scans for documentation to ensure follow-on scans match same conditions for valid comparison.
   2. Instrument: Inspect distribution systems with imaging equipment capable of detecting minimum temperature difference of 1 deg C at 30 deg C. Provide documentation of device calibration.
   3. Field Reports for Infrared Scanning: Prepare certified report that identifies transformer equipment checked, testing technician, and equipment used, and that describes scanning results. Include notation of deficiencies detected,

remedial actions taken, and scanning observations after remedial action. List results as follows:

a. Description of equipment to be tested.
b. Discrepancies.
c. Temperature difference between area of concern and reference area.
d. Probable cause of temperature difference.
e. Areas inspected. Identify inaccessible and unobservable areas and equipment.
f. Identify load conditions at time of inspection.
g. Provide photographs and thermograms of deficient area.

4. Act on inspection results in accordance with recommendations of NETA ATS, Table 100.18. Correct possible and probable deficiencies as soon as Owner's operations permit. Retest until deficiencies are corrected.

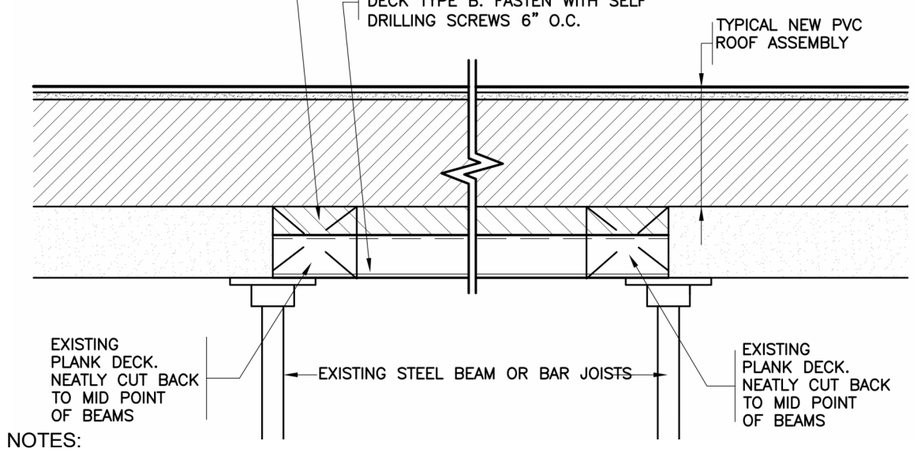
END OF SECTION 261219



NOTES:
1. REMOVE EXIST ABANDONED EQUIP, METAL CAPS, CONCRETE CURBS, & RELATED FLASHINGS.
2. FASTEN NEW METAL DECK TO STEEL ANGLES w/ SELF-DRILLING SCREWS 12" o.c.

C DECK INFILL AT CONC DECK

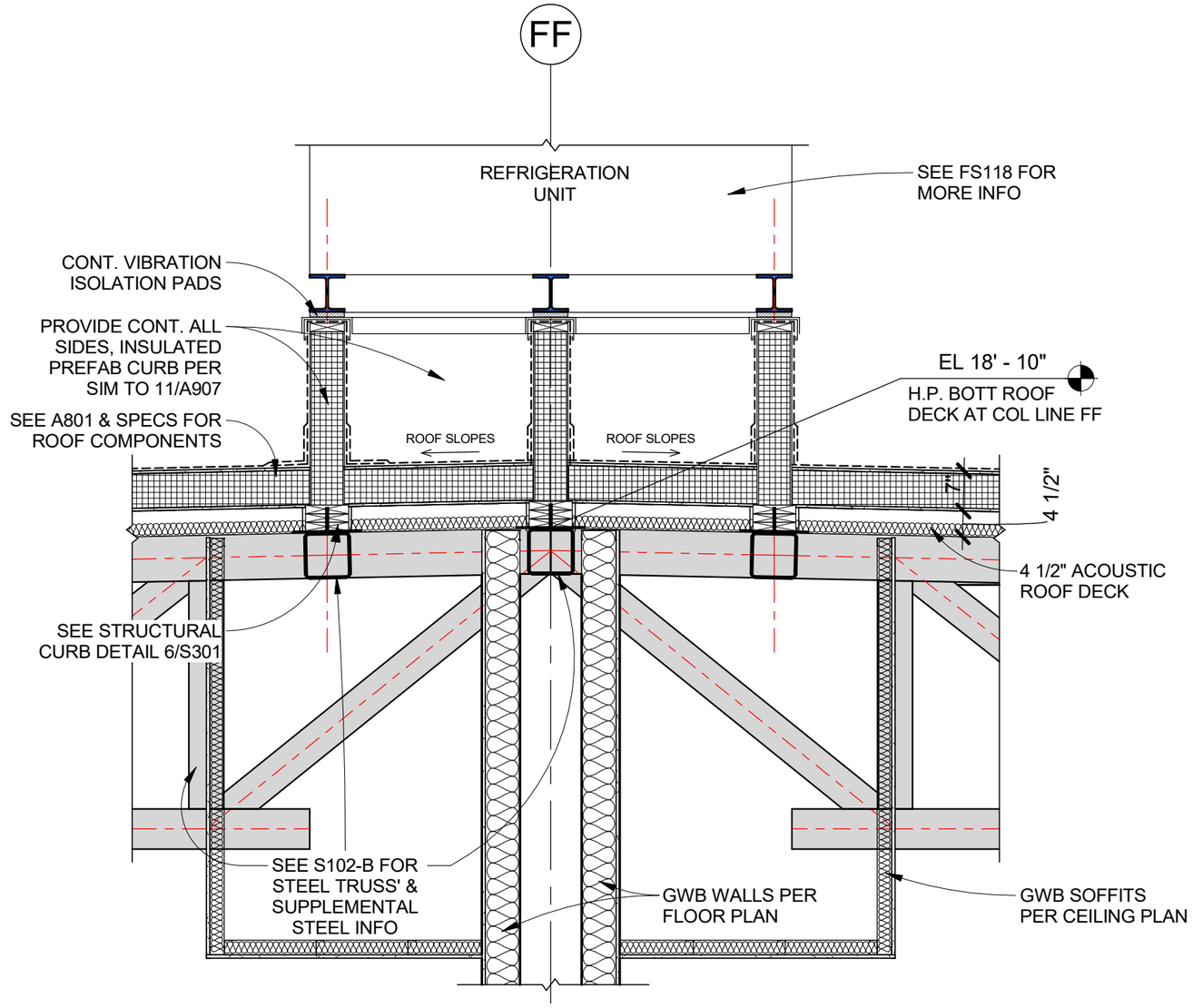
NOT TO SCALE



NOTES:
1. REMOVE EXIST ABANDONED EQUIP, METAL CAPS, CURBS, & RELATED FLASHINGS.
2. FASTEN NEW METAL DECK TO STEEL ANGLES w/ SELF-DRILLING SCREWS 12" o.c.

G DECK INFILL AT GYPSUM / FIBER PLANK

NOT TO SCALE



RC SECTION RC AT REFRIGERATION UNIT CURB

1/2" = 1'-0"

ADDENDUM 6

KG+D listen imagine build

TWIN TOWERS MIDDLE SCHOOL

ENLARGED CITY SCHOOL DISTRICT OF MIDDLETOWN

Project Issue Date: ADDENDUM 6 - 02/23/24 CONSTRUCTION DOCUMENTS

Sheet Title: AREA B ROOF - REFRIGERATION UNIT - CURB DETAIL

S.E.D. Control No.

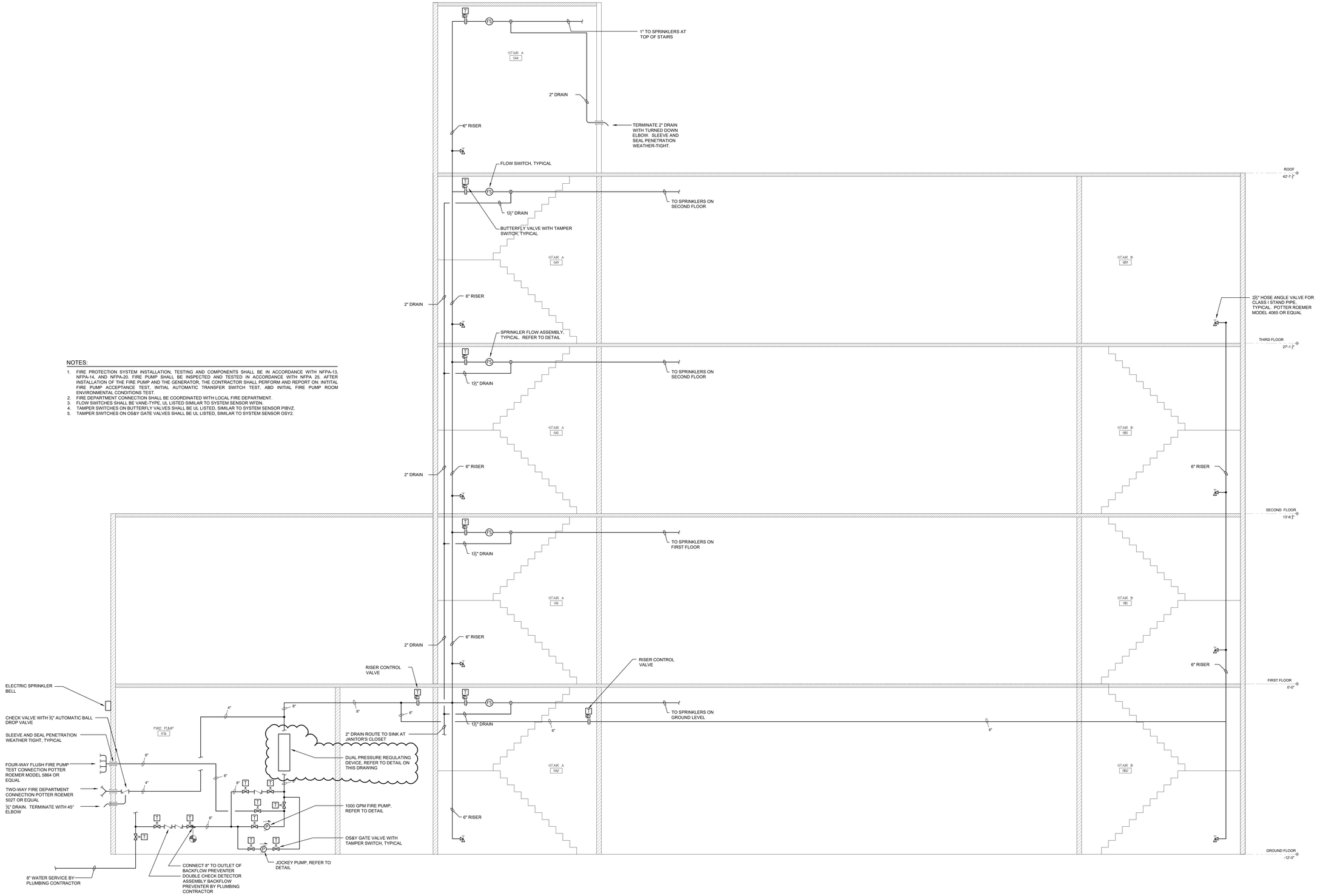
Job No. 2021-1087

Date 02/23/2024

Scal 'As indicated

Drawn / Checked KG+D

Sheet No. ASK-03



1 FIRE PROTECTION RISER DIAGRAM
NOT TO SCALE

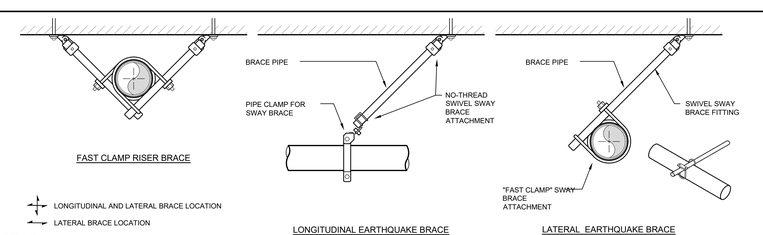
NOTES:

1. FIRE PROTECTION SYSTEM INSTALLATION, TESTING AND COMPONENTS SHALL BE IN ACCORDANCE WITH NFPA-13, NFPA-14, AND NFPA-20. FIRE PUMP SHALL BE INSPECTED AND TESTED IN ACCORDANCE WITH NFPA 25. AFTER INSTALLATION OF THE FIRE PUMP AND THE GENERATOR, THE CONTRACTOR SHALL PERFORM AND REPORT ON: INITITAL FIRE PUMP ACCEPTANCE TEST, INITIAL AUTOMATIC TRANSFER SWITCH TEST, ABD INITIAL FIRE PUMP ROOM ENVIRONMENTAL CONDITIONS TEST.
2. FIRE DEPARTMENT CONNECTION SHALL BE COORDINATED WITH LOCAL FIRE DEPARTMENT.
3. FLOW SWITCHES SHALL BE VANE-TYPE, UL LISTED SIMILAR TO SYSTEM SENSOR WFDN.
4. TAMPER SWITCHES ON BUTTERFLY VALVES SHALL BE UL LISTED, SIMILAR TO SYSTEM SENSOR PIBVZ.
5. TAMPER SIWTCHES ON OS&Y GATE VALVES SHALL BE UL LISTED, SIMILAR TO SYSTEM SENSOR OSY2.

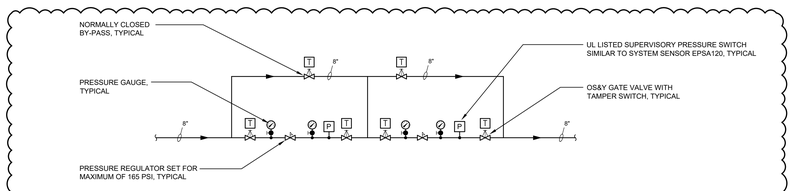
SEISMIC EQUIPMENT AND PIPE HANGER DESIGN

THE FIRE PROTECTION SYSTEM SHALL COMPLY WITH THE NEW YORK STATE UNIFORM FIRE PROTECTION AND BUILDING CODE SECTION 1613 AND APPLICABLE PROVISIONS OF ASCE 7 (ARCHITECTURAL, MECHANICAL AND ELECTRICAL COMPONENT SEISMIC DESIGN REQUIREMENTS).
SPRINKLER CONTRACTOR SHALL HIRE NYS LICENSED PROFESSIONAL ENGINEER TO DESIGN AND PREPARE SHOP DRAWINGS WITH CALCULATIONS FOR EACH PIPE SUPPORT, CONDUIT SUPPORT, MULTIPLE PIPE SUPPORT, TRAPEZE AND SEISMIC RESTRAINT. SUBMIT SHOP DRAWINGS WITH CALCULATIONS TO ENGINEER FOR RECORD AND TO LOCAL AUTHORITY HAVING JURISDICTION FOR APPROVAL.

SEISMIC REQUIREMENTS:
IMPORTANCE FACTOR - 1.5
BUILDING USE CATEGORY - III
SIESMIC DESIGN CATEGORY - C



2 SEISMIC HANGER DETAILS
NOT TO SCALE



3 DUAL PRESSURE REGULATING DEVICE
NOT TO SCALE

TWIN TOWERS MIDDLE SCHOOL

Additions & Alterations

ENLARGED CITY SCHOOL DISTRICT OF MIDDLETOWN

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NY SED PROJECT CONTROL NO.
44-10-00-01-0-001-041

CONSTRUCTION DOCUMENTS

Professional Seal

No.	Date	Issue
4	02/23/2024	ADDENDUM #6
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1	09/08/2022	SCHEMATIC DESIGN

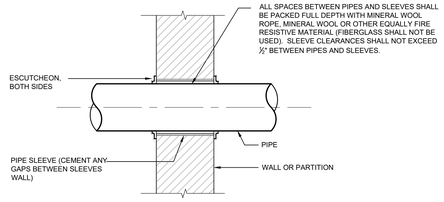
Sheet Title

FIRE PROTECTION: DETAILS

Job No.	Date
2021-1087	09/08/2022
Scale	Drawn / Checked
AS NOTED	BH/DC SZ

Sheet Number

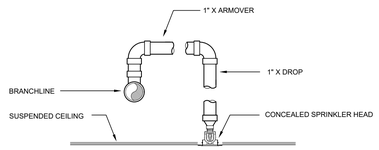
FP601



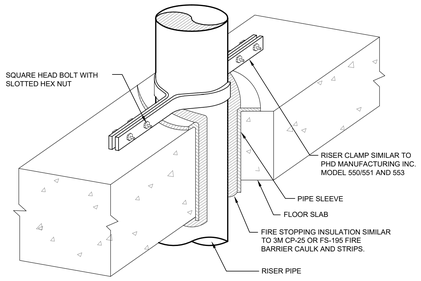
NOTE:

THIS DETAIL ALSO APPLICABLE TO INTERIOR NON-WATER PROOF FLOOR CONSTRUCTION. FOR WATER PROOF FLOOR CONSTRUCTION AND OTHER CONSTRUCTION - SEE SPECIFICATIONS.

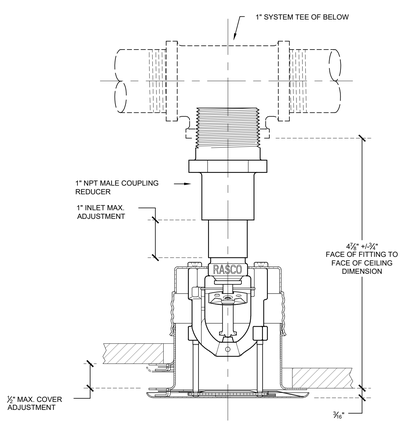
1 FIRE RATED PARTITION AND WALL PENETRATION DETAIL
NOT TO SCALE



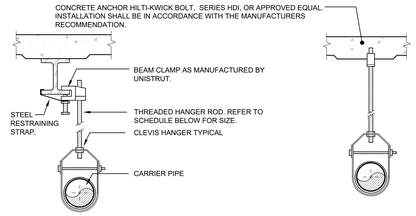
2 TYPICAL ARM-OVER DETAIL
NOT TO SCALE



3 PIPE PENETRATION THROUGH FLOOR DETAIL
NOT TO SCALE



4 CONCEALED SPRINKLER HEAD DETAIL
NOT TO SCALE

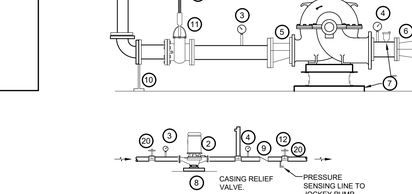


PIPE HANGER SCHEDULE					
PIPE DIA.	3/4"-2"	2 1/2"-3"	4"-5"	6"	8"-12"
HANGER DIA.	3/8"	1/2"	5/8"	3/4"	7/8"

NOTES:

1. CLEVIS HANGERS WITH WELDED INSULATION SHIELDS SIMILAR TO RAUCH FIG. 1008H ON ALL PIPES LARGER THAN 1".
2. ALL PIPE HANGERS SHALL BE GALVANIZED STEEL OR FACTORY PAINTED BLACK WITH ENAMEL.

5 PIPE HANGER DETAIL
NOT TO SCALE

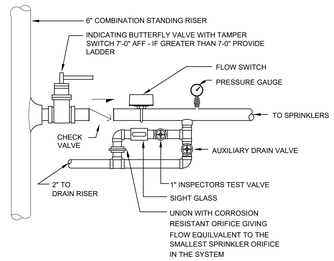


EXTERIOR WALLS

NOTE:

1. PIPE SLEEVE FOR EXTERIOR WALL ABOVE GRADE.

6 EXTERIOR WALL PIPE PENETRATION DETAIL
NOT TO SCALE

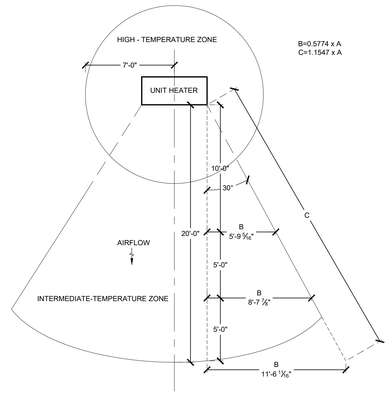


7 SPRINKLER FLOW ASSEMBLY DETAIL
NOT TO SCALE

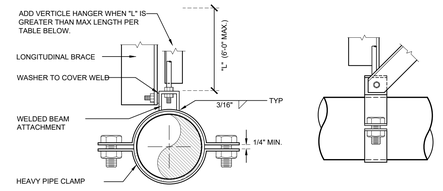
PIPING ARRANGEMENTS INDICATE GENERAL CONFIGURATION OF MAJOR COMPONENTS. SOME DETAILS AND SPECIALTIES HAVE BEEN OMITTED FOR CLARITY. REFER TO NFPA-20 AND MANUFACTURER'S REQUIREMENTS, AND LOCAL PLUMBING CODES FOR COMPLETE DETAILS AND SPECIALTIES.

1. ELECTRIC FIRE PUMP - MAINTAIN 38" CLEAR AROUND PUMP
2. JOCKEY PUMP
3. SUCTION GAUGE
4. DISCHARGE GAUGE
5. ECCENTRIC REDUCER
6. CONCENTRIC DISCHARGE REDUCER
7. CONCRETE BASE MIN. 12" HIGH. BASE TO EXTEND MIN. 8" BEYOND BEDPLATE
8. CONCRETE BASE
9. CHECK IN VERTICAL OR SWING CHECK IN HORIZONTAL POSITION
10. SUPPORT ELBOW
11. OS&Y VALVE
12. INDICATING GATE OR BUTTERFLY VALVE
13. 8" SUCTION SUPPLY
14. 8" DISCHARGE TO SYSTEM
15. NOT USED
16. CASING RELIEF VALVE
17. ¾" AUTOMATIC AIR RELEASE VALVE
18. TRANSFER SWITCH ELECTRIC FIRE PUMP CONTROLLER WITH 3'-0" CLEARANCE
19. JOCKEY PUMP CONTROLLER
20. TAMPER SWITCH
21. AIR VENT
22. NOT USED

8 FIRE PUMP SCHEMATIC
NOT TO SCALE

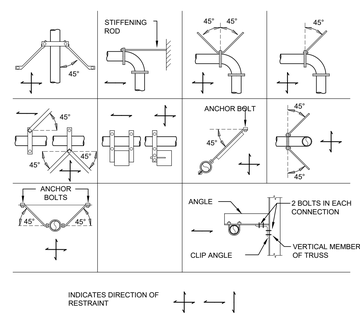


9 SPRINKLER TEMPERATURE ZONES AT UNIT HEATERS



BRACE SPACING	PIPE	ROD	MAX. ROD LENGTH	VERT. HANGERS	TRANSVERSE HANGERS	BOLT
80'	2½"	½"	25"	2 x 2 x 16ga	2½" x 2½ x 16ga	⅜"
80'	3"	½"	25"	2 X 2 X 16ga	2½" X 2½ X 16ga	⅜"
80'	4"	⅝"	31"	2 X 2 X 16ga	2½" X 2½ X 16ga	⅜"
80'	6"	¾"	37"	2 X 2 X 16ga	2½" X 2½ X 16ga	⅜"
80'	8"	⅞"	43"	2 X 2 X 16ga	2½" X 2½ X 16ga	⅜"

10 LONGITUDINAL SEISMIC BRACING



11 SEISMIC SWAY BRACING (GENERAL)

NOTES

1. THE FIRE PUMP AND THE JOCKEY PUMP MUST HAVE SEPARATE PRESSURE SENSING LINES.
2. ELECTRICAL CONTRACTOR IS RESPONSIBLE FOR POWER CONNECTIONS TO FIRE PUMP CONTROLLER AND JOCKEY PUMP CONTROLLER. SPRINKLER CONTRACTOR IS RESPONSIBLE FOR ALL POWER AND CONTROL WIRING FROM FIRE PUMP CONTROLLER AND JOCKEY PUMP EQUIPMENT AND APPURTENANCES. SYSTEM SHALL BECOME LEVEL AND OPERABLE.
3. FLANGED VALVES AND FITTINGS (INCLUDING FIRE PUMP DISCHARGE FLANGE) FROM THE FIRE PUMP DISCHARGE TO THE FIRE PUMP DISCHARGE ISOLATION VALVE SHALL BE EXTRA HEAVY PATTERN.
4. FIRE PUMP DISCHARGE FLANGE SHALL BE DRILLED PER ANSI B16.1 CLASS 250#.

ALARM SIGNAL NOTES

1. CONTRACTOR SHALL FURNISH & INSTALL LOW PUMP-ROOM TEMPERATURE ALARM. INTERFACE LOW TEMPERATURE ALARM WITH FIRE PUMP CONTROL PANEL.

CONTROLLERS FOR FIRE PUMP DRIVERS FOR ALARM AND STATUS INDICATORS, OUTPUT CONTACTS FROM FIRE PUMP CONTROLLER TO 24 HOUR MONITORING STATION:

- 1.1. PUMP OR MOTOR RUNNING (SEPARATE SIGNAL)
- 1.2. THE CONTROLLER MAIN SWITCH HAS BEEN TURNED TO THE OFF OR MANUAL POSITION (SEPARATE SIGNAL).
- 1.3. THERE IS TROUBLE ON THE CONTROLLER OR ENGINE (SEPARATE OR COMMON SIGNALS)

TWIN TOWERS MIDDLE SCHOOL

Additions & Alterations

ENLARGED CITY SCHOOL DISTRICT OF MIDDLETOWN

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NY SED PROJECT CONTROL NO.

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CONSTRUCTION DOCUMENTS

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1	09/08/2022	SCHEMATIC DESIGN

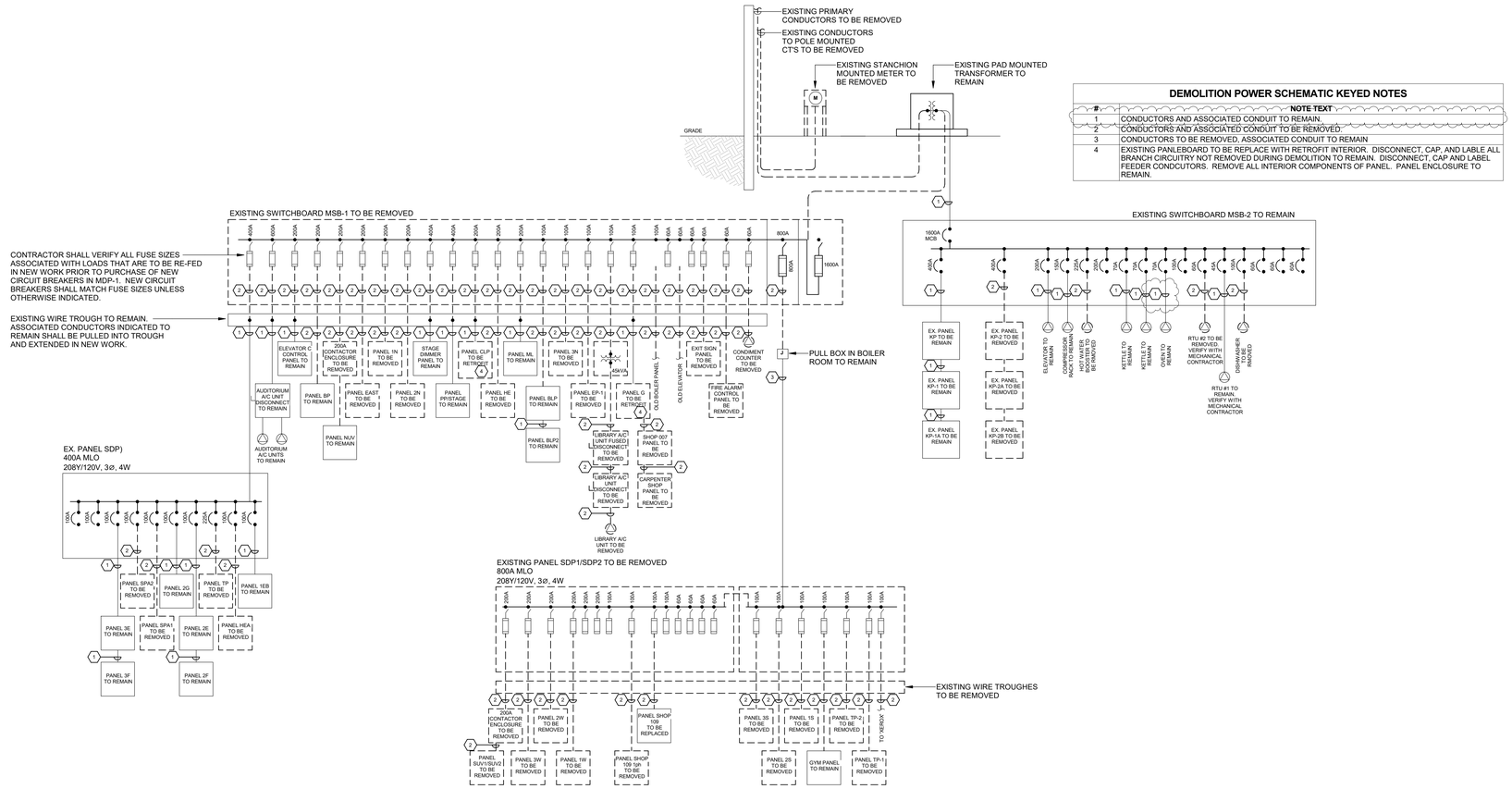
Sheet Title

FIRE PROTECTION: DETAILS

Job No.	Date
2021-1087	09/08/2022
Scale: AS NOTED	Drawn / Checked: BH/DC SZ

Sheet Number

FP602

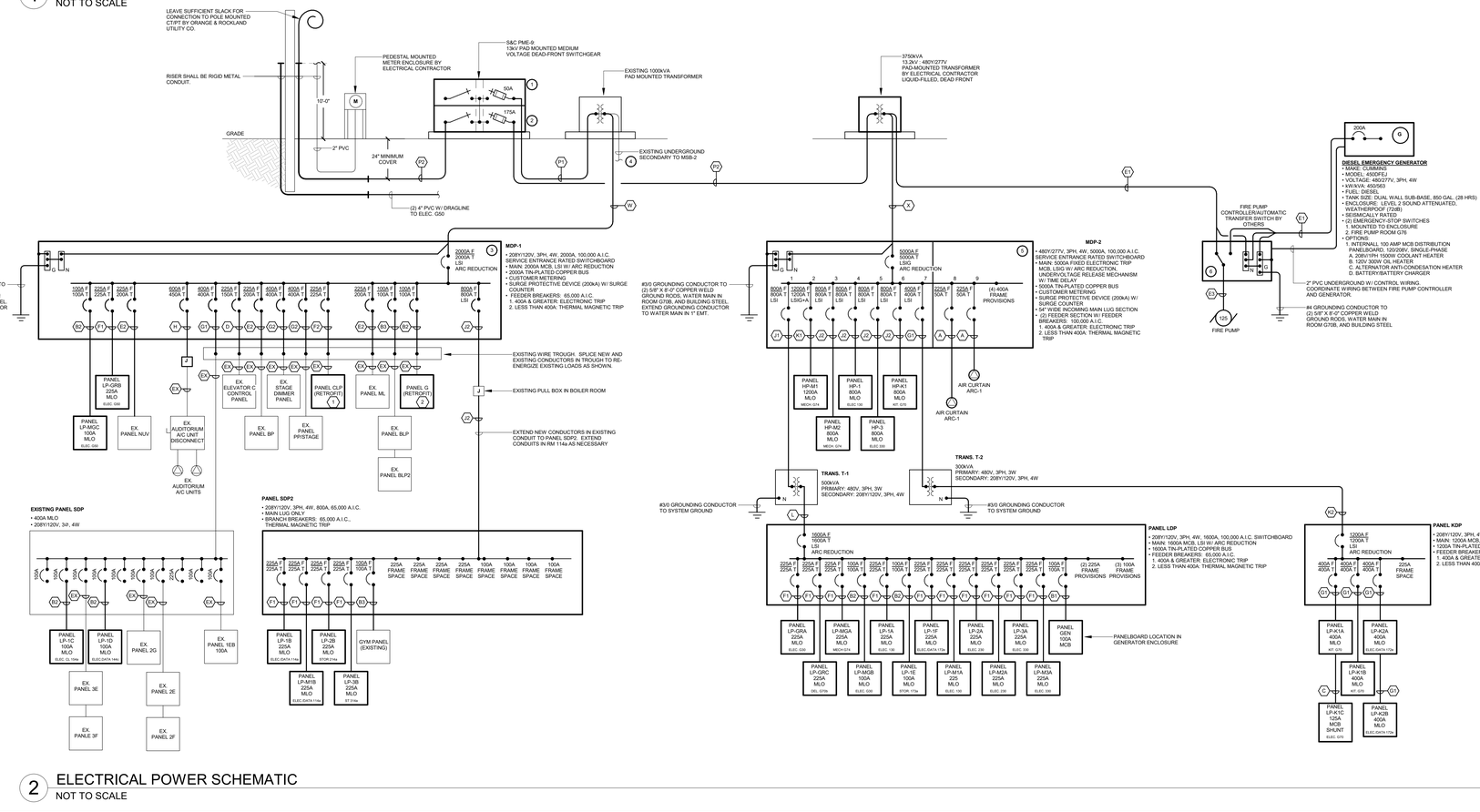


DEMOLITION POWER SCHEMATIC KEYED NOTES

#	NOTE TEXT
1	CONDUCTORS AND ASSOCIATED CONDUIT TO REMAIN.
2	CONDUCTORS AND ASSOCIATED CONDUIT TO BE REMOVED.
3	CONDUCTORS TO BE REMOVED, ASSOCIATED CONDUIT TO REMAIN
4	EXISTING PANLEBOARD TO BE REPLACE WITH RETROFIT INTERIOR. DISCONNECT, CAP, AND LABLE ALL BRANCH CIRCUITRY NOT REMOVED DURING DEMOLITION TO REMAIN. DISCONNECT, CAP AND LABEL FEEDER CONDCUTORS. REMOVE ALL INTERIOR COMPONENTS OF PANEL. PANEL ENCLOSURE TO REMAIN.

1 ELECTRICAL DEMOLITION POWER SCHEMATIC

NOT TO SCALE



2 ELECTRICAL POWER SCHEMATIC

NOT TO SCALE

SHORT CIRCUIT AND OVERCURRENT COORDINATION STUDY NOTE:

1. THE CONTRACTOR SHALL HAVE THE EQUIPMENT SUPPLIER PROVIDE A SHORT CIRCUIT AND OVERCURRENT COORDINATION STUDY FOR ALL SWITCHBOARDS, BRANCH CIRCUIT PANELBOARDS, AUTOMATIC TRANSFER SWITCHES, GENERATORS, ETC. BASED ON THE DESIGN SHOWN ON THIS DRAWING AND ANY ADDITIONAL INFORMATION THAT MAY BE PROVIDED BY THE ENGINEER. STUDY SHALL BE COORDINATED BETWEEN ALL CONTRACTOR SELECTED SUPPLIERS. CONTRACTOR SHALL BE RESPONSIBLE FOR PROVIDING EQUIPMENT MANUFACTURER PERFORMING STUDY WILL ALL REQUIRED INFORMATION. CONTRACTOR SHALL SUBMIT STUDY REPORT WITH ARC FLASH AND INCIDENT ENERGY ANALYSIS SUMMARY AND RECOMMENDATIONS, SHORT CIRCUIT DATA AND CALCULATIONS, COMPARISON OF CALCULATED SHORT CIRCUITS AND SPECIFIED PROTECTIVE DEVICE INTERRUPTING RATINGS, COORDINATION TIME-CURRENT PLOTS OF PROTECTIVE DEVICE CURVES AND SYSTEM SINGLE-LINE, TABLE LISTING COORDINATED SETTINGS FOR ALL ADJUSTABLE-TRIP PROTECTIVE DEVICES, AND SELECTIVE COORDINATION EVALUATION SUMMARY TABLE.

ARC FLASH STUDY NOTE:

1. THE CONTRACTOR SHALL HAVE THE EQUIPMENT SUPPLIER PROVIDE AN ARC FLASH ENERGY ANALYSIS STUDY FOR ALL SWITCHBOARDS, BRANCH CIRCUIT PANELBOARDS, AUTOMATIC TRANSFER SWITCHES, GENERATORS, ETC. BASED ON THE DESIGN SHOWN ON THIS DRAWING AND ANY ADDITIONAL INFORMATION THAT MAY BE PROVIDED BY THE ENGINEER. STUDY SHALL BE COORDINATED BETWEEN ALL CONTRACTOR SELECTED SUPPLIERS. CONTRACTOR SHALL BE RESPONSIBLE FOR PROVIDING EQUIPMENT MANUFACTURER PERFORMING STUDY WILL ALL REQUIRED INFORMATION. CONTRACTOR SHALL SUBMIT REPORT WITH ARC FLASH AND INCIDENT ENERGY ANALYSIS SUMMARY TABLE. PROVIDE AND INSTALL ARC FLASH AND PPE LABELS FOR ALL EQUIPMENT BASED ON STUDY.

WIRE AND CONDUIT SCHEDULE

TAG	FEEDER SIZE	WIRING AND CONDUIT	NOTE
A	50A, 3-PHASE, 3W	(3) #8 THHN, #10 GROUND, 1" EMT	-
B1	100A, 1-PHASE, 3W	(3) #1 THWN, #6 GROUND, 2" SCHED. 80 PVC	GENERATOR DISTRIBUTION PANEL
B2	100A, 3-PHASE, 4W	(4) #3 THHN, #8 GROUND, 1-1/4" EMT	-
B3	100A, 3-PHASE, 4W	(4) #3 THHN, #8 GROUND, 1-1/4" EMT	INSTALL GROUNDING BUSHING WITH LUG TO EXISTING CONDUIT AND CONNECT #8 EQUIPMENT GROUNDING CONDUCTOR.
C	125A, 3-PHASE, 4W	(4) #2 THHN, #6 GROUND, 1-1/2" EMT	-
D	150A, 3-PHASE, 4W	(4) #1/0mcm THHN, #6 GROUND, 2" EMT	-
E1	200A, 3-PHASE, 4W	(4) #3/0 THHN, #4 GROUND, 2" SCHED. 80 PVC	-
E2	200A, 3-PHASE, 4W	(4) #3/0 THHN, #4 GROUND, 2" EMT	-
E3	200A, 3-PHASE, 3W	(3) #3/0 THHN, #4 GROUND, 2" EMT	-
EX	-	EXISTING CONDUCTORS AND CONDUIT	-
F1	225A, 3-PHASE, 4W	(4) #4/0 THHN, #4 GROUND, 2-1/2" EMT	-
F2	225A, 3-PHASE, 4W	(4) #4/0 THHN, #4 GROUND, 2-1/2" EMT	INSTALL GROUNDING BUSHING WITH LUG TO EXISTING CONDUIT AND CONNECT #4 EQUIPMENT GROUNDING CONDUCTOR.
G1	400A, 3-PHASE, 4W	(4) 500mcm THHN, #3 GROUND, 3-1/2" EMT	-
G2	400A, 3-PHASE, 4W	(4) 500mcm THHN, #3 GROUND, 3-1/2" EMT	INSTALL GROUNDING BUSHING WITH LUG TO EXISTING CONDUIT AND CONNECT #3 EQUIPMENT GROUNDING CONDUCTOR.
H	450A, 3-PHASE, 4W	(4) 750mcm THHN, #2 GROUND, 4" EMT	INSTALL GROUNDING BUSHING WITH LUG TO EXISTING CONDUIT AND CONNECT #2 EQUIPMENT GROUNDING CONDUCTOR.
J1	800A, 3-PHASE, 3W	(2) SETS: (3) 500mcm THHN, #1/0 GROUND, 3-1/2" EMT	-
J2	800A, 3-PHASE, 4W	(2) SETS: (4) 500mcm THHN, #1/0 GROUND, 3-1/2" EMT	-
K1	1200A, 3-PHASE, 4W	(3) SETS: (4) 600mcm THHN, #4/0 GROUND, 4" EMT	-
K2	1200A, 3-PHASE, 4W	(3) SETS: (4) 600mcm THHN, #4/0 GROUND, 4" LFMC	-
L	1600A, 3-PHASE, 4W	(4) SETS: (4) 600mcm THHN, #4/0 GROUND, 4" EMT	-
P1	15kV, 3-PHASE, 3W	(3) #2 - 15kV UNDERGROUND PRIMARY DISTRIBUTION CABLE W/ FULL NEUTRAL, 4" SCHED. 80 PVC	-
P2	15kV, 3-PHASE, 4W	(3) #1 - 15kV UNDERGROUND PRIMARY DISTRIBUTION CABLE W/ FULL NEUTRAL, 4" SCHED. 80 PVC	-
W	2000A, 3-PHASE, 4W	(5) SETS: (4) 600mcm, THWN, #3/0 GROUND, 4" SCHED. 80 PVC	-
X	5000A, 3-PHASE, 4W	(12) SETS: (4) 600mcm, THWN, #3/0 GROUND, 4" SCHED. 80 PVC	-

POWER SCHEMATIC KEYED NOTES

#	NOTE TEXT
1	REPLACE PANEL 'CLP' INTERIOR WITH 42-SPACE, 225 AMPERE MAIN LUG, 3-PHASE, 4-WIRE 10kAIC RETROFIT PANELBOARD INTERIOR UTILIZING EXISTING ENCLOSURE. RECONNECT EXISTING BRANCH CONDUCTORS TO REMAIN ENERGIZED TO NEW CIRCUIT BREAKERS AS INDICATED IN PANEL SCHEDULE. RECONNECT EXISTING FEEDER CONDUCTORS. RECONNECT EXISTING CONDUCTOR TO NEW ASSOCIATED CIRCUIT BREAKERS, LUGS, OR TERMINAL BAR AS REQUIRED.
2	REPLACE PANEL 'C' INTERIOR WITH 30-SPACE, 100 AMPERE MAIN LUG, 3-PHASE, 4-WIRE10kAIC RETROFIT PANELBOARD INTERIOR UTILIZING EXISTING ENCLOSURE. RECONNECT EXISTING BRANCH CONDUCTORS TO REMAIN ENERGIZED TO NEW CIRCUIT BREAKERS AS INDICATED IN PANEL SCHEDULE. RECONNECT EXISTING FEEDER CONDUCTORS. RECONNECT EXISTING CONDUCTOR TO NEW ASSOCIATED CIRCUIT BREAKERS, LUGS, OR TERMINAL BAR AS REQUIRED.

SIGNAGE

PROVIDE ENGRAVED PLASTIC SIGNS AT EACH OF (2) SERVICE DISCONNECTS & (4) BUILDING DISCONNECTS, MINIMUM LETTER HEIGHT OF 1/4", MOUNTED ON FACE OF EQUIPMENT ENCLOSURES AS FOLLOWS:

3/8" LETTERS, TYPICAL
1/4" LETTERS, TYPICAL

1. SERVICE DISCONNECT 1 OF 2
THIS SERVICE IS SUPPLIED BY A UTILITY COMPANY SOURCE AND 450kW DIESEL EMERGENCY GENERATOR OPERATING AT 277/480 VOLTS, 3-PHASE, LOCATED TO THE SOUTH EAST OF THE BUILDING NEAR IRWIN AVENUE.
2. SERVICE DISCONNECT 2 OF 2
THIS SERVICE IS SUPPLIED BY A UTILITY COMPANY SOURCE AND 450kW DIESEL EMERGENCY GENERATOR OPERATING AT 277/480 VOLTS, 3-PHASE, LOCATED TO THE SOUTH EAST OF THE BUILDING NEAR IRWIN AVENUE.
3. BUILDING DISCONNECT 1 OF 4
THIS SERVICE IS SUPPLIED BY A UTILITY COMPANY SOURCE AND 450kW DIESEL EMERGENCY GENERATOR OPERATING AT 277/480 VOLTS, 3-PHASE, LOCATED TO THE SOUTH EAST OF THE BUILDING NEAR IRWIN AVENUE.
4. BUILDING DISCONNECT 2 OF 4
THIS SERVICE IS SUPPLIED BY A UTILITY COMPANY SOURCE AND 450kW DIESEL EMERGENCY GENERATOR OPERATING AT 277/480 VOLTS, 3-PHASE, LOCATED TO THE SOUTH EAST OF THE BUILDING NEAR IRWIN AVENUE.
5. BUILDING DISCONNECT 3 OF 4
THIS SERVICE IS SUPPLIED BY A UTILITY COMPANY SOURCE AND 450kW DIESEL EMERGENCY GENERATOR OPERATING AT 277/480 VOLTS, 3-PHASE, LOCATED TO THE SOUTH EAST OF THE BUILDING NEAR IRWIN AVENUE.
6. BUILDING DISCONNECT 4 OF 4
THIS SERVICE IS SUPPLIED BY A UTILITY COMPANY SOURCE AND 450kW DIESEL EMERGENCY GENERATOR OPERATING AT 277/480 VOLTS, 3-PHASE, LOCATED TO THE SOUTH EAST OF THE BUILDING NEAR IRWIN AVENUE.

TWIN TOWERS MIDDLE SCHOOL

Additions & Alterations

ENLARGED CITY SCHOOL DISTRICT OF MIDDLETOWN

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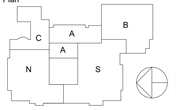
GA22017-A

NY SED PROJECT CONTROL NO.

44-10-00-01-0-001-041

CONSTRUCTION DOCUMENTS

Key Plan



Professional Seal

No.	Date	Issue
5	02/23/2024	ADDENDUM #6
4	02/02/2024	ADDENDUM #2
3	12/14/2023	ISSUE FOR BID
2	04/14/2023	NYSED ISSUE
1	09/08/2022	SCHEMATIC DESIGN

Sheet Title

ELECTRICAL:
DETAILS

Job No.	Date
2021-1087	09/08/2022
Scale: AS NOTED	Drawn / Checked: BH/DC SZ

Sheet Number

E601

Branch Panel: HP-1

Location: ELEC 130
Supply From: MDP2
Mounting: Surface
Enclosure: NEMA 1 Indoor

Volts: 480/277 Wye
Phases: 3
Wires: 4

A.I.C. Rating: 65kA
Mains Type: MLO
Mains Rating: 800 A

NOTES	CKT NO.	CIRCUIT DESCRIPTION	CONDUCTORS	CB SIZE	POLES	A	B	C	POLES	CB SIZE	CONDUCTORS	CIRCUIT DESCRIPTION	CKT NO.	NOTES
	1					14810 VA	4715 VA						2	
	3	RTU-11	(3) #4 THWN, #8 GND, 1" EMT	90 A	3		14810 VA	4715 VA	3	35 A	(3) #8 THHN, #10 GND, 1" EMT	RTU-17	4	
	5							14810 VA	4715 VA				6	
	7					15669 VA	10095 VA						8	
	9	RTU-15	(3) #4 THWN, #8 GND, 1" EMT	90 A	3		15669 VA	10095 VA	3	60 A	(3) #6 THWN, #10 GND, 1" EMT	RTU-18	10	
	11							15669 VA	10095 VA				12	
	13					15669 VA	18165 VA						14	
	15	RTU-16	(3) #4 THWN, #8 GND, 1" EMT	90 A	3		15669 VA	18165 VA	3	125 A	(3) #1 THWN, #6 GND, 1-1/2" EMT	RTU-19	16	
	17							15669 VA	18165 VA				18	
	19					--	--						20	
	21	100A FRAME PROVISION		--	3		--	--	3	--		100A FRAME PROVISION	22	
	23							--	--				24	
	25					--	--						26	
	27	100A FRAME PROVISION		--	3		--	--	3	--		100A FRAME PROVISION	28	
	29							--	--				30	
	31					--	--						32	
	33	100A FRAME PROVISION		--	3		--	--	3	--		100A FRAME PROVISION	34	
	35							--	--				36	
						79123 VA	79123 VA	79123 VA						
						286 A	286 A	286 A						

Branch Panel: HP-K1

Location: CENTRAL PREP KITCHEN G70
Supply From: MDP2
Mounting: Surface
Enclosure: NEMA 4X Type 304 Stainless

Volts: 480/277 Wye
Phases: 3
Wires: 4

A.I.C. Rating: 65kA
Mains Type: MLO
Mains Rating: 800 A

NOTES	CKT NO.	CIRCUIT DESCRIPTION	CONDUCTORS	CB SIZE	POLES	A	B	C	POLES	CB SIZE	CONDUCTORS	CIRCUIT DESCRIPTION	CKT NO.	NOTES
	1					4715 VA	1800 VA						2	
	3	ELEVATOR B MOTOR	(3) #10 THHN, #10 GND, 3/4" EMT	25 A	3		4715 VA	1800 VA	3	15 A	(3) #10 THHN, #10 GND, 3/4" EMT (THRU KITCHEN HOOD CONTROLLER)	EF-1	4	
	5							4715 VA	1800 VA				6	
	7					14227 VA	2532 VA						8	
	9	RTU-20	(3) #3 THWN, #8 GND, 1" EMT	100 A	3		14227 VA	2532 VA	3	15 A	(3) #10 THHN, #10 GND, 3/4" EMT (THRU KITCHEN HOOD CONTROLLER)	EF-2	10	
	11							14227 VA	2532 VA				12	
	13					14227 VA	1800 VA						14	
	15	RTU-21	(3) #3 THWN, #8 GND, 1" EMT	100 A	3		14227 VA	1800 VA	3	15 A	(3) #10 THHN, #10 GND, 3/4" EMT (THRU KITCHEN HOOD CONTROLLER)	EF-3	16	
	17							14227 VA	1800 VA				18	
	19					11121 VA	2532 VA						20	
	21	RTU-23	(3) #6 THWN, #8 GND, 1" EMT	60 A	3		11121 VA	2532 VA	3	15 A	(3) #10 THHN, #10 GND, 3/4" EMT (THRU KITCHEN HOOD CONTROLLER)	EF-4	22	
	23							11121 VA	2532 VA				24	
	25					18839 VA	1140 VA						26	
	27	RTU-24	(3) #4 THWN, #8 GND, 1" EMT	80 A	3		18839 VA	1140 VA	3	15 A	(3) #10 THHN, #10 GND, 3/4" EMT (THRU KITCHEN HOOD CONTROLLER)	EF-5	28	
	29							18839 VA	1140 VA				30	
	31					23130 VA	1164 VA						32	
	33	RTU-25	(3) #3 THWN, #6 GND, 1-1/4" EMT	100 A	3		23130 VA	1164 VA	3	15 A	(3) #10 THHN, #10 GND, 3/4" EMT (THRU KITCHEN HOOD CONTROLLER)	EF-6	34	
	35							23130 VA	1164 VA				36	
	37					7405 VA	1097 VA						38	
	39	WAREWASHER #C22	(3) #8 THHN, #10 GND, 3/4" EMT	35 A	3		7405 VA	1097 VA	3	15 A	(3) #10 THHN, #10 GND, 3/4" EMT (THRU HEARTH OVEN CONTROLLER)	EF-15	40	
	41							7405 VA	1097 VA				42	
	43					12924 VA	1997 VA						44	
	45	WAREWASHER #D3	(3) #8 THHN, #10 GND, 3/4" EMT	60 A	3		12924 VA	1997 VA	3	15 A	(3) #10 THHN, #10 GND, 3/4" EMT	MUA-1	46	
	47							12924 VA	1997 VA				48	
	49					7211 VA	1997 VA						50	
	51	HOSE WASH TANK #C26	(3) #8 THHN, #10 GND, 3/4" EMT	35 A	3		7211 VA	1997 VA	3	15 A	(3) #10 THHN, #10 GND, 3/4" EMT	MUA-2	52	
	53							7211 VA	1997 VA				54	
	55					3883 VA	1192 VA						56	
	57	AIR COMPRESSOR #C28	(3) #12 THHN, #12 GND, 3/4" EMT	20 A	3		3883 VA	1192 VA	3	15 A	(3) #10 THHN, #10 GND, 3/4" EMT	MUA-3	58	
	59							3883 VA	1192 VA				60	
	61					3883 VA	--						62	
	63	AIR COMPRESSOR #C28	(3) #12 THHN, #12 GND, 3/4" EMT	20 A	3		3883 VA	--	3	--		100A FRAME PROVISION	64	
	65							3883 VA	--				66	
	67					31034 VA	--						68	
	69	ROOF REFRIGERATION UNIT	(3) #1/0 THHN, #6 GND, 2" EMT	150 A	3		31034 VA	--	3	--		100A FRAME PROVISION	70	
	71							31034 VA	--				72	
						169848 VA	169848 VA	169848 VA						
						613 A	613 A	613 A						

Branch Panel: HP-3

Location: ELEC 330
Supply From: MDP2
Mounting: Surface
Enclosure: NEMA 1 Indoor

Volts: 480/277 Wye
Phases: 3
Wires: 4

A.I.C. Rating: 65kA
Mains Type: MLO
Mains Rating: 800 A

NOTES	CKT NO.	CIRCUIT DESCRIPTION	CONDUCTORS	CB SIZE	POLES	A	B	C	POLES	CB SIZE	CONDUCTORS	CIRCUIT DESCRIPTION	CKT NO.	NOTES
	1					6101 VA	4798 VA						2	
	3	ELEVATOR A MOTOR	(3) #10 THHN, #10 GND, 3/4" EMT	30 A	3		6101 VA	4798 VA	3	20 A	(3) #10 THHN, #10 GND, 3/4" EMT	RTU-5B	4	
	5							6101 VA	4798 VA				6	
	7					11010 VA	6905 VA						8	
	9	RTU-1	(3) #6 THWN, #8 GND, 1" EMT	60 A	3		11010 VA	6905 VA	3	30 A	(3) #10 THWN, #10 GND, 3/4" EMT	RTU-6	10	
	11							11010 VA	6905 VA				12	
	13					10372 VA	7238 VA						14	
	15	RTU-2	(3) #6 THWN, #8 GND, 1" EMT	60 A	3		10372 VA	7238 VA	3	35 A	(3) #8 THWN, #10 GND, 3/4" EMT	RTU-7	16	
	17							10372 VA	7238 VA				18	
	19					7238 VA	10372 VA						20	
	21	RTU-3	(3) #10 THWN, #10 GND, 3/4" EMT	35 A	3		7238 VA	10372 VA	3	60 A	(3) #6 THWN, #8 GND, 1" EMT	RTU-8	22	
	23							7238 VA	10372 VA				24	
	25					10372 VA	12841 VA						26	
	27	RTU-4	(3) #6 THWN, #8 GND, 1" EMT	60 A	3		10372 VA	12841 VA	3	80 A	(3) #4 THWN, #8 GND, 1" EMT	RTU-9	28	
	29							10372 VA	12841 VA				30	
	31					4160 VA	10344 VA						32	
	33	RTU-5A	(3) #10 THHN, #10 GND, 3/4" EMT	20 A	3		4160 VA	10344 VA	3	60 A	(3) #6 THWN, #8 GND, 1" EMT	RTU-10	34	
	35							4160 VA	10344 VA				36	
	37					4798 VA	373 VA						38	
	39	RTU-12	(3) #10 THHN, #10 GND, 3/4" EMT	20 A	3		4798 VA	373 VA	3	15 A	(3) #10 THHN, #10 GND, 3/4" EMT	EF-11	40	
	41							4798 VA	373 VA				42	
	43					4798 VA	--						44	
	45	RTU-13	(3) #10 THHN, #10 GND, 3/4" EMT	20 A	3		4798 VA	--	3	--		100A FRAME PROVISION	46	
	47							4798 VA	--				48	
	49					4798 VA	--						50	
	51	RTU-14	(3) #10 THHN, #10 GND, 3/4" EMT	20 A	3		4798 VA	--	3	--		100A FRAME PROVISION	52	
	53							4798 VA	--				54	
	55					373 VA	--						56	
	57	EF-10	(3) #10 THHN, #10 GND, 3/4" EMT	15 A	3		373 VA	--	3	--		100A FRAME PROVISION	58	
	59							373 VA	--				60	
	61					--	--						62	
	63	100A FRAME PROVISION		--	3		--	--	3	--		100A FRAME PROVISION	64	
	65							--	--				66	
	67					--	--						68	
	69	100A FRAME PROVISION		--	3		--	--	3	--		100A FRAME PROVISION	70	
	71							--	--				72	
						116893 VA	116893 VA	116893 VA						
						422 A	422 A	422 A						

Branch Panel: HP-M1

Location: MECH. G74
Supply From: MDP2
Mounting: Surface
Enclosure: NEMA 1 Indoor

Volts: 480/277 Wye
Phases: 3
Wires: 4

A.I.C. Rating: 65kA
Mains Type: MLO
Mains Rating: 1200 A

NOTES	CKT NO.	CIRCUIT DESCRIPTION	CONDUCTORS	CB SIZE	POLES	A	B	C	POLES	CB SIZE	CONDUCTORS	CIRCUIT DESCRIPTION	CKT NO.	NOTES
	1					11065 VA	28094 VA						2	
	3	RTU-22	(3) #6 THWN, #8 GND, 1" EMT	70 A	3		11065 VA	28094 VA	3	150 A	(3) #1/0 THWN, #6 GND, 1-1/2" EMT	WATER FURNACE (WF)	4	
	5							11065 VA	28094 VA				6	
	7					28094 VA	28094 VA						8	
	9	WATER FURNACE (WF)	(3) #1/0 THWN, #6 GND, 1-1/2" EMT	150 A	3		28094 VA	28094 VA	3	150 A	(3) #1/0 THWN, #6 GND, 1-1/2" EMT	WATER FURNACE (WF)	10	
	11							28094 VA	28094 VA				12	
	13					28094 VA	28094 VA						14	
	15	WATER FURNACE (WF)	(3) #1/0 THWN, #6 GND, 1-1/2" EMT	150 A	3		28094 VA	28094 VA	3	150 A	(3) #1/0 THWN, #6 GND, 1-1/2" EMT	WATER FURNACE (WF)	16	
	17							28094 VA	28094 VA				18	
	19					28094 VA	28094 VA						20	
	21	WATER FURNACE (WF)	(3) #1/0 THWN, #6 GND, 1-1/2" EMT	150 A	3		28094 VA	28094 VA	3	150 A	(3) #1/0 THWN, #6 GND, 1-1/2" EMT	WATER FURNACE (WF)	22	
	23							28094 VA	28094 VA				24	
	25					28094 VA	28094 VA						26	
	27	WATER FURNACE (WF)	(3) #1/0 THWN, #6 GND, 1-1/2" EMT	150 A	3		28094 VA	28094 VA	3	150 A	(3) #1/0 THWN, #6 GND, 1-1/2" EMT	WATER FURNACE (WF)	28	
	29							28094 VA	28094 VA				30	
	31					--	--						32	
	33	225A FRAME PROVISION		--	3		--	--	3	--		225A FRAME PROVISION	34	
	35							--	--				36	
	37					--	--						38	
	39	225A FRAME PROVISION		--	3		--	--	3	--		225A FRAME PROVISION	40	
	41							--	--				42	
	43					--	--						44	
	45	225A FRAME PROVISION		--	3		--	--	3	--		225A FRAME PROVISION	46	
	47							--	--				48	
	49					--	--						50	
	51	225A FRAME PROVISION		--	3		--	--	3	--		225A FRAME PROVISION	52	
	53							--	--				54	
						263908 VA	263908 VA	263908 VA						
						953 A	953 A	953 A						

Branch Panel: HP-M2

Location: MECH. G74
Supply From: MDP2
Mounting: Surface
Enclosure: NEMA 1 Indoor

Volts: 480/277 Wye
Phases: 3
Wires: 4

A.I.C. Rating: 65kA
Mains Type: MLO
Mains Rating: 800 A

NOTES	CKT NO.	CIRCUIT DESCRIPTION	CONDUCTORS	CB SIZE	POLES	A	B	C	POLES	CB SIZE	CONDUCTORS	CIRCUIT DESCRIPTION	CKT NO.	NOTES
	1					49920 VA	3883 VA						2	
	3	PUMP P-1A	(3) #4/0 THHN, #4 GND, 2" EMT	225 A	3		49920 VA	3883 VA	3	20 A	(3) #12 THHN, #12 GND, 3/4" EMT	PUMP P-4A	4	
	5							49920 VA	3883 VA				6	
	7					49920 VA	3883 VA						8	
	9	PUMP P-1B	(3) #4/0 THHN, #4 GND, 2" EMT	225 A	3		49920 VA	3883 VA	3	20 A	(3) #12 THHN, #12 GND, 3/4" EMT	PUMP P-4B	10	
	11							49920 VA	3883 VA				12	
	13					7488 VA	3883 VA						14	
	15	PUMP P-2A	(3) #8 THHN, #10 GND, 1" EMT	35 A	3		7488 VA	3883 VA	3	20 A	(3) #12 THHN, #12 GND, 3/4" EMT	PUMP P-5A	16	
	17							7488 VA	3883 VA				18	
	19					7488 VA	3883 VA						20	
	21	PUMP P-2B	(3) #8 THHN, #10 GND, 1" EMT	35 A	3		7488 VA	3883 VA	3	20 A	(3) #12 THHN, #12 GND, 3/4" EMT	PUMP P-5B	22	
	23							7488 VA	3883 VA				24	
	25					3883 VA	943 VA						26	
	27	PUMP P-3A	(3) #12 THHN, #12 GND, 3/4" EMT	20 A	3		3883 VA	943 VA	3	15 A	(3) #10 THWN, #10 GND, 3/4" EMT	JOCKEY PUMP	28	
	29							3883 VA	943 VA				30	
	31					3883 VA	--						32	
	33	PUMP P-3B	(3) #12 THHN, #12 GND, 3/4" EMT	20 A	3		3883 VA	--	3	--		100A FRAME PROVISION	34	
	35							3883 VA	--				36	
	37					--	--						38	
	39	100A FRAME PROVISION		--	3		--	--	3	--		100A FRAME PROVISION	40	
	41							--	--				42	
	43					--	--						44	
	45	100A FRAME PROVISION		--	3		--	--	3	--		100A FRAME PROVISION	46	
	47							--	--				48	
						139055 VA	139055 VA	139055 VA						
						502 A	502 A	502 A						

TWIN TOWERS MIDDLE SCHOOL

Additions & Alterations

ENLARGED CITY SCHOOL DISTRICT OF MIDDLETOWN

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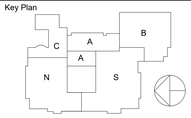
GA22017-A

NY SED PROJECT CONTROL NO.

44-10-00-01-0-001-041

CONSTRUCTION DOCUMENTS

Key Plan



Professional Seal

No.	Date	Issue
3	02/23/2024	ADDENDUM #6
2	12/14/2023	ISSUE FOR BID
1	04/14/2023	NYSED ISSUE

Sheet Title

ELECTRICAL:
EQUIPMENT SCHEDULES

Job No.	Date
2021-1087	09/08/2022
Scale	Drawn / Checked
AS NOTED	BH/DC SZ

Sheet Number

E703

Branch Panel: LP-K1A

Location: CENTRAL PREP KITCHEN G70 **Volts:** 120/208 Wye **A.I.C. Rating:** 65kA
Supply From: KDP **Phases:** 3 **Mains Type:** MLO
Mounting: Surface **Wires:** 4 **Mains Rating:** 400 A
Enclosure: NEMA 4X Type 304 Stainless

NOTES	CKT NO.	CIRCUIT DESCRIPTION	CONDUCTORS	CB SIZE	POLES	A		B		C		POLES	CB SIZE	CONDUCTORS	CIRCUIT DESCRIPTION	CKT NO.	NOTES
1*	1	REACH-IN FRIDGE #A1	(2) #12 THHN, #12 GND, 3/4" EMT	20 A	1	972 VA	360 VA					1	20 A	(2) #12 THHN, #12 GND, 3/4" EMT	CEILING RECEPTACLE	2	
1*	3	REACH-IN FRIDGE #A1	(2) #12 THHN, #12 GND, 3/4" EMT	20 A	1			972 VA	360 VA			1	20 A	(2) #12 THHN, #12 GND, 3/4" EMT	CEILING RECEPTACLE	4	
1*	5	REACH-IN FREEZER #A2	(2) #12 THHN, #12 GND, 3/4" EMT	20 A	1					912 VA	360 VA	1	20 A	(2) #12 THHN, #12 GND, 3/4" EMT	RECEPTACLES #B15	6	
	7	RECEPTACLE	(2) #12 THHN, #12 GND, 3/4" EMT	20 A	1	180 VA	660 VA					1	20 A	(2) #12 THHN, #12 GND, 3/4" EMT	FRIDGE CEILING RECEPTACLE #B16	8	1*
	9	RECEPTACLES	(2) #12 THHN, #12 GND, 3/4" EMT	20 A	1			360 VA	360 VA			1	20 A	(2) #12 THHN, #12 GND, 3/4" EMT	RECEPTACLES #B17	10	
	11	RECEPTACLES #A10	(2) #12 THHN, #12 GND, 3/4" EMT	20 A	1					360 VA	360 VA	1	20 A	(2) #12 THHN, #12 GND, 3/4" EMT	RECEPTACLES #B18	12	
	13	RECEPTACLES #A11	(2) #12 THHN, #12 GND, 3/4" EMT	20 A	1	360 VA	2400 VA					3	25 A	(3) 10 THHN, #10 GND, 3/4"	BAGEL DIVIDER #B22	14	
	15	CEILING RECEPTACLE	(2) #12 THHN, #12 GND, 3/4" EMT	20 A	1			360 VA	2400 VA							16	
	17	CEILING RECEPTACLE	(2) #12 THHN, #12 GND, 3/4" EMT	20 A	1					180 VA	2400 VA					18	
	19	DOUGH SHEETER #B1	(3) 12 THHN, #12 GND, 3/4"	15 A	3	264 VA	1128 VA					1	20 A	(2) #12 THHN, #12 GND, 3/4" EMT	FREEZER #C3	20	1*
	21							264 VA	3600 VA			3	40 A	(3) 8 THHN, #10 GND, 3/4"	ICE CREAM MACHINE #C4	22	
	23									264 VA	3600 VA					24	
1*	25	MIXER RECEPTACLE #B2	(3) 12 THHN, #12 GND, 3/4"	20 A	3	1200 VA	3600 VA									26	
	27							1200 VA	3960 VA			3	45 A	(3) 8 THHN, #10 GND, 3/4"	BATCH FREEZER #C7	28	
	29									1200 VA	3960 VA					30	
1*	31	MIXER RECEPTACLE #B2	(3) 12 THHN, #12 GND, 3/4"	20 A	3	1200 VA	3960 VA									32	
	33							1200 VA	652 VA			1	20 A	(2) #12 THHN, #12 GND, 3/4" EMT	WATER HEATER	34	
	35									1200 VA	360 VA	1	20 A	(2) #12 THHN, #12 GND, 3/4" EMT	CEILING RECEPTACLE	36	
	37	MIXER #B3	(3) 8 THHN, #10 GND, 3/4"	50 A	3	4200 VA	360 VA					1	20 A	(2) #12 THHN, #12 GND, 3/4" EMT	CEILING RECEPTACLE	38	
	39							4200 VA	660 VA			1	20 A	(2) #12 THHN, #12 GND, 3/4" EMT	FRIDGE #C15	40	1*
	41									4200 VA	360 VA	1	20 A	(2) #12 THHN, #12 GND, 3/4" EMT	RECEPTACLES #C16	42	
1*	43	WATER METER RECEPTACLE #B4	(2) #12 THHN, #12 GND, 3/4" EMT	20 A	1	180 VA	360 VA					1	20 A	(2) #12 THHN, #12 GND, 3/4" EMT	RECEPTACLES #C17	44	
	45	PROOFER/ RETARDER #B9	(3) 10 THHN, #10 GND, 3/4"	25 A	2			1872 VA	180 VA			1	20 A	(2) #12 THHN, #12 GND, 3/4" EMT	RECEPTACLE	46	
	47									1872 VA	360 VA	1	20 A	(2) #12 THHN, #12 GND, 3/4" EMT	CEILING RECEPTACLE	48	
	49	#B10 CONTROL CIRCUIT/EF-14	(2) #12 THHN, #12 GND, 3/4" EMT	20 A	1	926 VA	1080 VA					1	20 A	(2) #12 THHN, #12 GND, 3/4" EMT	RECEPTACLES	50	
	51	OVEN #B10	(2) #12 THHN, #12 GND, 3/4" EMT	20 A	2			915 VA	180 VA			1	20 A	(2) #12 THHN, #12 GND, 3/4" EMT	WATER COOLER	52	
	53									915 VA	--	1	--		SPACE ONLY	54	
	55	G70C RECEPTACLES	(2) #12 THHN, #12 GND, 3/4" EMT	20 A	1	1080 VA	--					1	--		SPACE ONLY	56	
	57	G70 RECEPTACLES	(2) #12 THHN, #12 GND, 3/4" EMT	20 A	1			360 VA	--			1	--		SPACE ONLY	58	
	59	G70 RECEPTACLES	(2) #12 THHN, #12 GND, 3/4" EMT	20 A	1					360 VA	--	1	--		SPACE ONLY	60	
	61	G70 RECEPTACLES	(2) #12 THHN, #12 GND, 3/4" EMT	20 A	1	360 VA	7248 VA					3	70 A	(4) #4 THHN, #8 GND 1-1/4" EMT	ROOF REFRIGERATION UNIT	62	
	63	G70 RECEPTACLES	(2) #12 THHN, #12 GND, 3/4" EMT	20 A	1			720 VA	7248 VA							64	
	65	G70 RECEPTACLES	(2) #12 THHN, #12 GND, 3/4" EMT	20 A	1					540 VA	7248 VA					66	
	67	G70j RECEPTACLES	(2) #12 THHN, #12 GND, 3/4EF" EMT	20 A	1	900 VA	11328 VA					3	125 A	(4) #2 THHN, #6 GND, 1-1/2" EMT	PANEL LP-K1C	68	
	69	G70h RECEPTACLES	(2) #12 THHN, #12 GND, 3/4" EMT	20 A	1			360 VA	11684 VA							70	
	71	G70h RECEPTACLES	(2) #12 THHN, #12 GND, 3/4" EMT	20 A	1					360 VA	9408 VA					72	
						44306 VA		44067 VA		40779 VA							
						373 A		371 A		340 A							

NOTES:
1* - INSTALL GFCI TYPE CIRCUIT BREAKER WHERE INDICATED.

Branch Panel: LP-K1B

Location: CENTRAL PREP KITCHEN G70 **Volts:** 120/208 Wye **A.I.C. Rating:** 65kA
Supply From: KDP **Phases:** 3 **Mains Type:** MLO
Mounting: Surface **Wires:** 4 **Mains Rating:** 400 A
Enclosure: NEMA 4X Type 304 Stainless

NOTES	CKT NO.	CIRCUIT DESCRIPTION	CONDUCTORS	CB SIZE	POLES	A		B		C		POLES	CB SIZE	CONDUCTORS	CIRCUIT DESCRIPTION	CKT NO.	NOTES
	1	CEILING RECEPTACLE	(2) #12 THHN, #12 GND, 3/4" EMT	20 A	1	360 VA	840 VA					1	20 A	(2) #12 THHN, #12 GND, 3/4" EMT	SLICER #P27	2	
	3	DRAINING TEMPERING KIT...	(2) #12 THHN, #12 GND, 3/4" EMT	20 A	1			180 VA	840 VA			1	20 A	(2) #12 THHN, #12 GND, 3/4" EMT	SLICER #27	4	
	5	VERTICAL FORM FILLER BAGGER #C38	(3) #12 THHN, #12 GND, 3/4" EMT	20 A	3					1920 VA	180 VA	1	20 A	(2) #12 THHN, #12 GND, 3/4" EMT	RECEPTACLE	6	
	7					1920 VA	540 VA					1	20 A	(2) #12 THHN, #12 GND, 3/4" EMT	G70b RECETPACLES #R1, R2	8	
	9							1920 VA	1654 VA			2	20 A	(3) #12 THHN, #12 GND, 3/4" EMT	ICE MAKER #R4	10	
	11	CONVEYOR #C39	(2) #12 THHN, #12 GND, 3/4" EMT	20 A	1					888 VA	1654 VA					12	
	13	BATCH CHILLER #C40	(3) #10 THHN, #10 GND, 3/4" EMT	30 A	3	2760 VA	500 VA					1	20 A	(2) #12 THHN, #12 GND, 3/4" EMT	HOOD CONTROL PANEL #A30	14	
	15							2760 VA	500 VA			1	20 A	(2) #12 THHN, #12 GND, 3/4" EMT	FIRE PROTECTION SYSTEM #A31	16	
	17									2760 VA	180 VA	1	20 A	(2) #12 THHN, #12 GND, 3/4" EMT	RECEPTACLE #A33	18	
	19	DRAIN TEMPERING KIT #D3	(2) #12 THHN, #12 GND, 3/4" EMT	20 A	1	180 VA	500 VA					1	20 A	(2) #12 THHN, #12 GND, 3/4" EMT	HOOD CONTROL PANEL #B31	20	
	21	POWER WASHER #D9	(3) #8 THHN, #10 GND, 3/4" EMT	35 A	3			3204 VA	500 VA			1	20 A	(2) #12 THHN, #12 GND, 3/4" EMT	FIRE PROTECTION SYSTEM #B32	22	
	23									3204 VA	420 VA	1	20 A	(2) #12 THHN, #12 GND, 3/4" EMT	WALK-IN COOLER #B33	24	
	25					3204 VA	500 VA					1	20 A	(2) #12 THHN, #12 GND, 3/4" EMT	HOOD CONTROL PANEL #C36	26	
	27	DRYER #D17	(3) #10 THHN, #10 GND, 3/4" EMT	30 A	2			2700 VA	500 VA			1	20 A	(2) #12 THHN, #12 GND, 3/4" EMT	FIRE PROTECTION SYSTEM #C37	28	
	29									2700 VA	1238 VA	2	20 A	(2) #12 THHN, #12 GND, 3/4" EMT	WALK-IN COOLER EVAPORATOR #C43	30	
	31	WASHER #D18	(2) #12 THHN, #12 GND, 3/4" EMT	20 A	1	1500 VA	1238 VA									32	
	33	FILTRATION SYSTEM #D19	(2) #12 THHN, #12 GND, 3/4" EMT	20 A	1			180 VA	1000 VA			1	20 A	(2) #12 THHN, #12 GND, 3/4" EMT	WALK-IN COOLER & HEAT TAPE #C43	34	
	35	AIR COMPRESSOR DRYER #C28	(2) #12 THHN, #12 GND, 3/4" EMT	20 A	1					660 VA	500 VA	1	20 A	(2) #12 THHN, #12 GND, 3/4" EMT	HOOD CONTROL PANEL #P10	36	
	37	CEILING RECEPTACLE	(2) #12 THHN, #12 GND, 3/4" EMT	20 A	1	360 VA	500 VA					1	20 A	(2) #12 THHN, #12 GND, 3/4" EMT	FIRE PROTECTION SYSTEM #P11	38	
	39	CEILING RECEPTACLE	(2) #12 THHN, #12 GND, 3/4" EMT	20 A	1			360 VA	860 VA			1	20 A	(2) #12 THHN, #12 GND, 3/4" EMT	WALK-IN COOLER #P25	40	
1*	41	FRIDGE RECEPTACLE...	(2) #12 THHN, #12 GND, 3/4" EMT	20 A	1					660 VA	1460 VA	1	20 A	(2) #12 THHN, #12 GND, 3/4" EMT	WALK-IN COOLER #R5	42	
	43	RECEPTACLES #P16	(2) #12 THHN, #12 GND, 3/4" EMT	20 A	1	360 VA	1460 VA					1	20 A	(2) #12 THHN, #12 GND, 3/4" EMT	WALK-IN COOLER #R9	44	
	45	RECEPTACLES #P17	(2) #12 THHN, #12 GND, 3/4" EMT	20 A	1			360 VA	3000 VA			3	35 A	(3) #8 THHN, #10 GND, 3/4" EMT	BLAST CHILLER #R12	46	
1*	47	VEG/FRUIT PREP #P22	(2) #12 THHN, #12 GND, 3/4" EMT	20 A	1					1440 VA	3000 VA					48	
1*	49	VEG/FRUIT PREP #P22	(2) #12 THHN, #12 GND, 3/4" EMT	20 A	1	1440 VA	3000 VA									50	
	51	PRODUCE WASH #23	(2) #12 THHN, #12 GND, 3/4" EMT	20 A	1			624 VA	3000 VA			3	35 A	(3) #8 THHN, #10 GND, 3/4" EMT	BLAST CHILLER #R12	52	
	53	RECEPTACLES	(2) #12 THHN, #12 GND, 3/4" EMT	20 A	1					360 VA	3000 VA					54	
	55	HOOD CONTROL PANEL #C11	(2) #12 THHN, #12 GND, 3/4" EMT	20 A	1	500 VA	3000 VA									56	
	57	FIRE PROTECTION SYSTEM #C12	(2) #12 THHN, #12 GND, 3/4" EMT	20 A	1			500 VA	5400 VA			3	60 A	(3) #8 THHN, #10 GND, 3/4" EMT	SHOCK FREEZER #R13	58	
	59	WALK-IN COOLER EVAPORATORS #R15	(2) #12 THHN, #12 GND, 3/4" EMT	20 A	2					1706 VA	5400 VA					60	
	61					1706 VA	5400 VA									62	
	63	WALK-IN COOLER & HEAT TAPE #R15	(2) #12 THHN, #12 GND, 3/4" EMT	20 A	1			1500 VA	0 VA			1	20 A		SPARE	64	
	65	SPARE		20 A	1					0 VA	0 VA	1	20 A		SPARE	66	
	67	SPARE		20 A	1	0 VA	1207 VA					1	20 A	(2) #12 THHN, #12 GND, 3/4" EMT	G70 LIGHTING	68	
	69	SPARE		20 A	1			0 VA	1461 VA			1	20 A	(2) #12 THHN, #12 GND, 3/4" EMT	G70 LIGHTING	70	
	71	SPARE		20 A	1					0 VA	871 VA	1	20 A	(2) #12 THHN, #12 GND, 3/4" EMT	G70B, G72, G76 LIGHTING	72	
						32974 VA		33003 VA		34200 VA							
						275 A		275 A		285 A							

NOTES:
1* - INSTALL GFCI TYPE CIRCUIT BREAKER WHERE INDICATED.

Branch Panel: LP-K1C

Location: CENTRAL PREP KITCHEN G70 **Volts:** 120/208 Wye **A.I.C. Rating:** 65kA
Supply From: LP-K1A **Phases:** 3 **Mains Type:** MCB
Mounting: Surface **Wires:** 4 **Mains Rating:** 125 A
Enclosure: NEMA 4X Type 304 Stainless **MCB Rating:** 125 A
MAIN CIRCUIT BREAKER SHALL BE SHUNT TRIP TYPE FOR CONNECTION TO FIRE ALARM.

NOTES	CKT NO.	CIRCUIT DESCRIPTION	CONDUCTORS	CB SIZE	POLES	A		B		C		POLES	CB SIZE	CONDUCTORS	CIRCUIT DESCRIPTION	CKT NO.	NOTES
1*	1	FRYER #A15	(2) #12 THHN, #12 GND, 3/4" EMT	20 A	1	1080 VA	1176 VA					1	20 A	(2) #12 THHN, #12 GND, 3/4" EMT	OVEN #B25	2	1*
1*	3	FRYER #A15	(2) #12 THHN, #12 GND, 3/4" EMT	20 A	1			1440 VA	960 VA			3	20 A	(3) #12 THHN, #12 GND, 3/4" EMT	TILITING KETTLE #C30	4	
1*	5	RECEPTACLES #A16, a17, A18, A19	(2) #12 THHN, #12 GND, 3/4" EMT	20 A	1					720 VA	960 VA					6	
1*	7	RANGE #A22	(2) #12 THHN, #12 GND, 3/4" EMT	20 A	1	1176 VA	960 VA									8	
1*	9	RANGE #A22	(2) #12 THHN, #12 GND, 3/4" EMT	20 A	1			1176 VA	960 VA			3	20 A	(3) #12 THHN, #12 GND, 3/4" EMT	TILITING KETTLE #C32	10	
	11	OVEN STEAMER #A23	(2) #12 THHN, #12 GND, 3/4" EMT	20 A	1					900 VA	960 VA					12	
	13	OVEN STEAMER #A24	(2) #12 THHN, #12 GND, 3/4" EMT	20 A	1	900 VA	960 VA									14	
	15	SMOKER OVEN #A13	(3) 10 THHN, #10 GND, 3/4"	25 A	3			2340 VA	1272 VA			1	20 A	(2) #12 THHN, #12 GND, 3/4" EMT	OVEN STEAMER #P1	16	
	17									2340 VA	1272 VA	1	20 A	(2) #12 THHN, #12 GND, 3/4" EMT	OVEN STEAMER #P1	18	
	19					2340 VA	1200 VA					1	20 A	(2) #12 THHN, #12 GND, 3/4" EMT	KETTLE #P2	20	1*
1*	21	FRYER #B23	(2) #12 THHN, #12 GND, 3/4" EMT	20 A	1			1440 VA	920 VA			1	20 A	(2) #12 THHN, #12 GND, 3/4" EMT	SKILLETS, STEAMER...	22	1*
1*	23	FRYER #B23	(2) #12 THHN, #12 GND, 3/4" EMT	20 A	1					1080 VA	--	1	--		SPACE ONLY	24	
1*	25	OVEN #B25	(2) #12 THHN, #12 GND, 3/4" EMT	20 A	1	1176 VA	--					1	--		SPACE ONLY	26	
1*	27	OVEN #B25	(2) #12 THHN, #12 GND, 3/4" EMT	20 A	1			1176 VA	--			1	--		SPACE ONLY	28	
1*	29	OVEN #B25	(2) #12 THHN, #12 GND, 3/4" EMT	20 A	1					1176 VA	--	1	--		SPACE ONLY	30	
	31	RECEPTACLES	(2) #12 THHN, #12 GND, 3/4" EMT	20 A	1	360 VA	--					1	--		SPACE ONLY	32	
1*	33	SPARE		20 A	1			0 VA	--			1	--		SPACE ONLY	34	
1*	35	SPARE		20 A	1					0 VA	--	1	--		SPACE ONLY	36	
	37	SPARE		20 A	1	0 VA	--					1	--		SPACE ONLY	38	
	39	SPARE		20 A	1			0 VA	--			1	--		SPACE ONLY	40	
	41	SPARE		20 A	1					0 VA	--	1	--		SPACE ONLY	42	
						11328 VA		11684 VA		9408 VA							
						97 A		100 A		78 A							

NOTES:
1* - INSTALL GFCI TYPE CIRCUIT BREAKER WHERE INDICATED.

Branch Panel: LP-K2A

Location: ELEC / DATA 172e **Volts:** 120/208 Wye **A.I.C. Rating:** 65kA
Supply From: KDP **Phases:** 3 **Mains Type:** MLO
Mounting: Surface **Wires:** 4 **Mains Rating:** 400 A
Enclosure: NEMA 1 Indoor
INSTALL WITH THROUGH-FEED LUGS TO FEED PANEL LP-K2B

NOTES	CKT NO.	CIRCUIT DESCRIPTION	CONDUCTORS	CB SIZE	POLES	A		B		C		POLES	CB SIZE	CONDUCTORS	CIRCUIT DESCRIPTION	CKT NO.	NOTES
	1	REF. MONITORING SYS. #7	(2) #12 THHN, #12 GND, 3/4" EMT	20 A	1	180 VA	936 VA					1	20 A	(2) #12 THHN, #12 GND, 3/4" EMT	FOOD PROTECTORS #61, 64, 66, 67	2	
	3	RECEPTACLES #9	(2) #12 THHN, #12 GND, 3/4" EMT	20 A	1			360 VA	1524 VA			1	20 A	(2) #12 THHN, #12 GND, 3/4" EMT	DROP-IN HOT/COLD #62	4	1*
	5	VEG. PREP. RECEPTACLE #12	(2) #12 THHN, #12 GND, 3/4" EMT	20 A	1					1440 VA	900 VA	1	20 A	(2) #12 THHN, #12 GND, 3/4" EMT	HOT/COLD SHELF #65	6	1*
	7	FOOD SLICER #13	(2) #12 THHN, #12 GND, 3/4" EMT	20 A	1	300 VA	720 VA					1	20 A	(2) #12 THHN, #12 GND, 3/4" EMT	POS SYSTEM RECEPTACLES	8	
1*	9	REFRIGERATOR #15	(2) #12 THHN, #12 GND, 3/4" EMT	20 A	1			660 VA	900 VA			1	20 A	(2) #12 THHN, #12 GND, 3/4" EMT	HOT/COLD SHELF #71	10	1*
	11	WAREWASHER #17	(3) #6 THHN, #8 GND, 1" EMT	70 A	3					6420 VA	816 VA	1	20 A	(2) #12 THHN, #12 GND, 3/4" EMT	FOOD PROTECTORS #72,73,75	12	
	13					6420 VA	1040 VA					2	20 A	(2) #12 THHN, #12 GND, 3/4" EMT	DROP-IN HEATED SHELF #74	14	1*
	15							6420 VA	1040 VA							16	
1* 2*	17	GRIDDLE/RANGE #29,30	(2) #12 THHN, #12 GND, 3/4" EMT	20 A	1					600 VA	1200 VA	1	20 A	(2) #12 THHN, #12 GND, 3/4" EMT	HEAT LAMP #76	18	
1* 2*	19	CONVECTION OVEN #31	(2) #12 THHN, #12 GND, 3/4" EMT	20 A	1	1176 VA	360 VA					1	20 A	(2) #12 THHN, #12 GND, 3/4" EMT	RECEPTACLES	20	
1* 2*	21	CONVECTION OVEN #31	(2) #12 THHN, #12 GND, 3/4" EMT	20 A	1			1176 VA	900 VA			1	20 A	(2) #12 THHN, #12 GND, 3/4" EMT	RECEPTACLES	22	
1* 2*	23	CONVECTION OVEN #31	(2) #12 THHN, #12 GND, 3/4" EMT	20 A	1					1176 VA	720 VA	1	20 A	(2) #12 THHN, #12 GND, 3/4" EMT	174b, 174c RECEPTACLES	24	
1* 2*	25	CONVECTION OVEN #31	(2) #12 THHN, #12 GND, 3/4" EMT	20 A	1	1176 VA	1080 VA					1	20 A	(2) #12 THHN, #12 GND, 3/4" EMT	174a, 174e, 174h RECEPTACLES	26	
2*	27	OVEN-STEAMER #32	(2) #12 THHN, #12 GND, 3/4" EMT	20 A	1			900 VA	1240 VA			1	20 A	(2) #12 THHN, #12 GND, 3/4" EMT	TV RECEPTACLES	28	
1*	29	FILTER SYSTEM #34	(2) #12 THHN, #12 GND, 3/4" EMT	20 A	1					276 VA	1240 VA	1	20 A	(2) #12 THHN, #12 GND, 3/4" EMT	TV RECEPTACLES	30	
1* 2*	31	STEAMER #36	(2) #12 THHN, #12 GND, 3/4" EMT	20 A	1	360 VA	680 VA					1	15 A	(2) #12 THHN, #12 GND, 3/4" EMT	FREEZER #1	32	
2*	33	KETTLE #37	(2) #12 THHN, #12 GND, 3/4" EMT	20 A	1			50 VA	978 VA			2	15 A	(2) #12 THHN, #12 GND, 3/4" EMT	FREEZER EVAPORATOR #2	34	
	35	EXHAUST FAN CONTROL PANEL	(2) #12 THHN, #12 GND, 3/4" EMT	20 A	1					50 VA	978 VA					36	
	37	FIRE PROTECTION SYSTEM	(2) #12 THHN, #12 GND, 3/4" EMT	20 A	1	50 VA	1428 VA					3	20 A	(3) #12 THHN, #12 GND, 3/4" EMT	FREEZER COMPRESSOR #2	38	
1*	39	REFRIGERATOR #42	(2) #12 THHN, #12 GND, 3/4" EMT	20 A	1			756 VA	1428 VA							40	
1*	41	ICE MAKER #44	(2) #12 THHN, #12 GND, 3/4" EMT	15 A	1					1008 VA	1428 VA					42	
1*	43	CABINET WARM/ HOLD #50	(2) #12 THHN, #12 GND, 3/4" EMT	20 A	1	1920 VA	420 VA					1	15 A	(2) #12 THHN, #12 GND, 3/4" EMT	COOLER & EVAPORATOR #4&5	44	
1*	45	CABINET WARM/ HOLD #50	(2) #12 THHN, #12 GND, 3/4" EMT	20 A	1			1920 VA	1248 VA			2	15 A	(2) #12 THHN, #12 GND, 3/4" EMT	COOLER COMPRESSOR #4	46	
	47	RECEPTACLES #51	(2) #12 THHN, #12 GND, 3/4" EMT	20 A	1					360 VA	1248 VA					48	
	49	RECEPTACLES #52	(2) #12 THHN, #12 GND, 3/4" EMT	20 A	1	360 VA	0 VA					1	20 A		SPARE	50	
1*	51	DROP-IN HOT/COLD #60	(3) #12 THHN, #12 GND, 3/4" EMT	20 A	2			1248 VA	360 VA			1	20 A	(2) #12 THHN, #12 GND, 3/4" EMT	STONE HEARTH OVEN #78	52	2*
	53									1248 VA	0 VA	1	20 A		SPARE (FUTURE HAND DRYER)	54	
						41349 VA		42377 VA		47183 VA							
						345 A		354 A		395 A							

NOTES:
1* - INSTALL GFCI TYPE CIRCUIT BREAKER WHERE INDICATED.
2* - INDICATED CIRCUIT CONDUCTORS SHALL BE EXTENDED THROUGH 'SERVERY CONTACTOR PANEL' FOR CONNECTION FIRE ALARM. REFER TO 'SERVERY CONTACTOR PANEL DETAIL'.

Branch Panel: LP-K2B

Location: ELEC / DATA 172e **Volts:** 120/208 Wye **A.I.C. Rating:** 65kA
Supply From: LP-K2A **Phases:** 3 **Mains Type:** MLO
Mounting: Surface **Wires:** 4 **Mains Rating:** 400 A
Enclosure: NEMA 1 Indoor
THROUGH-FEED FROM PANEL LP-K2A

NOTES	CKT NO.	CIRCUIT DESCRIPTION	CONDUCTORS	CB SIZE	POLES	A		B		C		POLES	CB SIZE	CONDUCTORS	CIRCUIT DESCRIPTION	CKT NO.	NOTES
	1	POS SYSTEM RECEPTACLES	(2) #12 THHN, #12 GND, 3/4" EMT	20 A	1	360 VA	360 VA					1	20 A	(2) #12 THHN, #12 GND, 3/4" EMT	FLOOR BOX RECEPTACLE	2	1*
1*	3	REFRIGERATOR #80	(2) #12 THHN, #12 GND, 3/4" EMT	20 A	1			888 VA	1477 VA			2	20 A	(2) #12 THHN, #12 GND, 3/4" EMT	REFRIGERATOR #113	4	1*
1*	5	HOT/COLD SHELF #86	(2) #12 THHN, #12 GND, 3/4" EMT	20 A	1					900 VA	1477 VA					6	
	7	FOOD PROTECTORS #87,88	(2) #12 THHN, #12 GND, 3/4" EMT	20 A	1	696 VA	360 VA					1	20 A	(2) #12 THHN, #12 GND, 3/4" EMT	RECEPTACLE	8	
1*	9	HEAT DISPLAY CASE #89	(3) #12 THHN, #12 GND, 3/4" EMT	20 A	2			1279 VA	360 VA			1	20 A	(2) #12 THHN, #12 GND, 3/4" EMT	RECEPTACLES	10	
	11									1279 VA	1647 VA	2	20 A	(3) #12 THHN, #12 GND, 3/4" EMT	HP-3/FCU-3	12	
1*	13	HEAT DISPLAY CASE #89	(3) #12 THHN, #12 GND, 3/4" EMT	20 A	2	1279 VA	1647 VA									14	
	15							1279 VA	2023 VA			2	20 A	(3) #12 THHN, #12 GND, 3/4" EMT	ACCU-3/AC-3	16	
1*	17	HEATED HOLDING CABINET #90	(2) #12 THHN, #12 GND, 3/4" EMT	20 A	1					996 VA	2023 VA					18	
1*	19	REFRIGERATORS #94	(2) #12 THHN, #12 GND, 3/4" EMT	20 A	1	1368 VA	1647 VA					2	20 A	(3) #12 THHN, #12 GND, 3/4" EMT	HP-3/FCU-3	20	
	21	FOOD PROTECTORS #95,97,100,101	(2) #12 THHN, #12 GND, 3/4" EMT	20 A	1			1056 VA	1647 VA							22	
1*	23	HOT/COLD DROP-IN #96	(2) #12 THHN, #12 GND, 3/4" EMT	20 A	1					1524 VA	150 VA	1	15 A	(2) #12 THHN, #12 GND, 3/4" EMT	EF-8, EF-9	24	
1*	25	HOT/COLD SHELF #99	(2) #12 THHN, #12 GND, 3/4" EMT	20 A	1	900 VA	4134 VA					3	40 A	(3) #8 THHN, #10 GND, 1" EMT	ERV-1	26	
1*	27	REFRIGERATOR #103	(2) #12 THHN, #12 GND, 3/4" EMT	20 A	1			300 VA	4134 VA							28	
1*	29	PANINI PRESS #104	(2) #8 THHN, #10 GND, 3/4" EMT	50 A	2					3276 VA	4134 VA					30	
	31					3276 VA	1620 VA					1	20 A	(2) #10 THHN, #10 GND, 3/4" EMT	HVAC SERVICE RECEPTACLES	32	
	33	RECEPTACLES	(2) #12 THHN, #12 GND, 3/4" EMT	20 A	1			720 VA	--			1	--		SPACE ONLY	34	
1*	35	OVEN #106	(2) #10 THHN, #10 GND, 3/4" EMT	30 A	2					3100 VA	--	1	--		SPACE ONLY	36	
	37					3100 VA	--					1	--		SPACE ONLY	38	
1*	39	REFRIGERATOR #107	(2) #12 THHN, #12 GND, 3/4" EMT	20 A	2			999 VA	--			1	--		SPACE ONLY	40	
	41									999 VA	--	1	--		SPACE ONLY	42	
1*	43	REFRIGERATOR #107	(2) #12 THHN, #12 GND, 3/4" EMT	20 A	2	999 VA	--					1	--		SPACE ONLY	44	
	45							999 VA	--			1	--		SPACE ONLY	46	
1*	47	REFRIGERATOR #107	(2) #12 THHN, #12 GND, 3/4" EMT	20 A	2					999 VA	--	1	--		SPACE ONLY	48	
	49					999 VA	--					1	--		SPACE ONLY	50	
1*	51	HEATED SELF-SERVE CASE #108	(2) #10 THHN, #10 GND, 3/4" EMT	30 A	2			2111 VA	--			1	--		SPACE ONLY	52	
	53									2111 VA	1464 VA	1	20 A	(2) #12 THHN, #12 GND, 3/4" EMT	174, 175 LIGHTING	54	
						22743 VA		19270 VA		26075 VA							
						194 A		161 A		222 A							

NOTES:
1* - INSTALL GFCI TYPE CIRCUIT BREAKER WHERE INDICATED.

TWIN TOWERS MIDDLE SCHOOL

Additions & Alterations

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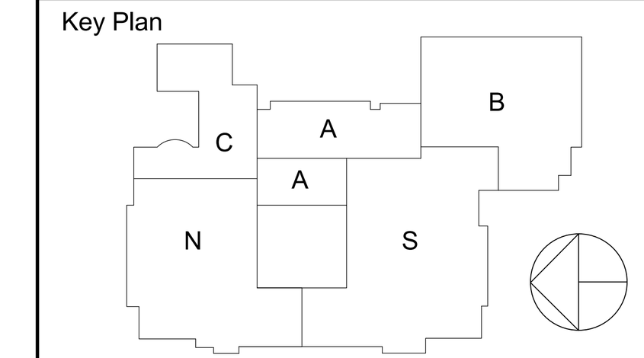
44-10-00-01-0-001-041

CONSTRUCTION DOCUMENTS

Key Plan



Professional Seal

No.	Date	Issue
4	02/23/2024	ADDENDUM #6
3	02/02/2024	ADDENDUM #2
2	12/14/2023	ISSUE FOR BID
1	04/14/2023	NYSED ISSUE

Sheet Title

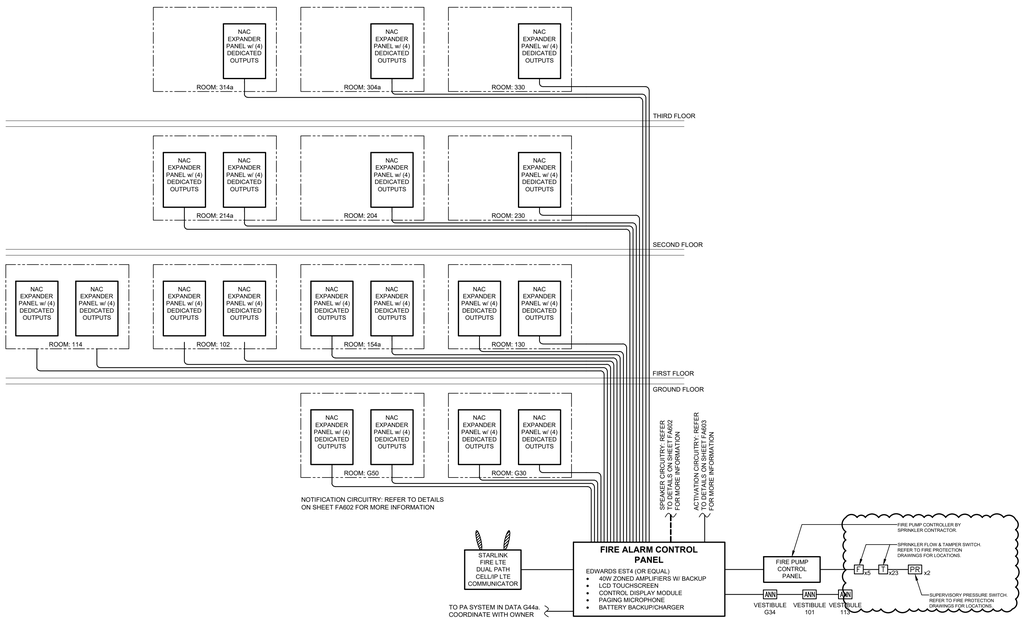
ELECTRICAL:
EQUIPMENT SCHEDULES

Job No. 2021-1087 Date 09/08/2022
Scale AS NOTED Drawn / Checked BH/DC SZ

Sheet Number
E709

FIRE ALARM EQUIPMENT SCHEDULE

SYMBOL	MANUFACTURER	CATALOG #	DESCRIPTION
ANN	———	———	LCD REMOTE ANNUNCIATOR.
cd L C	———	———	CEILING MOUNTED FIRE ALARM STROBE LIGHT WITH MINIMUM FIELD SELECTABLE OUTPUT OF 15, 30, 75 & 115 CANDELAS. COLOR: RED. LABEL: 'FIRE'. "cd" - MINIMUM CANDELA SETTING "C" - CEILING MOUNTED
L cd	———	———	WALL MOUNTED FIRE ALARM STROBE LIGHT WITH MINIMUM FIELD SELECTABLE OUTPUT OF 15, 30, 75 CANDELAS. COLOR: RED. LABEL: 'FIRE'. "cd" - MINIMUM CANDELA SETTING
L WG cd	———	———	WALL MOUNTED FIRE ALARM STROBE LIGHT WITH MINIMUM FIELD SELECTABLE OUTPUT OF 15, 30, 75 CANDELAS. COLOR: RED. LABEL: 'FIRE'. "cd" - MINIMUM CANDELA SETTING "WG" - PROVIDE WITH PROTECTIVE STEEL CAGE WIRE GUARD.
cd SA # C	———	———	CEILING MOUNTED FIRE ALARM SPEAKER/STROBE LIGHT WITH MINIMUM FIELD SELECTABLE OUTPUT OF 1/4, 1/2, 1, & 2 WATTS AND 15, 30, 75 & 115 CANDELAS. COLOR: RED. LABEL: 'FIRE' "cd" - MINIMUM CANDELA SETTING "#" - MINIMUM DESIGN TAP SETTING - CAN BE ADJUSTED LOWER IN FIELD AS REQUIRED TO MEET AUDIBILITY REQUIREMENTS. "C" - CEILING MOUNTED
WG cd SA # C	———	———	CEILING MOUNTED FIRE ALARM SPEAKER/STROBE LIGHT WITH MINIMUM FIELD SELECTABLE OUTPUT OF 1/4, 1/2, 1, & 2 WATTS AND 15, 30, 75 & 110 CANDELAS. COLOR: RED. LABEL: 'FIRE' "cd" - MINIMUM CANDELA SETTING "#" - MINIMUM DESIGN TAP SETTING - CAN BE ADJUSTED LOWER IN FIELD AS REQUIRED TO MEET AUDIBILITY REQUIREMENTS. "C" - CEILING MOUNTED "WG" - PROVIDE WITH PROTECTIVE STEEL CAGE WIRE GUARD.
SA # cd	———	———	WALL MOUNTED FIRE ALARM SPEAKER/STROBE LIGHT WITH MINIMUM FIELD SELECTABLE OUTPUT OF 1/4, 1/2, 1, & 2 WATTS AND 15, 30, 75 & 110 CANDELAS. COLOR: RED. LABEL: 'FIRE' "cd" - MINIMUM CANDELA SETTING "#" - MINIMUM DESIGN TAP SETTING - CAN BE ADJUSTED LOWER IN FIELD AS REQUIRED TO MEET AUDIBILITY REQUIREMENTS.
SA # cd WG	———	———	WALL MOUNTED FIRE ALARM SPEAKER/STROBE LIGHT WITH MINIMUM FIELD SELECTABLE OUTPUT OF 1/4, 1/2, 1, & 2 WATTS AND 15, 30, 75 & 110 CANDELAS. COLOR: RED. LABEL: 'FIRE' "cd" - MINIMUM CANDELA SETTING "#" - MINIMUM DESIGN TAP SETTING - CAN BE ADJUSTED LOWER IN FIELD AS REQUIRED TO MEET AUDIBILITY REQUIREMENTS. "WP" - WEATHER PROOF, OUTDOOR RATED.
SA # cd WP	———	———	WALL MOUNTED FIRE ALARM SPEAKER/STROBE LIGHT WITH MINIMUM FIELD SELECTABLE OUTPUT OF 1/4, 1/2, 1, & 2 WATTS AND 15, 30, 75 & 110 CANDELAS. COLOR: RED. LABEL: 'FIRE' "cd" - MINIMUM CANDELA SETTING "#" - MINIMUM DESIGN TAP SETTING - CAN BE ADJUSTED LOWER IN FIELD AS REQUIRED TO MEET AUDIBILITY REQUIREMENTS. "WP" - WEATHERPROOF.
S # C	———	———	CEILING MOUNTED FIRE ALARM SPEAKER WITH MINIMUM FIELD SELECTABLE OUTPUT AUDIO OUTPUT OF 1/4, 1/2, 1, & 2 WATTS. COLOR: RED. LABEL: 'FIRE'. "#" - MINIMUM DESIGN TAP SETTING - CAN BE ADJUSTED LOWER IN FIELD AS REQUIRED TO MEET AUDIBILITY REQUIREMENTS. "C" - CEILING MOUNTED
P	———	———	DOUBLE ACTION ADDRESSABLE MANUAL PULL STATION WITH TAMPER-PROOF CLEAN POLYCARBONATE SHIELD HINGED AT TOP.
S	———	———	ADDRESSABLE OPTICAL SMOKE DETECTOR
S WG	———	———	ADDRESSABLE OPTICAL SMOKE DETECTOR. PROVIDE WITHPROTECTIVE STEEL CAGE WIRE GUARD.
H	———	———	ADDRESSABLE HEAT DETECTOR ACTUATED BY A FIXED TEMPERATURE OF 135°F OR A RATE OF RISE OF THAT EXCEEDS 15°F PER MINUTE.
CO	———	———	ADDRESSABLE CARBON MONOXIDE DETECTOR WITH TEMPORAL 3 & 4 SOUNDER BASE. PROVIDE WITH TONE PATTERN GENERATOR.
S	———	———	ADDRESSABLE DUCT MOUNTED SMOKE DETECTOR WITH SAMPLING TUBE. PROVIDE WITH KEYED REMOTE TEST STATION. DETECTOR INSTALLED ON SUPPLY AND RETURN DUCTWORK UPSTREAM OF FAN OR FILTERS OF INDICATED SYSTEM. FIRE ALARM CONTRACTOR SHALL BE RESPONSIBLE FOR MEASURING EXISTING DUCTWORK FOR SAMPLING TUBE SIZE. DETECTOR SHALL BE INSTALLED IN WEATHERPROOF ENCLOSURE IN CASE OF ROOF MOUNTED DUCTWORK INSTALLATION.
B	———	———	WALL MOUNTED ADDRESSABLE PROJECTED BEAM SMOKE DETECTOR.
R	———	———	AUXILIARY RELAY
RT	———	———	KEY ACTIVATED REMOTE TEST STATION. TEST STATION SHALL BE INSTALLED WITH WEATHERPROOF COVER WHEN INSTALLED ON ROOF IN CASE OF ROOF MOUNTED DUCTWORK.
D	———	———	MAGNETIC DOOR HOLDER. CONTRACTOR SHALL COORDINATE WITH ARCHITECT AND REFER TO DOOR HARDWARE SCHEDULE FOR REQUIRED CONTROL AND MOUNTING AT EACH INDICATED LOCATION.
F	———	———	SPRINKLER FLOW SWITCH
T	———	———	SPRINKLER TAMPER SWITCH
PR	———	———	SUPERVISORY PRESSURE SWITCH
ACM	———	———	ADDRESSABLE CONTROL MODULE
AM	———	———	ADDRESSABLE MONITOR MODULE
CFSD	———	———	COMBINATION FIRE SMOKE DETECTION - HOUSING PROVIDED BY MC, DETECTION DEVICE BY EC.



1 FIRE ALARM RISER DIAGRAM (1 OF 3)
NOT TO SCALE

FIRE ALARM SYSTEM INPUT/OUTPUT MATRIX

SYSTEM OUTPUTS

FACP ANNUNCIATION: ACTUATE COMMON ALARM SIGNAL INDICATOR; ACTUATE AUDIBLE ALARM SIGNAL; ACTUATE COMMON SUPERVISORY SIGNAL INDICATOR; ACTUATE AUDIBLE SUPERVISORY SIGNAL; ACTUATE COMMON TROUBLE SIGNAL INDICATOR; ACTUATE AUDIBLE TROUBLE SIGNAL

NOTIFICATION: ACTUATE ZONE OR DEVICE ADDRESS ALARM INDICATOR; ACTUATE GENERAL EVACUATION SIGNAL; DISPLAY CHANGE OF STATUS; TRANSMIT FIRE ALARM SIGNAL TO CENTRAL STATION; TRANSMIT SUPERVISORY SIGNAL TO CENTRAL STATION; TRANSMIT TROUBLE SIGNAL TO CENTRAL STATION

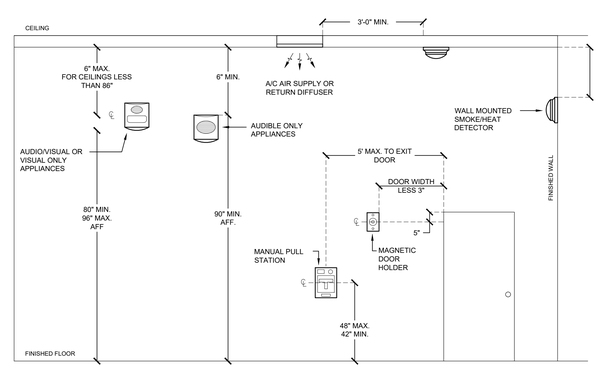
REQUIRED FIRE SAFETY CONTROL: RECALL ELEVATOR TO RECALL FLOOR; RECALL ELEVATOR TO ALTERNATE RECALL FLOOR; ACTUATE WARNING TO ELEVATOR CARS; DELAYED REMOVAL OF POWER FROM ELEVATOR; CLOSE ALL SMOKE DAMPERS; UNLOCK EXITS AND CONTROL DOORS; SHUT DOWN RECIRCULATING AIR HANDLING EQUIPMENT; ACTUATE SMOKE EXHAUST

SYSTEM INPUTS	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	
1 FIRE ALARM SYSTEM AC POWER FAILURE			X	X							X										1
2 FIRE ALARM SYSTEM LOW BATTERY					X	X						X									2
3 OPEN CIRCUIT					X	X						X									3
4 GROUND FAULT					X	X						X									4
5 NOTIFICATION APPLIANCE SHORT CIRCUIT					X	X						X									5
6 BUILDING MANUAL PULL STATIONS	X	X					X	X	X	X								X			6
7 SMOKE DETECTORS	X	X					X	X	X	X			X				X	X		X	7
8 HEAT DETECTORS	X	X					X	X	X	X			X				X	X		X	8
9 CARBON MONOXIDE DETECTORS	X						X		X		X										9
10 HVAC AIR DUCT SMOKE DETECTORS			X	X			X				X								X		10
11 SPRINKLER PRESSURE OR TAMPER SWITCH			X	X			X				X										11
12 SPRINKLER WATER FLOW IN BUILDING	X	X					X	X	X	X			X				X	X			12
13 SPRINKLER WATER FLOW IN ELEV EQUIP RM OR SHAFT	X	X					X	X	X	X			X		X	X	X	X			13
14 ELEV EQUIP RM AREA SMOKE DETECTOR	X	X					X	X	X	X			X		X		X	X			14
15 ELEV SHAFT AND ELEV EQUIP RM HEAT DETECTORS	X	X					X	X	X	X			X		X	X	X	X			15
16 ELEV LOBBY SMOKE DETECTORS - UPPER FLOORS	X	X					X	X	X	X							X	X		X	16
17 ELEV LOBBY SMOKE DETECTORS - RECALL FLOORS	X	X					X	X	X	X				X	X		X	X		X	17
18 ELEV CONTROLLER POWER SHUNT TRIP STATUS			X	X			X				X										18
19 FIRE PUMP POWER FAILURE/PHASE REVERSAL			X	X			X				X										19
20 FIRE PUMP RUNNING	X	X					X	X	X	X			X				X	X			20
21 FIRE PUMP SYSTEM NOT IN AUTOMATIC			X	X			X				X										21
22 -																					22
23 -																					23
	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	

FIRE ALARM NOTES

(APPLIES TO THIS SHEET ONLY)

1. FIRE ALARM SYSTEM WIRING, NUMBER AND SIZE OF CONDUCTORS SHALL BE PER MANUFACTURER'S RECOMMENDATIONS BUT NOT LESS THAN 18 AWG. COPPER CONDUCTOR.
2. FIRE ALARM SYSTEM SHALL BE FULLY ADDRESSABLE, WITH DISCREET ADDRESSES FOR EACH ACTIVATING DEVICE. MAIN PANEL SHALL IDENTIFY DEVICE BY ROOM NAMES AND LOCATIONS TO BE PROVIDED BY THE BUILDING OPERATOR.
3. ELECTRICAL CONTRACTOR SHALL FURNISH AND INSTALL A COMPLETE AND OPERABLE FIRE ALARM AND SMOKE DETECTION SYSTEM IN ACCORDANCE WITH NFPA 72, BUILDING CODE OF NEW YORK STATE AND ALL LOCAL CODES, INCLUDING ALL CIRCUITRY, SMOKE DETECTORS, HEAT DETECTORS, ZONE MODULES, ANNUNCIATION DEVICES, FIRE ALARM PANEL, POWER MODULES, BATTERY BACKUP, MUNICIPAL TIE AND CONNECTION AND OTHER MISCELLANEOUS ITEMS NOT NECESSARILY DETAILED ON THIS DRAWING TO RENDER FIRE ALARM SYSTEM COMPLETE AND OPERATIVE.
4. ELECTRICAL CONTRACTOR SHALL HIRE MANUFACTURER'S REPRESENTATIVE TO FULLY DEMONSTRATE SYSTEM FUNCTION, OPERATION AND MAINTENANCE OF FIRE ALARM SYSTEM TO OWNER.
5. HVAC CONTRACTOR SHALL INSTALL DUCT SMOKE DETECTORS IN DUCTS. DUCT SMOKE DETECTORS SHALL BE FURNISHED AND WIRED BY ELECTRICAL CONTRACTOR.
6. ELECTRICAL CONTRACTOR SHALL PROVIDE AND INSTALL ALL WIRING, RELAYS AND MISCELLANEOUS EQUIPMENT ASSOCIATED WITH HVAC AIR HANDLER UNIT SHUTDOWN FROM FIRE ALARM PANEL.



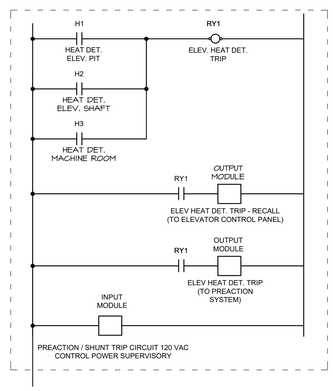
2 FIRE ALARM DEVICE MOUNTING HEIGHT REFERENCE (PER NFPA 72)
NOT TO SCALE

ELEVATOR SPRINKLER PREACTIVE SYSTEM CONTROL REQUIRED COMPONENTS

1. 135°F HEAT DETECTOR IN ELEVATOR PIT WITHIN 24 IN. OF SPRINKLER HEAD.
2. 135°F HEAT DETECTOR IN ELEVATOR SHAFT WITHIN 24 IN. OF SPRINKLER HEAD.
3. 135°F HEAT DETECTOR IN ELEVATOR MACHINE ROOM WITHIN 24 IN. OF SPRINKLER HEAD.
4. FIRE ALARM PANEL OUTPUT MODULE FOR ELEVATOR RECALL.
5. FIRE ALARM PANEL OUTPUT MODULE FOR ELEVATOR/SPRINKLER PREACTION CONTROL.
6. ELEVATOR CONTROL PANEL OUTPUT MODULE (OR ELEVATOR CONTROL PANEL N.O. CONTACT PAIR) FOR ELEVATOR RECALL COMPLETE STATUS.
7. ELEVATOR POWER DISCONNECT FUSIBLE DISCONNECT SWITCH
   - 6.1. EQUIPPED WITH SHUNT TRIP MECHANISM OPERATED BY FIRE SAFETY INTERFACE RELAY (2017 NEC 620.51).
   - 6.2. EQUIPPED WITH AUXILIARY CONTACT THAT DISCONNECTS ANY ADDITIONAL EMERGENCY OR STANDBY POWER FROM THE LOAD WHEN THE DISCONNECT SWITCH IS IN THE OPEN POSITION (2017 NEC 620.91).
8. FIRE ALARM PANEL 120VAC INPUT MODULE FOR SUPERVISORY MONITORING OF CONTROL POWER.

SEQUENCE OF OPERATION

1. HEAT DETECTOR TRIPS (ELEVATOR PIT, MACHINE ROOM, OR ELEVATOR SHAFT).
2. ELEVATOR RECALL CONTACTS FROM FIRE PANEL TO ELEVATOR CONTROL PANEL ACTIVATE.
3. ELEVATOR RECALLS TO DEFAULT LEVEL.
4. ELEVATOR RECALL COMPLETE STATUS CONTACTS ACTIVATE.
5. ELEVATOR POWER SUPPLY SWITCH SHUNT TRIP COIL IS ENERGIZED.
6. ELEVATOR POWER SUPPLY SWITCH OPENS.
7. LOSS OF 120 VAC CONTROL POWER GENERATES FIRE ALARM PANEL TROUBLE ALARM (SUPERVISORY).



3 ELEVATOR SPRINKLER PREACTION DETAIL
NOT TO SCALE

TWIN TOWERS MIDDLE SCHOOL

Additions & Alterations

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CONSTRUCTION DOCUMENTS

Professional Seal

No.	Date	Issue
3	02/23/2024	ADDENDUM #6
2	12/14/2023	ISSUE FOR BID
1	04/14/2023	NYSED ISSUE

Sheet Title

FIRE ALARM: DETAILS

Job No.	Date
2021-1087	09/08/2022
Scale: AS NOTED	Drawn / Checked: BH/DC SZ

Sheet Number

FA601