7.1 Power Distribution

7.1.1 Electric Service

Description/Design Approach:

A. General

1. At the Schematic Design Phase, the design engineer shall submit a service request/load letter to the utility company. This request shall inquire about the available service voltage, utility short circuit current and impedance, charges and any other requirements. The request shall also indicate the desired voltage and point of entry. Also, the engineer should transmit a copy of the site plan with all available geotechnical, architectural and structural information including the following documentation. Drawings should also be submitted in AutoCAD format and when available copies of the approved drawings by the Department of Buildings.

    a. Legal Survey of Property (and/or with sidewalk elevations in the area of proposed vaults)
    b. Builder's Paving plan
    c. Environmental Study for the site
    d. Soils report with boring data
    e. Site Plan with all utilities
    f. Foundation drawings
    g. Architectural drawings for the building in the area of proposed vaults with floor elevations
    h. Structural drawings for the building in the area of the proposed vaults
    i. Details of any special construction at proposed vault location such as planting areas, sidewalk snow melting devise, street lights, hydrants, etc

2. The available voltage in NYC is generally 120/208 volts. In some areas of NYC, 265/460 volts may be available. If 265/460 volts is available, that is the preferred voltage provided it's cost effective and feasible based on the site conditions. When both voltages are available, the designer is to request both cost options from Con Edison so an economic analysis can be made in item 4 below. When the available voltage is 120/208 volts, the engineer must consider the cost effectiveness of stepping up the voltage to 265/460 volts for motor loads. The 120/208 volts shall be used for receptacles and other systems.

3. When the available voltage is 265/460 volts, the engineer must consider connecting the lighting and motor loads and stepping down the voltage to 120/208 volts for receptacles and other systems.

4. In either case, the design engineer must perform an economic analysis to justify the service voltage and design option selected. The cost should include internal distribution and associated work savings as well in comparing both voltage options.

5. If transformers (both step-up and step-down) are used in a project, the electrical engineer must coordinate with the HVAC discipline for the ventilation requirements.

6. If a step-up transformer is provided, the switch on the primary side of the step-up transformer must be carefully selected and specified to accommodate the prevalent high in-rush currents. The transformer in-rush current shall be limited to 10 times rated current.

7. For Con Edison Point of Entry (POE) service, rather than one foot past the property line, the conduits shall be run to one foot past the street curb line for all capacity projects. For all CIP projects, the POE service conduits shall be run to one foot past the property line when no sidewalk work is done or no sidewalk sheds are to be provided as part of the project or 1 foot past the street curb line when new sidewalk work is done or sidewalk sheds exists or sidewalk sheds are installed as part of the project

8. **For electrical service takeoffs and switchboards, the largest size shall not be larger than 4,000 Amps for 120/208-volt or 265/460-volt systems. There can be multiple service takeoffs at a maximum of 4,000 amps for each service takeoff for 120/208-volt or 265/460-volt systems.**

B. Electrification Projects/CIP Projects

1. All requirements shall apply as for a new service.

2. Electrical designer shall design new electrical service and determine the POE taking into consideration existing conditions and constructability and phasing of new service into the existing building. Designer shall evaluate existing electrical service by engaging electrician and switchgear experts/manufacturers during design to determine existing conditions and how to reinforce based on Con Edison service ruling.

   a. If Con Edison rules the existing 208-volt service can be reinforced due to existing vault space or available conduit spares and provides a new takeoff, existing service reinforcement should be considered since the existing service can be left alone and only new service switches are required to be added due to a new service takeoff for new loads.

   b. If 460-volt service is available, a hybrid electric service condition may be considered due to site space constraints where the existing 208-volt service can be left for the existing building loads and a new 460-volt service provided only for the new mechanical equipment loads.

   c. When there is not enough area to provide a vault (208-volt or 460-volt) within the public right of way or not enough area to do a network protector room or block house, provide a 265/460-volt pad-mounted transformer on the school property where Con Edison has a radial system in the Con Edison service area.

3. Preference is to have developer agreements with Con Edison to control scheduling for the project.

4. The Con Edison load letter shall indicate developer agreement would be preferred if new vault is being ruled at the requested POE.

5. The backup electrical service size for the heat pumps is to be based on 75% of the total size of all the heat pumps based on functioning energy recovery wheel at 50% efficiency**.** If a temporary street chiller/heater connection is provided at the building as a backup, there is no need for electric boiler backup. The electrical service size should never be sized for the simultaneous draw of the heat pump draw plus the backup redundancy electric heating draw, because those two loads will not occur simultaneously. **When providing a temporary boiler connection to the building for the backup temporary water heating system for the HVAC, coordinate with mechanical engineer for size of boiler to be provided. Provide**

electrical connection provision at the temporary water connection location. Provide camlock connections with disconnects on exterior of building.

6. Coordinate with the mechanical engineer and manufacturer to ensure that when looking at the electrical load of the heat pumps with auxiliary supplemental electric heating or the backup all-electric heating (heat pump compressors failed), only the largest of the two is included and not both in the electric service calculation when doing the load letter to Con Edison since, the two loads will never occur simultaneously.

C. NYCDOT Requirements

When a transformer vault is required by the utility company, the design engineer shall establish a reference number with the NYC Department of Transportation (NYCDOT) Office of Permit Management and meet with NYCDOT to secure vault grating location approvals. This meeting with NYCDOT shall take place during the Design Development Phase. Forms and information can be obtained at NYCDOT at: www.nyc.gov/dot or by calling (212) 676-9847.

D. Relevant Conceptual Sketches

- Sample load letter requesting service to the utility company

November 30, 2000

Consolidated Edison of New York
Address

Attention: Mr./ Ms. xxx
Major Account Services Representative

Re: P.S./I.S. 194 – Bronx (New School)
Block 3834, Lot 70
1301 Zerega Avenue, Bronx

Dear Mr./ Ms. xxx,

The NYC School Construction Authority, in conjunction with the Department of Education, is currently preparing plans and specifications for the construction of a new Primary/Intermediate School at the above mentioned location.

The building gross floor area is 140,000 square feet comprising of four stories educational spaces along with a Penthouse and Cellar and will be fully air-conditioned. Our preliminary estimate of the loads of the new building is as follows:

General Lighting and Convenience Outlets	560 KW
2 Chillers @ 285 KW	570 KW
3 Heat Pump Unit @ 3 KW	9 KW
20 Electric Unit Heater @ 7.5 KW	150 KW
2 Split A/C Units @ 5 KW	10 KW
2 Air Handling Units @ 30 HP	60 HP
6 Air Handling Units @ 20 HP	120 HP
5 Air Handling Units @ 15 HP	75 HP
6 Return Fans @ 10 HP	60 HP
7 Return Fans @ 7 ½ HP	53 HP
2 Smoke Purge Fans @ 15 HP	30 HP
15 Exhaust Fans @ 2 HP	30 HP
5 Chilled Water Pumps @ 40 HP	200 HP
2 Boiler Burner @ 5 HP	10 HP
3 Boiler Compressor @ 3 HP	6 HP
2 Boiler Feed Pumps @ 3 HP	3 HP
2 Vacuum Pumps @ 2 HP	4 HP
2 Cooling Tower @ 20 HP	40 HP
1 Fire Pump	30 HP
Miscellaneous single phase motors	20 HP
1 Elevator	40 HP
	Total: 2080 KW

The largest motor will be the 40 HP, Chilled Water Pump Unit.

Based on the above estimate, we are proposing to install a 6,000 AMP, 120/208 volts, 3-phase, 4-wire service, comprised of fifteen sets of 4-500MCM cables into the Electrical Switchboard Room in the Cellar.

Enclosed please find two copies of the Site and Cellar Plan indicating the Electrical Switchboard Room and our preferred Point of Entry. We would like to request a developer's agreement if vault is being ruled for the site. Kindly return one copy along with your service layout and available short circuit current. In order to confirm the location of available service suitable for the proposed building, we would like to schedule an early meeting with you at the site at your convenience.

Please contact the writer at xxxx for any other information you may require from the School Construction Authority. Please address your reply to the undersigned.

Sincerely,

xxxxx
Project Engineer

cf: SCA/A&E Design Manager
Project Architect

Enclosure
Site and Cellar Plan

Enclosed please find two copies of the Site and Cellar Plan indicating the Electrical Switchboard Room and our preferred Point of Entry. Kindly return one copy along with your service layout and available short circuit current. In order to confirm the location of available service suitable for the proposed building, we would like to schedule an early meeting with you at the site at your convenience.

Please contact the writer at xxxx for any other information you may require from the School Construction Authority. Please address your reply to the undersigned.

Sincerely,

xxxxx
Project Engineer

cf: SCA/A&E Design Manager
Project Architect

Enclosure
Site and Cellar Plan

7.1 Power Distribution

7.1.2 Emergency and Standby Generator

Description/Design Approach:

A. Per Section BC 2702.1 of the 2022 NYC Building Code, a diesel emergency generator, rated for stand-by operation, shall be provided in schools meeting any of the following conditions as per Chapter 27 of the 2022 NYC Building Code and shall be sized to accommodate all systems indicated in paragraph C below:
   - An occupied floor 75 or more feet above the lowest level of fire department vehicle access (Section BC 2702.2.14).
   - A gross floor area over 15,000 square feet on each floor (Section BC 2702.2.20).
   - A total gross floor area of 100,000 square feet or more (Section BC 2702.2.20).
   - For new construction when a fire alarm system with a voice communication system is provided (required for schools with greater than 100 occupants).
     - **Note for** projects in existing buildings when a new fire alarm with voice/alarm communication is being installed, SCA policy is to have the engineer to provide a UPS system as the secondary power source for the new fire alarm system with emergency voice/alarm communication, since there usually is no room within the existing building and/or lot/line issues and/or roof structural issues. (Refer to DR 7.3.15 for DOB letter and filing requirements with FDNY.)
   - As per Section BC 3002.4.1, a new elevator serving five stories or more is provided (new or existing building) and the floor square footage or total gross floor area square footage of Section BC 2702.2.20 is exceeded.

B. As required standby power must be provided for the following items per Section BC 2702.2.20 (though an emergency generator for the building may not have been required by code because it did not meet the requirements listed in paragraph A above), an emergency generator, rated for stand-by operation, shall be provided and sized to accommodate all systems indicated in paragraph C below:
   - All “Elevators” and “Platform Lifts (wheelchair lifts)” that serve as an “Accessible Means of Egress” per Sections BC 1009.5, BC 2702.2.5 and BC 3002.4.1.
     - Stages require two means of egress (Sections BC 1009.1 and BC 410.6.1). When a minimum of two means of egress is required, two accessible means of egress must be provided (Section BC 1009.1). Hence, if a required accessible means of egress, from a stage, is provided by an “Elevator” or “Lift”, it is required to be provided with stand-by power. When feasible and practical, the design of a stage should incorporate two accessible means of egress (i.e., stairs, corridors, ramps, etc.) that are independent from a “Lift” that provides access to a stage. The intent for most schools is to utilize platforms, not stages, and would not need to meet the requirements, but the intent is to have a means of egress independent from a ‘lift’ that provides access to the platform.
   - Smoke control system required for atriums (3 stories and above) and high-rise building stairways (Section BC 2702.2.2). Per Sections BC 403.5.4 and BC 1023.11, every required interior exit stairway and ramp serving occupied floors more than 75 feet above the lowest level of fire department vertical access shall be provided with smoke-proof enclosures or pressurized stairway.
   - A smoke venting system: Stages require an emergency ventilation system if greater than 1,000 sq. ft. in floor area or with a stage height higher than 40 ft. Reference Section BC

410.3.7.1 for roof vent requirements (preferred) or Section BC 410.3.7.2 for smoke venting requirements. Smoke venting systems shall be automatically activated by heat detector, smoke detector, sprinkler flow, etc. and supplemental manual activation.

- Power and lighting for the Fire Command Center required by Sections BC 403.4.6 and BC 2702.2.20.2.

C. Where an emergency generator is provided, the emergency loads shall be divided into the following classifications, each of which shall be connected to the emergency generator distribution system via its own dedicated automatic transfer switch (ATS):
   - Emergency Systems (NYCEC Article 700)
   - Legally Required Standby Systems (NYCEC Article 701)
   - Optional Standby Systems (NYCEC Article 702)
   - Fire Detection and Alarm Systems (NYCEC Article 700.10(E))
   - Fire or Sprinkler Booster Pumps (NYCEC Article 695).

   Coordinate with the Architect to provide separate ATS rooms, as the Code does not permit the Optional ATS to be in the same room as the emergency, legally required standby ATS and fire alarm ATS as per Section BC 2702.1.7.1.

   1. The following systems shall be connected to the Emergency Systems ATS per Section BC 2702.2.20.1:
      - Emergency lighting in corridors, exit discharges, Areas of Refuge, Safe Areas, stairs, places of assembly, electrical rooms containing electrical point of entry or building service disconnects (e.g., Electrical Service rooms), fire pump/sprinkler booster pump rooms, generator rooms, and public restrooms with an area greater than 300 ft².
      - Exterior lighting fixtures immediately adjacent to exit discharge doorways
      - Emergency Lighting for Fire Rescue Areas, Horizontal Exits, Holding Areas and Areas of Rescue Assistance
      - Signs or lighting meeting the required FC level identifying Fire Rescue Areas, Holding Areas, Horizontal Exits and Areas of Rescue Assistance
      - Intercom systems for Fire Rescue Areas, Holding Areas and Areas of Rescue Assistance
      - Elevator emergency communication
      - Exit Signs
      - Elevator cab lighting
      - Gas Leak Detection and Alarm System per Section BC 918.5
      - Exhaust fan in gas meter room (if any)
      - Generator accessory power for battery chargers, enclosure heaters, enclosure lighting, etc...
      - Fuel oil transfer pumps serving the generator

   2. The following systems shall be connected to the Legally Required Standby Systems ATS per Section BC 2702.2.20.2:
      - Elevators as indicated below.
        - Per Section BC 3003.3.1, Elevator in Readiness for Fire Department Emergency Access, except as provided in Section BC 3003.3.2 in buildings five stories in height or more, underground buildings as described in Section 405.1, and high-rise buildings, at least one elevator shall be kept available for immediate use by the Fire Department during all hours of the night and day, including holidays, Saturdays and Sundays. The elevator in readiness shall serve all floors of the building. For buildings where a Fire Service Access Elevator (FSAE) is provided,

the FSAE shall serve all floors of the building. There shall be available at all times a person competent to operate the elevator. However, an attendant shall not be required for buildings with occupied floors of 150 feet or less above the lowest level of the Fire Department vehicle access that have elevators with automatic or continuous pressure operation with keyed switches meeting the requirements of ASME A17.1-2013 as modified by Appendix K, Chapter K1, of the 2022 NYC Building Code so as to permit sole use of the elevators by the Fire Department. Provide for a manual transfer of power to each elevator.

- For high-rise buildings, power is to be provided for up to three elevators at one time, with manual transfer of power to all other elevators if more than three are provided in the building.

- Air conditioning or ventilation systems serving elevator machine rooms as per Section BC 3003.1.4.
- Wheelchair lifts if they are the accessible means of egress.
- Smoke Control Systems (including smoke control systems required for atriums and high-rise stair pressurization systems.)
- Stages requiring an emergency ventilation system if greater than 1,000 sq. ft. in floor area or with a stage height higher than 40 ft.
- Power and lighting for the Fire Command Center

3. The following systems shall be connected to the Optional Standby Systems ATS:
   - Public Address System
   - Telephone System
   - BACnet Server
   - Intrusion Alarm System
   - LAN System
   - Video Surveillance System
   - Lighting for Principal's Office, General Office, Medical Suite, Custodian Office and Electrical Rooms with point of entry or service disconnect

4. The following systems, as per Section 2702.2.20.1, shall be connected to the Fire Detection and Alarm Systems ATS:
   - Emergency Voice/Alarm Communication System (includes the ARC system in high-rise buildings and the Auditorium Pre-signal system, where required)
   - Automatic fire detection systems
   - Fire Alarm System

5. Electrically powered fire pumps, including manual fire pumps, automatic fire pumps and sprinkler booster pumps per Section BC 2702.2.20.1. The fire or sprinkler pump controller shall have its own integral dedicated and listed ATS. **The fire or sprinkler pump controllers shall have an integral surge protective device.**

Note that the Post-Fire Smoke Purge Systems are not required to be connected to the emergency power source.

D. An optional standby generator is to typically be provided for schools in a flood zone when undergoing a flood mitigation project at the school to power the emergency sump pumps (Refer to DR 1.3.1.11). The generator is to be a gas-powered generator (if gas is available) and as required by Section BC 2702.4, the following items are required to be connected to the generator when the item is required by the code:
   - Emergency Lighting if not already on battery backup;

- Fire Alarm Systems; and
- Elevators for buildings having occupied floors located more than 75 feet above the lowest level of fire department vehicle access, with at least one elevator that serves all floors.

Note: Natural gas fuel source is permitted where the 2022 NYC Building Code permits gas generators as per the Section EC 700.12(D)(2)(c) of the 2025 NYC Electrical Code that goes into effect on December 21, 2025.

E. Emergency Generators shall be installed in accordance with the New York City Electrical Code, NFPA 110 and NFPA 111. Emergency Generators shall be listed in accordance with UL 2200 and shall be registered with the NYCDEP. Fuel storage tank shall be an integral 275-gallon tank or greater (not exceeding 330 gallons). Its size shall be based on fuel consumption to provide at least six (6) hours running capacity. Optional standby generators, where provided, are to meet the same requirements below, as applicable to the fuel source.

1. Location of the emergency generator shall be coordinated with the architect at the Preliminary Design phase. The preferred location of the emergency generator is outdoors on grade (and not within the building footprint) within close proximity to the Electrical Service Room, in a suitable enclosure with accessibility for fueling. For projects in a flood plain, generators shall be mounted on a structure base that is a minimum of 2 feet above the greater of the FEMA FIRM or Pre-FIRM maps. Provide noise abatement barriers if standard UL 2200 unit will not meet DEP noise criteria for surrounding buildings.

2. Exhausts shall terminate a minimum of 10 feet from building openings (forced air intakes for mechanical equipment, operable windows and doors) measured horizontally, which is in keeping with the requirements of Section MC 811.2 of the 2022 NYC Mechanical Code, NFPA 37-15, and NFPA 211-13 (based on similar requirements in Section MC 401.4). Where the 10 feet requirement cannot be achieved, exhausts shall terminate at least 3 feet above the air intake openings when the exhaust termination is located within 10 feet from the air intake opening per Section MC 401.4.4 and NFPA 211-13. No point of the generator enclosure itself shall be located closer than 5 feet away from openings in walls per Section 4.1.4 of NFPA 37-15. At property lines it is preferred to provide additional distance and thus generators are to be located at least 10 feet from property lines unless approved as a deviation due to space constraints.

3. The generator shall be situated such that, per Section MC 1305.6.2, the diesel fuel oil fill terminal is located not less than 2 feet laterally from any building opening and not less than 5 feet away from any subway grating. Also, the fill terminal should not be more than 75 ft from the street curb or driveway to permit fueling.

4. Per Section MC 1305.7.2, diesel fuel oil vent lines shall terminate outside of buildings not less than 2 feet (measured vertically or horizontally) from any building opening.

5. The normal and emergency vents of a grade mounted generator shall have 3-foot pipe extension for each vent in accordance with NFPA 30-12. Support pipe extension as required. The normal and emergency vents may be combined into one vent pipe and be in accordance with the sizing methodology of Section 22.7 of NFPA 30-12. The designer shall show the combination vent pipe routing on the Drawings. Per Section MC 1305.8.4, calculations shall be performed (and submitted to the Authority for review, if requested) verifying that any extensions of the normal and emergency vent piping are in accordance with NFPA 30-12. In addition, per Table 1305.7(2) calculations shall be performed for the normal venting of UL 142 tanks. Emergency venting by long bolted covers which lift under emergency venting

pressures are not allowed Section MC 1305.8. Venting shall terminate outside of the enclosure. Vent pipes shall terminate in a weatherproof vent cap or fitting or weatherproof hood and shall not employ screens finer than No. 4 mesh. All vent caps shall have a minimum free open area equal to the cross-sectional area of the vent pipe. (Refer to Section MC 1305.7.3).

6. In the case where the generator is located above the lowest floor (including a roof mounted generator) and is fed by lower elevation transfer pumps, the designer shall show termination of the supply and return lines routed from the lower floor with flanged connections that in turn connect to the external flanged connections of the generator tank. These flanged connections are to be provided to enable testing of the fuel oil supply and return lines routed from the lower floors and to isolate the generator's UL 142 fuel tank during the line testing. All generator connections and flanges shall be shown located outside the UL 2200 generator enclosure as they must be delivered as integral components of the factory shipped unit; no field assembly or modification of the generator factory provided connections are permitted. The normal and emergency vents of the generators located above the lowest floor shall be combined into one vent pipe and be in accordance with the sizing methodology of Section 22.7 of NFPA 30-012 and per Section MC 1305.8.4. The Designer shall show the combination vent pipe routing on the Drawings. The combination normal and emergency vent piping shall be piped into the vent or top of the tank of the lowest floor storage tank that supplies the fuel to such tank. Per Section MC 1305.8.4, calculations shall be performed verifying that any extensions of the normal and emergency vent piping are in accordance with NFPA 30-12. Per Section MC 1305.9.4, the designer shall show a drainpipe installed at the base of shafts enclosing the supply and overflow piping. The pipe shall lead to a dedicated sump (preferred) or minimum 55-gallon container with a leak detection alarm, arranged so as to sound an alarm and shut down the transfer pump. The alarm shall be connected to a local audible alarm and to a remote alarm located at a supervising station. The Designer is advised that, per Section MC 1305.9.11, in systems with equipment above the lowest floor where such equipment is designed to operate utilizing fuel stored above the lowest floor, piping diameters shall not exceed 4".

7. The emergency and legally required standby automatic transfer switches and distribution panel shall be located in a room separate from the electrical service distribution equipment and switchgear and separate from the optional standby automatic transfer switches and distribution panels. The emergency and legally required standby equipment room shall be of 2-hour fire rated construction.

8. The optional standby automatic transfer switches and distribution panel shall be located in a room of 2-hour fire rated construction separate from the electrical service distribution equipment and switchgear and separate from the emergency and legally required standby automatic transfer switches and distribution panel.

9. Distribution associated with the emergency and legally required standby power systems shall not pass through the room containing main or primary electrical service equipment as per Section BC 2702.1.2.1.

10. The generator's remote annunciation panel, which is located in the custodian's office, shall be connected to the intrusion alarm panel for DOE central station monitoring.

11. For generators that cannot be in self-enclosed units outside the building, special attention shall be given to the NYC Mechanical Code requirements regarding fuel oil tank and fuel oil piping pressure testing, venting, fill and exhaust piping arrangement.

F. When an emergency generator is not being provided, as the conditions of paragraphs A and B above requiring such generator are not met, the remaining systems listed in Section BC 2702 that are part of the project must have other emergency or standby power as appropriate for the system (such as a battery back-up) per the applicable code reference.

G. A listed surge protective device shall be installed in or on all emergency systems switchboards and panelboard as per Section EC 700.8 for all projects that will follow the 2025 NYC Electrical Code.

H. For all projects that will follow the 2025 NYC Electrical Code, if the emergency/standby system relies on a single alternate source of power, the emergency/standby system shall include a permanent switching means to connect a portable or temporary alternate source of power, which shall be available for the duration of the maintenance or repair. The permanent switching means to connect a portable or temporary alternate source of power, such as generator via camlock cabinet with disconnect switch located on outside of building. Per the code, the fire alarm connection and fire pump connection must also have a tap between the camlock box and line side of disconnect switch. Also, a Kirk Key Interlock system must be provided to prevent both sources from feeding the emergency system simultaneously. The switching point must also include a contact point that signals a visual and audible signal at the custodian's office that the permanent generator has been disconnected from the emergency system. The switching point must also include control wiring from the automatic transfer switches to automatically start the portable or temporary generator.

I. Relevant Documents

- HVAC Design Requirement 6.2.21, Emergency Generator and Fuel Tank.

7.1 Power Distribution

7.1.3 Receptacles

Description/Design Approach:

A. Switched and Non-switched Receptacles

In order to reduce plug loads, the designer shall indicate on the drawings the locations of switched (Controlled) and non-switched receptacles. All switched receptacles shall be controlled through the respective electrical panel and shall be on a timer to shut off after school hours as indicated below or as needed. All switched receptacles shall be marked "Controlled" in silk screened letters as per UL 498 standards. As per Section 8.4.2 of ASHRAE 90.1-2016 (Appendix CA of the 2020 NYCECC), a minimum of 50% of receptacles are required to be switched.

B. Classrooms Receptacles

1. Classrooms for general instruction shall be provided with the following minimum convenience outlets, typically meeting the spacing and location as indicated on the Room Planning Standards:

- Front Teaching Wall**:**
  - One switched 20-Amp**,** 125-Volt, specification grade quad receptacle under the interactive whiteboard
  - One non-switched 20-Amp, 125-Volt, specification grade, quad receptacle with surge protection located near the teacher's computer station (Note: Provide data outlets per Design Requirement 7.3.5 next to the receptacles**)**

- Rear Wall:
  - One non-switched 20-Amp, 125-Volt, specification grade, duplex receptacle.
  - Additional non-switched 20-Amp, 125-Volt, specification grade, duplex receptacle on a dedicated circuit for the laptop charging cart.

- Window Wall: One non-switched and one switched 20-Amp, 125-Volt, specification grade, duplex receptacles placed above the bookcases and spaced as per the Room Planning Standards.

- Corridor Wall: One **non-**switched 20-Amp,125-Volt, specification grade, duplex receptacle on corridor-side wall near entry, used for cleaning purposes or to be used for the CASS system

- Computer counter:
  - One switched 20-Amp, 125-Volt, specification grade, Quadruplex receptacle under the counter (18" AFF) with surge suppression for computer, printer and/or scanner.
  - One switched quad receptacle above the counter (36" above finish floor) for the students use. (Note: Provide a data outlet as per Design Requirement 7.3.5 next to the receptacle.)

2. Pre-k and Kindergarten classrooms:
   - Front teaching wall and corridor wall: Similar to general instruction classrooms.
   - Rear Wall:
     - One non-switched 20-Amp, 125-Volt, specification grade, duplex receptacle
     - One switched 20-Amp, 125-Volt, specification grade, duplex receptacle.
     - Refer to the room planning standards.
   - Window wall: One non-switched 20-Amp, 125-Volt, specification grade, duplex receptacle
   - For kindergarten and pre-kindergarten classrooms, safety type receptacles are to be installed and the surge suppression feature should be provided at the panel.

C. Corridors, Lobbies, Places of Assembly, Parapet, Pipe Chases and Roofs

Receptacles for maintenance, non-switched 20-Amp, 125-Volt, specification grade, duplex type, shall be provided so that all areas in the spaces are accessible by a 50' extension cord. Parapet-mounted receptacles shall be GFCI protected.

D. Offices

Receptacles for which the office computers and printers will be plugged into shall be switched 20-Amp, 125-Volt, specification grade, duplex receptacle.

E. Kitchens and Bathrooms

Receptacles shall be 20-Amp, 125-Volt, GFCI protected duplex outlets. Outlet covers shall be stainless steel. For the cooking equipment under a Type I Exhaust Hood, provide waterproof receptacle with the GFCI circuit breaker in the panel that controls the receptacle circuit serving the equipment(s) under the hood.

F. Outlet Circuits

Outlet circuits shall be designed efficiently to minimize the number of circuits required. Typical classroom should be done with a maximum of 4 per classroom while Pre-K and kindergarten with a maximum of 2. Variations shall be discussed with A&E.

G. Tamper Resistant Receptacles (Safety Type Receptacles)

All receptacles in schools shall be tamper-resistant receptacles throughout the school as per Section EC 406.12 of the 2025 NYC Electrical Code (effective 12/21/25 when permits are pulled). Receptacles in the following locations shall not be required to be tamper resistant:

- **Receptacles located more than 5.5 feet above the floor.**
- **Receptacles part of a luminaire or appliance**
- **A single receptacle or duplex receptacle for two appliances, located within the dedicated space for each appliance that, in normal use, is not easily moved from one place or another and that is cord-and-plug connected.**

H. Ground Fault Circuit Interrupter Protection

Please ensure that circuit or receptacle have ground fault circuit interrupter protection for vending machines, sump pumps, drinking water fountains and bottle fill stations, and any receptacle that is within 6 feet from the top inside edge of bowl of the sink, or water

source, crawl spaces at or below grade level, unfinished areas of basements, locker rooms with showering facilities, indoor damp and wet locations, outdoors, rooftops, kitchens, and bathrooms.

7.1 Power Distribution

7.1.4 Kitchen Electrical Requirements

Description/Design Approach:

A. Electric kitchen equipment systems and electrically and mechanically operated gas valves, when provided**,** shall be installed in kitchens and interlocked with auxiliary systems and cooking equipment to provide proper control and safe operation as well as emergency features. For all Type I hoods, the interlocks and control schemes shall be as follows:

1. Exhaust Fan Interlock with Appliances

   a. The NFPA requires the energy source (gas or electric) producing heat for each appliance under the kitchen exhaust hood to be interlocked with the kitchen exhaust fan.

      In general, each gas appliance (if provided or existing) contains an integral gas shut down solenoid. Appliances with a gas pilot must be provided with a pilot bypass. The solenoid control circuit is factory-wired to the main electrical supply for the appliance. For both gas- or electric-operated appliances, the main electrical supply shall be interlocked with the exhaust fan. The power for the equipment under the hood shall be served from dedicated power panel**s** (KPP-2.X) and equipped with as many branch circuit breakers as required. Provide additional panels as required to feed the electric load under the hood and label KPP-2.1, KPP-2.2, etc. These power panels (KPP-2.X) shall be controlled via an auxiliary contact from the hood exhaust fan motor starter incorporated in the switching control circuit of a remote control switch furnished inside each of the KPP-2.X panels. For KPP-2.X panels, limit the size of the panels to 400A to accommodate the contactors and to limit the quantity of contactors to a minimum. All control coils shall be wired in series so the remote control switch can control all contactors simultaneously.

2. Fire Suppression System/Appliance Shutdown

   a. When the fire suppression system is activated, the energy source for the appliances under the hood must be shut down. However, the exhaust fan must continue to operate so as to aid in dispersing the fire suppression agent. The fuel and electrical supply reset shall be manual as per Section BC 904.12.2 of the 2022 NYC Building Code.

   b. To accomplish this, a normally closed pressure-activated micro switch, supplied by the fire suppression system contractor, shall be wired to the control loop of the KPP-2.X relays. This will shut down panels KPP-2.X when the fire suppression system is activated. In addition, a second micro switch contact shall be provided to notify the Fire Alarm Control Panel when the fire suppression system is activated.

   c. When provided or existing, the main gas supply is shut down by a mechanically operated valve, activated by the fire suppression system. This valve has no electrical connections.

3. Electric Appliances

   When the kitchen only has electrical appliances under the hood (typical of new design and kitchen equipment replacement projects), there shall be an emergency shutoff switch that will turn off all electrical appliances under the hood. The shutoff switch shall be located at each

egress door. Each shutoff switch shall be tied together so that any one of them will de-energize all the appliances under the hood. The electrical shutoff switch shall be a red mushroom push-button labeled “Emergency Shutoff” and located at each means of egress of the kitchen. The red mushroom pushbutton shall have a key to reset the switch.

4. Gas Appliances **-** Master Control Gas Valve (MGCV)

   When the kitchen only has gas appliances under the hood (existing kitchen or when approved on a special basis), the Master Control Gas Valve shall be capable of shutting off all gas flow to the kitchen in case of emergency. This sub-system is comprised of a 120-Volt 60 Hz AC valve, a relay control panel, and a master control station. The master control station shall contain a key switch to energize the gas valve and a red mushroom push-button labeled "Emergency Gas Shutoff" and be located near the kitchen entrance door. The Master Control Gas Valve shall be controlled by a relay control panel located underneath the valve, and they shall be located near the kitchen entrance door. Additionally, remote control stations shall be located at each means of egress of the Kitchen. The Master Control Gas Valve shall control the gas supply to all gas-fired appliances, including the pilot lights, when the Kitchen is closed for long periods of time and for an emergency shut-off situation.

5. Electric and Gas Appliances

   When there is both electric and gas appliances under the hood (rare situation), there need only be one red mushroom push-button to shut down both electric and gas appliances under the hood. Provide mushroom push-button labeled “Emergency Shutoff” next to each exit door in the kitchen. There shall still be a key switch to energize the gas valve adjacent to the red mushroom push-button at the kitchen entrance door as per paragraph 4 above.

B. General Electrical Requirements for the Kitchen

1. Exhaust Hood light fixtures provided by the Kitchen Equipment Contractor shall be installed and connected to a switch by the Electrical Contractor. The switch provided by the Electrical Contractor shall be installed next to the exhaust fan switch.

2. All disconnect switches in the kitchen area shall be in NEMA 4 enclosures to provide protection against splashing water. Surface-mounted switches shall be provided with waterproof hubs.

3. All 20-Amp, 125-Volt kitchen receptacles shall be GFCI protected.

4. Provide a doorbell at the Kitchen delivery door entrance and connect to the Auxiliary Signal System.

5. The Kitchen Power Panels (KPP-2.X) shall be located in an area adjacent to the kitchen, but not in the kitchen proper. For new construction design, coordinate with the Architect to provide a rectangular room to house the kitchen panels with all code required clearances to avoid panels in kitchen proper. Provide **permanent provision to** lock-out breakers for those circuits servicing equipment that is not plugged into outlets.

6. Provide a video intercom at the kitchen delivery door entrance and integrate with IPDVS. Refer to Specification Section 16724.

C. Relevant Documents

- Kitchen Hood Exhaust Motor Starter & Interlocking Wiring Diagram – Refer to Standard Detail 1648000a.

7.1 Power Systems

7.1.5 Lightning Protection

Description/Design Approach:

A. General

1. A lightning protection system **(LPS)** with UL Master Label Certificate shall be provided for new **stand-alone** schools in accordance with NFPA 780, UL 96A and SCA specifications.

2. Lightning protection for addition projects is to be designed by the same methodology and to the same standards as stand-alone buildings but for the addition building only. As the existing building will not be included in the LPS, the system will not be able to, or be required to, attain the UL Master Label Certificate.

3. Lightning protection is to be provided for boiler replacement projects installing a stainless steel liner. As the entire building will not be included in the LPS, the system will not be able to, or be required to, attain the UL Master Label Certificate.

B. Lightning Risk Assessment

At the Schematic Design Phase, the design engineer shall perform Lightning Risk Assessment calculations based on the latest NFPA 780 to determine if **an LPS** is warranted for the **new stand-alone** building **or addition**. **If the assessment shows protection is not warranted, no further analysis or design is required for the project.**

C. Equipment and Locations

1. The **LPS** shall be Franklin Rod type with strike termination devices (air terminals) provided along the rooftop, rooftop perimeter**, photovoltaic system (if determined to require them based on height and location)** and selected rooftop mechanical equipment. **Provide** ground conductors, surge suppression devices, and other connectors or fittings required to complete the system. Dedicated ground rods shall be provided for each down conductor. The lightning protection grounding system shall be bonded to the electrical grounding system electrode.

2. The SCA does not recommend lightning protection system installation by early streamer emission system or charge dissipation system. **For lightning protection of new chimney liners, a Franklin Rod is be installed at the liner.**

D. System Types Based on Building Height

Ordinary structures not exceeding 75 ft (23 m) in height shall be protected with Class I materials as shown in NFPA 780 Table 4.1.1.1(A). Ordinary structures greater than 75 ft (23 m) in height shall be protected with Class II materials as shown in NFPA 780 Table 4.1.1.1(B). If part of a structure is over 75 ft (23 m) in height (e.g., **chimney**) and the remaining portion does not exceed 75 ft (23 m) in height, the requirements for Class II air terminals and conductors shall apply only to that portion exceeding 75 ft (23 m) in height. Class II conductors from the higher portion shall be extended to ground and shall be interconnected with the balance of the system.

7.1 Power Distribution

7.1.6 Miscellaneous Power Distribution Drawing Requirements

Description/Design Approach:

A. The following items shall be shown or taken into account on the Electrical Drawings:

1. Ensure that power and associated relays to the maxon valve has been coordinated with the plumbing designer and is included on the electrical drawings. If the valves are on the exterior, ensure the relays are in a NEMA-4 weather tight enclosure.

2. Ensure that power to the automatic hand wash sinks (Cafeteria, Nurses office) has been coordinated with the plumbing designer and is included on the electrical drawings.

3. Ensure the correct voltage is provided for the Art Room kiln.

4. Ensure that there is power provided to the card access reader for the elevator machine room door.

5. Ensure the correct voltage is provided for window AC Units.

6. Ensure that there is power provided to all energy consumption monitoring meters.

7. Ensure power requirement for outlet at floor cleaning station shown on RPS is shown on the appropriate power drawings.

8. Ensure appropriate power drawings show power to outlets on front of the kitchen tables and for the Mobile Cashier Counter (POS system). Provide power for POS system at both ends of the serving line.

9. Ensure that power supply to the gas and oil leak detection systems are indicated.

10. Ensure power is provided to the damper required during replacement of a gravity vent.

11. Ensure that miscellaneous wiring, receptacles and switches required for the elevators/lifts have been shown. Refer to Section 16120. **Provide Surge Protective Device (SPD) as required for the panel feeding elevators/lifts.**

12. Drawings are to indicate hospital grade wiring where required by Section 517 of the 2011 NEC. Provide for all school-based health clinic and other locations with exam rooms.

13. Ensure that the power requirements for the condensing unit for the walk-in refrigerators/freezers are provided, including wiring between the box and outdoor condensers, power for lighting and switches, etc., are coordinated with the Kitchen consultant and Architect, and shown on the Drawings.

14. Ensure “shunt valves” are installed in open chair lifts. Coordinate with Elevator consultant.

15. Ensure hard wiring of explosion-proof refrigerator and freezer installed in science labs has been shown on drawings.

16. If project has electrically operated retractable bleachers, show power requirements and wiring on the drawings.

17. Ensure a single-phase 110-volt duplex outlet and power is provided within 3 to 5 feet from the utility's electrical utility meter (to be used for the DOE's participation in a demand response program).

18. Ensure that wiring to be provided by the Electrical Contractor for various equipment as required by Article 3.04 of Section 11400 is shown on the electrical drawings.

19. For filing purposes and as required to facilitate plan review, Drawings shall clearly document the appropriate items of the 2020 NYCECC as per the Department of Buildings Document "2020 NYECC – How-to Guide – Lighting and Electrical Power".

20. Location of outlets for plug-in equipment in serveries and the layout of such equipment must be coordinated with the Architect and Mechanical Designer to avoid cords for the servery equipment to potentially drape over convectors, if convectors are used.

21. While not typical as the SCA standard is to use heat pump systems for heating and domestic hot water, provide emergency power connection for the exhaust fan in the gas meter room and the natural gas leak detection system, if gas is provided for the project. Ensure that the natural gas leak detection is tied to the fire alarm system and has a distinct supervisory and alarm reporting to Central Station.

22. For new buildings and existing buildings undergoing major modernization projects, coordinate with the plumbing and mechanical engineer for the required electrical loads associated with heat pumps with 100% electric backup for following systems:
    a. Domestic hot water heat pumps
    b. Vertical Unit Ventilators in classrooms with integral electric heaters
    c. Split systems, VRF systems, and DOAS with baseboard electric heat

23. Provide standby power for low energy power door opening systems. Coordinate with the Project Architect. For existing buildings projects installing such door (such as for a Path of Travel project) where there is no generator, provide door opening system manufacturer's battery backup system.

24. **Provide power for specialty spaces associated with the Athletic Fieldhouse as follows:**
    a. **Concession stand: Provide GFCI receptacles for convenience, refrigerators, heating appliances, heaters, grills, and associated equipment associated with the concession stand.**
    b. **Ticket booth: Provide GFCI receptacles to power POS, convenience receptacle and heater.**
    c. **Press box: Provide 2 dedicated circuit GFCI receptacles 36" AFF to power equipment for the room. A small 6-pole 100A power panel with spare breakers is to be provided to feed all circuits within the press box. Provide power for local sound system, if any. Most sound systems will be located within the athletic fieldhouse with remote connections in the press box. The press box is a small space, less than 500SF, and is basic room that is naturally ventilated with operable windows and no permanent means of heating or cooling.**

25. **For Electrical Vehicle Power Transfer System when designing for requirements to support Electric Vehicle Charging Stations for open and enclosed public parking garages and open parking lots as per NYCEC Section 625.1 and Local Law 55 of 2024. Due to the high percentage of charging stations that are required, there is an exception for DCAS to waive or adjust the requirement for city owned property. This needs to be discussed as early as possible with SCA for a decision since a waiver will be required for the exception.**

26. **When providing a temporary boiler connection to the building for the backup temporary water heating system for the HVAC, coordinate with mechanical engineer for size of boiler to be provided. Provide electrical connection provision at temporary water connection location. Provide camlock connections with disconnects on exterior of building.**

7.2 Lighting Systems

7.2.1 Interior Lighting

Description/Design Approach:

A. Energy Efficient Lighting Luminaires

1. Luminaires shall be high efficiency LED.

2. In general, Lighting Systems shall conform to NYC Green Schools Guide Credit Q6.1R – Interior Lighting Control, Credit Q6.2 – Interior Lighting Quality and Credit Q6.3R - Visual Performance, and the 2020 NYC Energy Conservation Code (NYCECC), which includes the NYC modifications to ASHRAE 90.1-2016.

3. The number of different luminaires shall be limited as much as possible. Custom luminaires shall be avoided.

B. Illumination Levels

1. The following are illumination levels for typical functional areas. This listing is intended to provide guidance in the design of lighting for the indicated areas as well as for other areas (unlisted) that have similar functions.

2. Listed illumination levels are average maintained values in foot-candles (FC) and are predicated on a thirty-inch (30") reference work plane, unless otherwise noted. Where multiple functions and multiple lighting levels are indicated for a particular area, it is intended that multiple switching be provided to achieve same. In all cases, compliance with IES minimum recommended illumination levels and the 2020 NYCECC watts per square foot limitations is intended. The maximum LPD per space is at or below ASHRAE 90.1-2016 levels**,** as modified by Appendix CA of the 2020 NYCECC, though they will typically be much lower to meet the required overall building LPD. Total building lighting power density (LPD) using the 2020 NYCECC – ASHRAE 90.1-2016 procedure shall be a maximum of: 0.5 w/ft² for new PS, IS, HS and Additions, Modernizations and new ECC. These are the values utilized in the SCA's prototypical energy modeling as a means to meet LL 31/16 goals. The total building LPD shall be determined utilizing ASHRAE Methodology. Trade-offs among spaces is permitted provided that the total LPD is not exceeded, though based on LED technology trade-offs should not be required for most spaces to maintain the indicated foot-candle levels.

Area	FC LEVEL	Maximum LPD*
Athletic Field House		
Concession Stand	**35**	
Ticket Booth	**35**	
Press Box	**35**	
Auditorium	*4	
Primary and Intermediate Schools		
General	40	0.63 W/ft^2
Aisles	2	
High School		
Theatrical/General Use/Study Room	15/30/40	0.63 W/ft^2
Stage – General	30	

Production	(As Required)	
Aisles	2	
Boiler Room	30	0.39 W/ft^2
Cafeteria/Lunchroom	30*4	0.53 W/ft^2
Serving Area	40	0.92 W/ft^2
Cafetorium	30*4	0.63 W/ft^2
Classrooms	35*2	0.5 W/ft^2
Community Rooms	40	0.7 W/ft^2
Computer Rooms	30/**35**	0.5 W/ft^2
Corridors	20 @ 18" AFF	**0.58** W/ft^2*3
Dance Studios	40 @ 18"AFF	0.5 W/ft^2
Duplication Room	30	0.5 W/ft^2
Electric Closets	30	0.39 W/ft^2
Elevator Machine/Control Room/Spaces	*5	0.39 W/ft^2
Exam Areas of Medical Suites/Clinics	50	1.1**6** W/ft^2
Exercise Room	30	0.5 W/ft^2
Gymnasium	*4	
General	30	0.75 W/ft^2
Bleacher	20	0.43 W/ft^2
Gymatorium	30	0.75 W/ft^2
Janitor Closets	20	0.43 W/ft^2
Kitchen	50	0.92 W/ft^2
Laboratories	50	1.0**4** W/ft^2
Library		
General	30	0.77 W/ft^2
Reading	40	0.77 W/ft^2
Stacks	20 @ 18" AFF	0.77 W/ft^2
Lobby	30	0.90 W/ft^2
Locker Rooms	20 @ 18" AFF	0.45 W/ft^2
Mechanical Areas – Service Areas	30	**0.39** W/ft^2
Media Centers/TV Studios	30/40	1.0 W/ft^2
Offices	35	0.5 W/ft^2
Pipe Chases/Crawl Spaces	10	
Playroom	30	0.5 W/ft^2
Records Room	20 @ 18" AFF	0.6 W/ft^2
Shops & Areas with Critical Visual Tasks	50	1.0**9** W/ft^2
Shower Rooms	20	0.75 W/ft^2
Staff – Lunchroom/Lounge	30	0.44 W/ft^2
Resource Center/Workroom	30/50	**1.09** W/ft^2
Stairs	20	**0.5** W/ft^2
Storage Rooms	30	0.43 W/ft^2
Swimming Pools *6		
Poolside	50	*6
Bleachers	20	0.4 W/ft^2
Switchboard Rooms	30	0.39 W/ft^2
Telecommunication Rooms	30	0.39 W/ft^2
Toilets	20	0.75 W/ft^2

* Denotes total average power density for particular spaces and includes all power densities for all areas within the space. For auditoriums, this power density shall be calculated utilizing a 40 FC setting, excluding the theatrical stage lighting. Submit computer generated lighting calculations and Lighting Power density at 60% Design for the following (Sample of typical classroom, general office, corridors, libraries, cafeteria, and gymnasium). Also submit total LPD for the entire school.

*2 Classroom foot-candle calculations shall exclude the levels in the area 3 feet around the perimeter of each classroom but shall include lighting over all teaching surfaces. Average maintained level at 30" AFF shall be a minimum of 35 FC with an average to minimum ratio not to exceed 2.5. For calculation purposes, use a light loss factor of 0.9 and room reflectance of 90/60/25 (Ceiling/walls/floors)

*3 Corridors with lockers can use the requirement for locker rooms.

*4 PA space foot-candle calculations shall exclude the levels in the area 3 feet around the perimeter of each space. Average maintained level at 30" AFF shall be the indicated FC with an average to minimum ratio not to exceed 2.5 to ensure even lighting. For calculation purposes, use a light loss factor of 0.9 and room reflectance of 80/50/20

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(Ceiling/walls/floors). Locations where providing such maximum ratio may increase the LPD above the required maximums shall be discussed with A&E.

*5 Must be 19 fc minimum at floor level for entire room per ASME 17.1.

*6 Lighting for Pool surfaces are excluded. Neither the surface area of the swimming pool nor the wattage of the lighting serving the pool shall be counted in the LPD.

C. Lighting Fixture Requirements by Space

1. General: Designers shall utilize those manufacturers and model numbers indicated in Section 16502 (LED Interior Lighting) of the Standard Specification as their Basis of Design.

2. Instructional Space and Library: Direct/indirect, ceiling pendant luminaires. For typical classrooms measuring approximately 29' X 26', lighting shall consist of two (2) rows of direct /indirect, ceiling pendant-mounted luminaires spaced approximately 12' on center to produce optimum lighting. The distance between the wall and the luminaires at the front of the run (the front wall with the marker boards) should be no more than 3'. Luminaires lighting distribution shall be 70% up and 30% down. The total luminary efficiency of the luminaires shall be 90% or better. Mounting shall be such that the bottom of the luminaires shall not be lower than 8'-0" in Early Childhood Centers and Primary Schools and 8'-6" in Intermediate Schools and High Schools, with the optimum fixture to ceiling distance ranging from 14" to 24". For non-conventional shaped instructional spaces (spaces not measuring approximately 29' X 26'), the quantity of pendant luminaires, rows of pendant luminaires, and their spacing shall vary as required to provide the required foot-candle levels and minimize lighting power density.

3. District 75 Classrooms: Pendant mounted indirect, 100% up-light to be used

4. Office and Cafeteria: Recessed 2'x4' luminaires,

5. Corridor: Recessed 2'x4' or 2x2, luminaires (based on ceiling grid selected)

6. Gymnasium: High Bay, non-glare luminaires with impact resistance lens

7. Kitchen Areas, Kitchen Storerooms and Servery Areas: Recessed 2'x2' luminaires, for metal pan ceiling using a lay in system such as Armstrong "Metal Works-Flush Tegular" with, gasket, UL listed for wet location, NSF C-2 certification, with silicone sealant on all seams.

8. Stair: 4' luminaires, wrap around, with vandal resistant lens with integral occupancy sensors.

9. Storage/Mechanical Space: 1' x 4' or 1' x 8' luminaires

10. Shower Room: Recessed 1' x 4' luminaires, gasketed, UL listed for wet location.

11. Toilet/Locker Room: Recessed 2'x4' luminaires

12. Auditorium, Main Lobby, Library and luminaires at the Main Entrance: The lighting designer may select luminaires suited to the aesthetic of the spaces.

D. Lighting Controls

1. All interior lighting shall automatically be controlled by a programmable Lighting Control Panel with integral clock as indicated in following Table. The Lighting Control Panel shall be

provided at the Electric Closet and shall control all spaces that do not have 100% automatic shut-off and/or Occupant sensors.

2. All stairs, locker/shower rooms and multi-user student toilet luminaires shall be set to 50% power levels in the unoccupied state using occupancy Sensors (Auto-ON) to bring it up to 100% when space is occupied.

3. Each area enclosed by walls or floor-to-ceiling partitions shall have at least one switch to control the lighting within. Due to the nature of schools and the need for safety and the potential for vandalism or horseplay, the code allowed exception to eliminate controls where safety is concerned has been utilized for some spaces. For (CIP) projects, window row (in a two or three luminaires row room) shall have the ability to be switched off manually.

4. Daylight Harvesting

   a. Provide for all spaces with windows where required per the 2020 NYC Energy Conservation Code. Daylight Harvesting per section C405.2.3 of 2020 NYCECC and Section 9.4.1.1.e of ASHRAE 90.1 2016 as modified by Appendix CA is required for New Construction in all areas with windows when total fenestration area in sidelighted daylight area is 24 SF per C405.2.3 or 20 SF per 9.4.1.1.e (whichever standard is used for the design) or greater and the general lighting in the primary sidelight area is 100W or greater.

   b. Install daylight harvesting sensor to control both rows in each classrooms and offices (with windows) to maintain required foot-candle (closed loop and dual loop sensors to be used in skylight application).

   c. Place the closed loop sensor between 1 to 2 times the height of the window away from the window (typically 12-15 ft. from the window).

   d. Provide room controller to control both rows of light.

   e. Provide an over-ride four position push button switch set to off, 30%, 70% and 100%.

   f. For all gymnasiums with skylights (as required by Section C402.4.2), provide daylight harvesting controls as required by Section C405.2.3.1 of the 2020 NYCECC and Section 9.4.1.1.f of ASHRAE 90.1-2016 as modified by Appendix CA. Auditorium type spaces are not required to have skylights.

   g. When daylight harvesting is not provided in spaces with windows, the designer to include in the GSG submission the following in support of justification that a daylight sensor is not required by code:
      - Area of window within the space
      - Daylight (sidelighted) area within the space
      - Wattage of lighting fixtures within the Daylight area

The following table provides guidelines for the individual controls for each space and is in keeping with the 2020 NYC Energy Code. Daylight harvesting controls are not indicated in the Local Automatic Control/Sensor column, as the requirements are described above and is dependent on several factors. 'Not Required' in this column applies to when either occupancy or vacancy sensors are not to be provided. Sensor locations described in the comment field do apply to the daylight harvesting sensors. The descriptions are typically for new construction and locations may need to be altered for CIP projects.

AREA	LOCAL MANUAL CONTROL/SWITCH	LOCAL AUTOMATIC CONTROL/SENSOR	Time Clock Control	COMMENTS
PUBLIC ASSEMBLY SPACES				
Auditorium				
General Lighting	Three-way dimming key pad	Vacancy sensor	No	Three-way dimming keypad to control house lighting to be located at the entrance and stage. Ceiling mounted sensors for existing auditorium projects, discuss with SCA.
Stage Area	Toggle switch	Not required	Yes	Switches to control non-theatrical stage lights to be located at the stage.
Gymnasium				
General Lighting, Emergency Circuit	Key-operated line voltage switch	Occupancy sensor	Yes	Switch at one entrance to turn on lights on emergency. All fixtures Normally at 50% of power level; turns to 100% on motion – (C405.2.1.4) Circuiting for lights to allow them to turn on upon loss of power if they are turned off.
General Lighting, non-emergency circuit	Key-operated switch	Occupancy sensor	Yes	Switches for general lighting to be located at same entrance as emergency lighting switch. Ceiling/corner/fixture mounted sensors depending on fixture height and required coverage.
Gymatorium				
General Lighting	Three-way dimming key pad	Vacancy sensor	No	Three-way dimming keypad to control house lighting to be located at the entrance and stage. Ceiling mounted sensors Daylight harvesting sensors to be luminaire mounted for those fixtures in the daylight zone to avoid interference with the zoning provided for the theater function.
Stage Area	Toggle switch	Not required	Yes	Switches to control non-theatrical stage lights to be located at the stage
Cafeteria/Lunch room				
General Lighting, Emergency Circuit	Key-operated line voltage switch	Not required	Yes	Switch at one entrance to turn on emergency lights that will also provide minimal entry/circulation illumination. Circuiting for lights to allow them to turn on upon loss of power if they are turned off.
General Lighting, non-emergency circuit	Key-operated low voltage switch	Occupancy sensor	Yes	Switches for general lighting to be located at same entrance as emergency lighting switch. Ceiling/corner/fixture mounted sensors depending on fixture height and required coverage.
Kitchen	Toggle switch	Not required	Yes	
Cafetorium				
General lighting	Three-way dimming key pad	Vacancy sensor	No	Three-way dimming keypad to control house lighting to be located at the entrance and stage. Ceiling mounted sensors. For existing auditorium projects, discuss with SCA
Stage Area	Toggle switch	Not required	Yes	Switches to control non-theatrical stage lights to be located at the stage

AREA	LOCAL MANUAL CONTROL/SWITCH	LOCAL AUTOMATIC CONTROL/SENSOR	Time Clock Control	COMMENTS
Library				
General	Three-way dimming pad	Vacancy sensor	No	Three-way switches at entrance and at Librarian desk. Ceiling mounted sensor.
Reading	Three-way low-voltage switch	Vacancy sensor	No	Three-way switches at entrance and at Librarian desk. Ceiling mounted sensor.
High Stacks	Three-way low-voltage switch	Luminaire-mounted occupancy and daylight harvesting sensor	No	Three-way switches at entrance and at Librarian desk. All luminaires in High Stack area shall be equipped with occupancy and daylight harvesting sensors
CLASSROOMS/OFFICES				
3K, Pre K	Low-voltage **4**-button dimmer switch	Vacancy	No	Ceiling mounted sensor (s)
K-12 including resource and CSD sped rooms	Low-voltage **4**-button dimmer switch	Vacancy	No	Ceiling mounted sensor (s)
D75 Instructional space	Low-voltage 5-button dimmer switch	Vacancy	No	Ceiling mounted sensor (s)
Community Rooms	Low-voltage **4**-Button Dimmer Switch	Vacancy	No	Ceiling mounted sensor(s)
Tech Laboratories (other than Science)	Low-voltage **4**-button dimmer switch	Vacancy	No	Ceiling mounted sensor(s)
Dance Studios	Low-voltage **4**-button dimmer switch	Vacancy	No	Ceiling mounted sensor(s)
Science labs and Prep Rooms- IS and High Schools	Low voltage Switch	Not required - **Safety**	Yes	
Media Centers/TV Studios	Low-voltage switch	Vacancy sensor	No	Ceiling mounted sensor(s)
Offices Large	Low-voltage **4**-button dimmer Switch	Vacancy sensor	No	Ceiling mounted sensor(s)
Individual offices	Low-voltage **2**-button dimmer switch	Vacancy sensor/	No	Ceiling mounted sensor(s)
Records Room	Low-voltage switch	Vacancy sensor/	No	Ceiling mounted sensor
Resource Center/Workroom	Low-voltage switch	Vacancy sensor/	No	Ceiling mounted sensor(s)
Staff – Lunchroom/Lounge	Low-voltage **2**-button dimmer switch	Vacancy sensor/	No	Ceiling mounted sensor(s)
School-based Health Clinic/Exam Areas of medical suites	Push-button switch (or toggle to match other spaces)	Not Required	Yes	Switch to match style of typical classroom
Waiting Areas	Low-voltage switch	Occupancy Sensors	No	Ceiling mounted sensor(s)
SERVICES/UTILITIES				
Electric Closets	Toggle switch	Not required	No	
Elevator Machine Room	Toggle switch	Not required	No	
Janitor Closets	Low-voltage switch	Vacancy sensor	No	Wall mounted sensor/switch
Mechanical Areas Service Areas	Toggle switch	Not required	No	
Pipe Chases/Crawl Spaces	Toggle switch	Not required	No	

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AREA	LOCAL MANUAL CONTROL/SWITCH	LOCAL AUTOMATIC CONTROL/SENSOR	Time Clock Control	COMMENTS
Shops & Areas with Machinery	Low-voltage 2-Button Dimmer Switch	**Not required**	No	
Storage Rooms	Low-voltage **2**-Button Switch	Vacancy sensor	No	Wall-mounted sensor/switch if small storage room.
Switchboard Rooms	Toggle switch	Not required	No	Lighting on emergency circuit.
Telecommunication Rooms/Closets	Low voltage switch	Vacancy sensor	No	Wall-mounted sensor/switch
CIRCULATION AREAS				
Lobby	Key-operated switch (One for Emergency)	Occupancy sensor/Daylight harvesting sensor	Yes, for normal lighting only	Key operated switch located at main entrance for emergency lighting. Ceiling mounted sensor(s) for both emergency and non-emergency lighting luminaires. All fixtures Normally at 50% of power level; turns to 100% on motion – (C405.2.1.4) Circuiting for emergency lights to allow them to turn on upon loss of power if they are turned off. **The normal light control is from the respective floor electric closets controlling lights.**
Corridors	Key-operated switch (One for Emergency)	Occupancy sensor/ Daylight harvesting sensor built-in luminaire(s) near window	Yes, for normal lighting only	Key operated switch located at main entrance for emergency lighting. Ceiling mounted sensor(s) for both emergency and non-emergency lighting luminaires. All fixtures Normally at 50% of power level; turns to 100% on motion – (C405.2.1.4) Circuiting for emergency lights to allow them to turn on upon loss of power if they are turned off. **The normal light control is from the respective floor electric closets controlling lights.**
Stairs	Key-operated switch	Built-in Occupancy Sensor in each luminaire Daylight harvesting sensor built-in luminaire(s)	No	Key operated switch located at main entrance for emergency lighting in stairs (all luminaires in stairs are emergency). Normally at 50% of power level (if minimum fc **is** met); turns to 100% on motion - Life safety/security per C405.2 exception. Circuiting for emergency lights to allow them to turn on upon loss of power if they are turned off.
PHYSICAL EDUCATION				
Locker Rooms (Students)	Key-operated switch	Built-in occupancy sensor in each luminaire	Yes	Normally at 50% of power level; turns to 100% on motion - Life safety/security per C405.2 exception
Locker Room (Adult)	Low voltage switch	Vacancy sensor	No	Wall-mounted sensor/switch – Ceiling mounted if partition
Shower Rooms	Key-operated switch	Built-in occupancy sensor in each luminaire	No	Normally at 50% of power level; turns to 100% on motion. Luminaire mounted sensor - Life safety/security per C405.2 exceptions
Swimming Pools	Key-operated switch	Not required	Yes	
Poolside	Key-operated switch	Not required	Yes	
Bleachers	Key-operated switch	Occupancy	Yes	
Exercise Room	Low-voltage switch	Vacancy sensor	No	Ceiling-mounted sensor(s)
TOILETS				
Staff Toilet (single user)	Line voltage switch	Vacancy sensor	No	Wall-mounted sensor/switch
Staff Toilet (Multi-user)	Low voltage switch	Vacancy sensor	No	Ceiling-mounted sensor(s)
Student Multi-user Toilets	Key-operated switch	Built-in occupancy sensor in each luminaire	Yes	Normally at 50% of power level; turns to 100% on motion – Life safety/security per C405.2 exceptions

Requirement Applies to: ✔ **New Construction** ✔ **Major Modernizations** ✔ **Capital Improvement Projects**

AREA	LOCAL MANUAL CONTROL/SWITCH	LOCAL AUTOMATIC CONTROL/SENSOR	Time Clock Control	COMMENTS
Student Classroom Toilets	Line voltage switch	Vacancy sensor	No	Wall-mounted sensor/switch
Student Toilet (single user)	Line voltage switch	**Vacancy** sensor	No	Wall-mounted sensor/switch

a. Instructional space: For spaces 2,000 SF or less in area, lighting shall be controlled by one ceiling mounted vacancy sensor and multiple daylight harvesting sensor one for each row of lights**,** and one 4-button switch located by the classroom entrance door.

b. Track luminaires in Labs to have a dedicated single on/off switch by the teacher's desk.

c. For CIP projects, required sensors in most spaces will likely need to be wall mounted, typically near the front corner. Designer is to submit all designs for review.

d. All sensors in corridors, student locker rooms, stairs and bathroom to be set for 5 minutes

e. Note that not all Room Planning Standards have been updated to incorporate all revisions to the controls. Follow the above table and modify the room requirements as appropriate.

7.2 Lighting Systems

7.2.2 Stage and Platform Lighting for Primary and Intermediate Schools

Description/Design Approach:

A. General

1. A dimming system shall be provided for auditorium/gymatorium stage area/platform lighting. The dimming system shall control spotlights and border lights via a stage control panel mounted on the stage area/platform and/or a remote portable control console that can be plugged into remote outlets. (Emergency lighting is not part of the dimming system and shall not be dimmed.)

2. Minimum requirements for a standard primary school and intermediate school configuration are indicated below. These may be augmented and modified to accommodate larger facilities (high schools), though a specialty consultant is typically to be utilized for those facility designs.

3. Coordinate exact location and mounting height of all fixtures with the Architect.

B. Requirements for Primary School Stages Less Than Thirty (30) Feet Wide and Fifteen (15) Feet Deep

1. Spotlights

a. Two (2) sets of spotlights shall be provided, ideally located 45 degrees up and 45 degrees to the left and right of the centerline of the stage. Each set shall consist of four (4) 6" zoom type ellipsoidal reflector spotlights. Spotlights shall have a knob-adjustable beam angle of 25-50 degrees to allow for adjustment to actual stage size. Fixtures shall be paired to light the Left, Center and Right portions of the stage, with the fourth fixture pair as a Front Special. **Fixtures shall use LED with five individually controllable LED colors as per Section 16502, capable of producing 75 fc with lens set for 30 degrees, 20 feet away.** In new construction, spotlight sets shall be housed inside ceiling pocket.

b. Mounting: Each spotlight shall be secured to a $1^{1}/_{2}$" iron pipe batten by means of a cast iron "C" clamp. One safety cable shall be provided for each spotlight.

c. Control: All spotlights shall be controlled by dimmers.

d. Electrical: Each spotlight shall be provided with a 3-foot, 3-wire flexible cable terminated in a 20 amp 3-wire stage pin plug. Four (4) 20 amp receptacles shall be set in an outlet box for each set of spotlights. Spotlight and stage pin receptacle outlet box shall be U.L. listed and grounded as per manufacturer's requirements.

2. Border Lights

a. Two (2) rows of border lights shall be provided above the platform. Each border light shall be **color mixed LED with DMX controls with a minimum of five individually controlled LEP colors per Section 16502.**

b. Mounting: Each border light shall be equipped with a heavy steel trunnion securely fastened to each of the cast steel end plates and equipped with iron "C" clamps for $1^{1}/_{2}$" pipe mounting. Each unit shall be provided with a tilt adjust knob and two safety cables.

c. Control: One dimmer per circuit, one control channel per color.

d. Electrical: Border light shall be U.L. listed and provided with #12 cable and grounding conductor. Cable shall be terminated in a terminal junction box. Terminal junction box shall also include (2) stage pin receptacle outlets for two Overhead Special dimming circuits. Two Overhead Special Circuits are parallel wired to each border light row.

3. Dimmer Racks

a. Dimmer racks shall be wall mounted dead front type. They shall accept plug-in electronic control modules and be designed to contain up to 24 plug-in dimmer modules each rated at 2.4 KW.

b. Dimmer racks shall be provided with a lockable door.

c. Dimmer racks shall be 120/208V, 3-phase, 4-wire, 60 Hz A.C. and U.L. listed.

4. Portable Control Console

a. Control console shall be microprocessor-based with 24 channels for two scene preset and manual operations, and switchable to 96 channels, 500 cues for advanced operation. Each dimmer shall be individually controllable with the control console. Console shall allow SubMaster grouping of control for multiple circuits such as border light colors. Console shall also have display and on-screen help menus.

b. Output of console shall be a digital multiplexed signal USITT Standard DMX-512

c. Two (2) 5-pin XLR type DMX input receptacles shall be provided for the control console. One shall be located at rear of room and another near stage control panel on platform. Provide one (1) fifty (50) foot extension DMX control cable. DMX control receptacles shall be located within two (2) feet of a 120 volt receptacle.

5. Stage Control Panel

a. Stage control panel shall be equipped with faders and master intensity control to provide easy playback and recording of a minimum of 8 lighting presets. Manual sliders shall be provided for Left, Center, Right and Front Special spotlights, Overhead Clear, Amber, Red and Blue Borderlights, two Overhead Specials and Two Stage Specials.

b. Stage control panel shall be wall mounted inside a lockable enclosure located on stage (Enclosure to be flush mounted in new construction and surface mounted in existing building).

6. Entry Stations

Provide additional single gang control stations at entry doors. Entry Stations shall have a key lockable cover and allow selection of the first preset and off.

7. Worklights

Worklights above the platform shall be building standard **LED** of the type used elsewhere in the room and shall be switched separately from the dimming system.

C. Requirements for Intermediate School Stages/Primary School Stages Greater Than Thirty (30) Feet Wide and Fifteen (15) Feet Deep, or any Stage with Front Curtain and Stage Apron Area

1. Spotlights

a. Two (2) sets of spotlights shall be provided, ideally located 45 degrees up and 45 degrees to the left and right of the centerline of the stage. Each set shall consist of eight (8) 6" zoom type ellipsoidal reflector spotlights. Spotlights shall have a knob-adjustable beam angle of 25-50 degrees to allow for adjustment to actual stage size. Fixtures shall be paired to light the Left, Center and Right portions of the stage in front of the curtain line, and Left, Center and Right behind the curtain, with the seventh and eighth fixture pair as Front Specials. Provide one additional non-dimmed circuit controlled by the dimmer rack at each location. **Fixtures shall use LED with five individually controllable LED colors as per Section 16502, capable of producing 75 fc with lens set for 30 degrees, 20 feet away.** In new construction, spotlight sets shall be housed inside ceiling pocket.

b. Mounting: Each spotlight shall be secured to a $1^{1}/_{2}$" iron pipe batten by means of a cast iron "C" clamp. One safety cable shall be provided for each spotlight.

c. Control: All spotlights shall be controlled by dimmers.

d. Electrical: Each spotlight shall be provided with a 3-foot, 3-wire flexible cable terminated in a 20 amp 3-wire stage pin plug. Nine (9) 20 amp receptacles shall be set in an outlet box or strip for each set of spotlights. Spotlight and stage pin receptacle outlet box shall be U.L. listed and grounded as per manufacturer's requirements.

2. Border Lights

a. Three (3) rows of border lights shall be provided above the platform. Each border light shall be **color mixed LED with DMX controls with a minimum of five individually controlled LEP colors per Section 16502.**

b. Mounting: Each border light shall be equipped with a heavy steel trunnion securely fastened to each of the cast steel end plates and equipped with iron "C" clamps for $1^{1}/_{2}$" pipe mounting. Each unit shall be provided with a tilt adjust knob and two safety cables.

c. Control: One dimmer per circuit.

d. Electrical: Border light shall be U.L. listed and provided with #12 cable and grounding conductor. Cable shall be terminated in a terminal junction box. Terminal junction box shall also include four (4) stage pin receptacle outlets for four (4) Overhead Special dimming circuits. The four Overhead Special Circuits are parallel wired to each border light row.

3. Dimmer Racks

a. Dimmer racks shall be wall mounted dead front type. They shall accept plug-in electronic control modules and be designed to contain up to 48 plug-in dimmer modules each rated at 2.4 KW.

b. Dimmer racks shall be provided with a lockable door.

c. Dimmer racks shall be 120/208V, 3-phase, 4-wire, 60 Hz A.C. and U.L. listed.

4. Portable Control Console

a. Control console shall be microprocessor-based with 48 channels for two scene preset and manual operations, and switchable to 250 channels, 10,000 cues for advanced operation. Each dimmer shall be individually controllable with the control console. Console shall allow SubMaster grouping of control for multiple circuits such as border light colors. Console shall also have display and on-screen help menus.

b. Output of console shall be a digital multiplexed signal USITT Standard DMX-512

c. Two (2) 5-pin XLR type DMX input receptacles shall be provided for the control console. One shall be located at rear of room and another near stage control panel on platform. Provide one (1) fifty (50) foot extension DMX control cable. DMX control receptacles shall be located within two (2) feet of a 120 volt receptacle.

5. Stage Control Panel

a. Stage control panel shall be equipped with faders and master intensity control to provide easy playback and recording of a minimum of 8 lighting presets. Manual sliders shall be provided for Left, Center, Right Front spotlights, Left, Center and Right Stage Spotlights, (2) two Front Special spotlights, Overhead Clear, Amber, Red and Blue Borderlights, (4) four Overhead Specials and (4) four Stage Specials.

b. Stage control panel shall be wall mounted inside a lockable enclosure located on stage (Enclosure to be flush mounted in new construction and surface mounted in existing building).

6. Entry Stations

Provide additional single gang control stations at entry doors. Entry Stations shall have a key lockable cover and allow selection of the first preset and off.

7. Worklights

Worklights above the platform shall be building standard **LED** of the type used elsewhere in the room and shall be switched separately from the dimming system.

7.2 Lighting Systems

7.2.3 Emergency Lighting

Description/Design Approach:

A. General

1. Emergency lighting shall be provided for all areas listed in Design Requirement 7.1.2.

2. Illumination levels required for emergency lighting shall be as follows:

Places of Assembly – Auditorium, Cafeteria, Gymnasium, Gymatorium	
General/ Aisle/Cross isles	1.0 foot-candle measured at floor
General/Aisle/Cross isles	0.5 foot-candles measured at the floor - During performance only
Places of Assembly – Auditorium, Gymatorium	
Exterior exit lights immediately adjacent to exit doorways leading into yards and courts	5 foot-candles measured at the floor over the specified area per **Section** BC 1029**.19.4 of the 2022 NYC Building Code**
Exit Doors	1 foot-candle measured at the floor
Corridors, exits, exit discharges, Areas of Refuge and stairs	1 foot-candle measured at the floor
Exits, in high-rise buildings with existing photoluminescent markings	2 foot-candles measured at the floor
Fire Rescue Areas/ Areas of Rescue Assistance	1 foot-candle measured at the floor
Safe Areas, including all stairs, ramps, etc within the area	5 foot-candles measured at the floor
Corridor sign for Fire Rescue Area/ Area of Rescue Assistance	25 foot-candles measured at sign
Electrical service room (containing the disconnect switch), Fire Command Center, Fire pump rooms, generator rooms	**1 foot-candle measured at the floor**
Public Restrooms with area greater than 300 square feet (e.g. Field House)	**1 foot-candle measured at the floor**

B. Buildings with Generator

1. In new buildings, major modernizations, or major additions where an emergency generator is being provided, provide power for Emergency Lighting through the Emergency Systems automatic transfer switch as described in DR 7.1.2.

C. Buildings without Generator

1. In buildings not provided with an emergency generator, emergency luminaire shall be connected to a power source recognized by Section 700-12 of the **2011** NYC Electrical Code.

2. The emergency luminaires in the Places of Assembly and the paths of egress to the outside shall be controlled by a relay with sensing circuit off the local lighting panel. A key operated test switch shall be wired into the **sensing** circuit.

7.2 Lighting Systems

7.2.4 Exit Signs

Description/Design Approach:

A. Exit signs shall be in accordance with Section BC 1013 of the 2022 NYC Building Code. Locations of exit signs shall be designated on the Contract Drawings by the Architect of Record. Means of egress shall be clearly marked by illuminated exit signs with 8" letters so that exits and path of egress are easily recognized from any point in a corridor or Place of Assembly. Exit signs placement shall be such that no point in an exit access corridor is more than 100 feet or the UL[1] listed viewing distance for the sign, whichever is less, from the nearest visible exit sign. Wall mounted exit signs are preferred over pendant mounted exit signs. Pendant mounted exit signs should be strictly limited to meet visibility requirements, and only when additional wall mounted units may not suit the need.

B. Exit signs shall be coordinated with fire alarm strobes so that a minimum separation of five feet is maintained.

C. For buildings with a generator, exit signs shall be connected to the emergency lighting panel through transfer switch.

D. For buildings without a generator, exit signs shall be provided with battery packs and fed from the same source as the area lighting for the space.

E. If mechanical rooms on the roof require two means of egress per Section BC 1006.2.2.1, exit signs are required out of the mechanical room. If one of these exits is the exterior door to the roof, then an exterior exit sign on the exterior side of the stair bulkhead door is required to direct occupants back into the building to the required egress path. Exterior exit signs are to be a "weatherproof" type.

Note:

[1] Manufacturers may request UL to test their self-luminous or electroluminescent exit signs at lesser distances. UL requires those signs to be marked with the legible viewing distance. The NYC DOB recognizes other nationally listed labs that perform tests in accordance with the UL standard.

7.2 Lighting Systems

7.2.5 Exterior/Site/Security Lighting

Description/Design Approach:

A. General

1. Exterior/site/security lighting shall be provided around the perimeter of the school and on playing fields for safe passage of students and staff and to deter theft and vandalism. Lighting design shall minimize light trespass from the building and site, reduce sky glow, improve nighttime visibility through glare reduction and reduce development impact on nocturnal environment.

2. For capacity and major modernization projects, design shall comply with all the requirements of NYC Green Schools Guide Credit for Light Pollution Reduction.

B. Lighting Levels

Provide computer generated lighting calculations for the entire school site. Provide calculations for building perimeter. Calculation results shall show horizontal illuminance on ground level. Where required, provide calculations in compliance with NYC Green Schools Guide Credit for Light Pollution Reduction.

1. All entrances, exits and walkways, including exit discharge to public way: 1.0 FC min. as per **Section** BC **1008.2.1** of the **2022** NYC Building Code. Exterior fixtures immediately adjacent to exit discharge doorways are required to be connected to emergency power. Refer to DR 7.2.3.

2. All Auditorium, Cafeteria, Gymnasium, Gymatorium or Cafetorium exit doors that open into an exit discharge area in schoolyard: 5.0 FC min. over the required area. Refer to **Section** BC **1029.19.4** for requirements.

3. Building perimeter: 1.0 FC (average maintained) to a 20-foot depth from the building with 0.1 FC minimum and 5 FC maximum. These levels shall be reduced to comply with Light Pollution Reduction Credit if building perimeter is on the site boundary.

4. Site (athletic fields security lighting): 0.5 FC (average maintained) with 0.01 FC minimum and 5 FC maximum. These levels shall be reduced to comply with Light Pollution Reduction Credit if building perimeter is on the site boundary.

C. Design Parameters

1. Due to the aesthetics of exterior lighting, its impact on a school facade and the difficulty in describing multiple elevations on a plan, it is essential that the designer provide building elevations to clearly depict the location and mounting height of each fixture.

2. The exterior lighting power densities shall not exceed those defined in Table 9.4.2-2 of ASHRAE 90.1-2016 as modified by Appendix CA of the 2020 NYC Energy Conservation Code. All new building projects shall be classified under one of the following exterior Lighting Zones and shall follow the requirements for the specific zone. Determination of the Lighting

Zones indicated below for the specific project shall be based on RCNY 5000-01 of the Rules of the City of New York, which assigns an exterior Lighting Zone to each zoning district in the New York City Zoning Resolution. While it is the intent on each project to meet this credit, it may be difficult to achieve for buildings placed on the Street Line and fixtures should not be lowered to a height where they will be subject to vandalism to meet the credit. The design is to be discussed with the Authority once this condition is ascertained.

LZ1 – Dark (Park Land and Rural Settings)

Design exterior lighting so that all site and building mounted luminaries so that 0% of the total initial designed fixture lumens are emitted above horizontal. As per RCNY 5000-01: Parkland.

LZ2 – Low (Residential Area)

Design exterior lighting so that all site and building mounted luminaries **so** that no more than **1.5**% of the total initial designed fixture lumens are emitted above horizontal. For site boundaries that abut public rights-of-way, light trespass requirements may be met relative to the curb line instead of the site. As per RCNY 5000-01: All R districts, R districts with C overlays, and MX districts.

LZ3 – Medium (Commercial/Industrial, High-Density Residential)

Design exterior lighting so that all site and building mounted luminaries **so** that no more than **3**% of the total fixture lumens are emitted above horizontal. For site boundaries that abut public rights-of-way, light trespass requirements may be met relative to the curb line instead of the site boundary. As per RCNY 5000-01: M districts, except MX; C districts, except C5, C6 and C overlays on R districts.

LZ4 – High (Major City Centers, Entertainment Districts)

Design exterior lighting so that all site and building mounted luminaries **so** that no more than **6**% of the total initial designed site lumens are emitted above horizontal. For site boundaries that abut public rights-of-way, light trespass requirements may be met relative to the curb line instead of the site boundary. As per RCNY 5000-01: C5 and C6 districts.

D. Lighting Equipment

Lighting levels shall be achieved utilizing the following equipment:

1. Light Source: The light source for all exterior lighting shall be High Efficiency LED Luminaires and shall have a minimum of 50,000 hours of operation and comply with the IESNA LM-80 test method. All Luminaries shall be DLC certified (Design Lights Consortium)

2. Luminaires: Luminaire selection shall be coordinated with the architect so as to complement and accent architectural features. Luminaires for perimeter lighting shall be wall surface mounted at a maximum of 15 feet above grade for ease of service. Roof parapet mounted luminaires may be used only in as indicated in paragraph E below.

   a. Luminaires shall have cutoff optical system in compliance with NYC Green Schools Guide Light Pollution Reduction Credit. Use of non-cutoff luminaires shall not be utilized

and may be only permitted for the following applications: sports lighting (provide justification), construction lighting, and historic restoration lighting.

b. Luminaires shall have high reflectivity segmented optical system with minimum efficiency of (66%). Lighting distribution NEMA Type III and Type IV shall be used.

c. Luminaires shall have a minimum IP 65 rating, a minimum 2G vibration tested and shall be UL 1598 listed for 25 degrees Celsius ambient temperature application.

3. Poles:

a. The usage and quantities of poles shall be limited and may be used only with the written approval of the SCA Design Manager. When wall-mounted or parapet-mounted luminaires cannot achieve the intended site lighting criteria, pole mounted fixtures may be provided. Site lighting poles shall be anodized aluminum (tapered or square) with an overall maximum mounting height of forty (40) feet. Higher mounting heights may be considered only when heavy-duty poles are justified by unusual site conditions such as athletic field lighting. Mounting heights 25 feet and lower should be avoided to limit the number of poles and luminaires and to minimize light trespass. Spill light optical shields shall be used to minimize light behind pole to a 2% of the total lamp lumens.

b. In general, pole foundations shall be designed by a structural engineer and shown on the structural contract drawings with all conduit entries and exits. Poles shall be provided with a suitable lockable hand-hole and grounding lug. Plug fusing shall be provided on each circuit phase leg within the hand-hole.

4. Lighting Control: In new construction and major modernization, all site security lighting shall be master controlled by the building lighting management system. For Capital Improvement Projects, the security lighting shall be controlled by time clock, photocell and multi-pole lighting contactor. In all cases, the photocell shall be circuited in parallel to time clock such that either one will activate the site security lighting.

5. Raceways: In general, raceway shall be run on the inside face of the parapet and/or concealed in the building interior. Exposed raceway on building facades is not permissible.

E. CIP Projects

Existing buildings (over 15 years old or so) typically have large arm-mounted security lighting attached to the parapet. Security lighting may need to be replaced as part of a plan project due to BCAS rating or due to a parapet replacement/roof replacement.

1. SHPO Buildings

a. If parapet-mounted lights are less than 10 years old, the brackets can typically be reused and LED luminaries installed, unless they are already LED and have been replaced within the last 7 years and the entire system just reinstalled.

b. If the use of wall-pack models are feasible as building can facilitate running the conduit inside the building and approved by SHPO, use of parapet-mounted luminaires can be limited to playground lots or interior courtyards to avoid affecting the appearance of the façade and possible community complaints.

2. Non-SHPO Buildings: As there is less concern with the façade appearance, the use of roof-mounted lights can be avoided if possible as they are the subject of community complaints. Wall–pack luminaires shall be used except where roof mounted are needed for large playgrounds or interior courtyards. Conduit runs shall be shown with input from the architect to minimize the appearance and is to be painted to match the adjacent masonry. If parapet-mounted lights are less than 10 years old, the brackets can typically be reused and LED luminaries installed, unless they are already LED and have been replaced within the last 7 years and the entire assembly reinstalled.

7.2 Lighting Systems

7.2.6 Athletic Field/Sports Lighting

Description/Design Approach:

Athletic field lighting shall be provided only when requested specifically by the Department of Education Program of Requirements. The engineer must verify that the request is not intended for Security/Site Lighting.

In the event that Sports Lighting is confirmed, the designer shall follow the IES recommendations for the application.

When poles are required, provide aluminum or steel poles, mounted around the perimeter of the site to facilitate maintenance without driving onto the field. Any poles not located on the perimeter must be accessible by roadway suitable for a bucket truck with 75' boom **to avoid driving on the synthetic turf or natural grass field.**

Fixtures shall be selected for superior photometry minimizing the number of required fixtures and ease of maintenance/lamp replacement**, while avoiding light pollution trespass to adjoining properties.**

7.3 Low Voltage Systems

7.3.1 Fire Detection and Alarm System for School Buildings with Occupant Load <100

Description/Design Approach:

A. General

The fire detection and alarm system for low-rise school buildings (buildings less than 75 feet in height as defined by the 20**22** NYC Building Code) **with an occupant load of less than 100** shall be a Manual and Automatic Fire Alarm System with Central Office Connection provided in accordance with the Section BC 907.2.3 of the 20**22** NYC Building Code. This system shall be a fully supervised, microprocessor-based multiprocessing system with individually addressable devices connected to a central station. **This Design Requirement may apply to 3K lease projects and other very small buildings. Refer to DR 7.3.15 for all other buildings.**

B. Fire Alarm System Coding

The manual and automatic fire alarm system shall operate as a "Temporal 3" Coded System.

C. Smoke Control

1. Smoke control systems shall be provided for systems required by the 20**22** NYC Building Code (Refer to DR 6.2.10) and shall be designed in accordance with Section BC 909. Coordinate with HVAC engineers. **Due to the limited size of the building for the occupancy (<100), smoke control should not typically be required or the building designed to require such.**
   - Smoke control systems shall be activated by any of the following:
     - Automatically by area or duct smoke detectors
     - Automatically by sprinkler waterflow switches
     - Manually by the Fire Fighter's Smoke Control Station
   - Smoke control system activation shall be immediately initiated after receipt of appropriate automatic or manual activation command.
   - Activation of the smoke control system shall send an alarm to the Central Station.
   - The smoke control system shall be connected to the FACP via a UL 864 listed Fire Fighter's Smoke Control Station. This station shall provide status and manual override control of all automatic smoke control devices associated with the smoke control system, as well as manual control of Post-Fire Smoke Purge systems (where applicable).
   - The Fire Fighter's Smoke Control Station shall override any other building controls that may be controlling smoke control equipment from any control point other than the Fire Fighter's Smoke Control Station.

2. Post-Fire Smoke Purge systems are required for the following conditions for low-rise school buildings:
   - Buildings with any story exceeding 50,000 SF in floor area
   - Buildings with spaces exceeding 100 feet from natural ventilation openings (natural ventilation is defined in BC 91**7**.1)

System shall be designed in accordance with section BC 91**7** of the NYC Building Code.

- Post-fire smoke purge systems are not intended to be life safety system. They are typically operated after the fire has been extinguished.
- Post-fire smoke purge systems are manually controlled from the Post-Fire Smoke Purge panel. (If there is a smoke control system in place, then the post-fire smoke purge system is manually controlled from the Fire Fighter's Smoke Control Station).

3. Ensure drawings show a detail showing the supervised auxiliary fan shut-down relay within 3'-0" of each starter contact or motor control starter. As per NFPA 72, it is acceptable to have the supervised auxiliary fan shut down relay within 3'-0" of interposing UL 864-9th edition listed relays on the same rung of the ladder logic that connects to the starters to shut them down directly. Use of a cascading series of relays beyond the permitted interposing relay(s) to shut down the fans is not code compliant.

D. Equipment and Locations

Fire Alarm Control Panel (FACP), including Post-Fire Smoke Purge controls, where required, and Fire Fighter's Smoke Control Station, where required – Placed in the main lobby, near the main entrance. Provide microphone and voice control where presignal system for place of assembly is required.

Printer – Placed in the Custodian's Office

Remote Annunciator – Placed in the General Office

Manual Pull Station – Placed in accordance with Section BC 907.4.2. Specifically, they shall be provided at each door leading to legal exit in corridors, lobbies, places of assembly and as required to meet the NYC Building Code travel limitations of 200'. The height of the manual pull stations shall be a minimum of 3'-6" and maximum of 4'-0" measured vertically from the floor level to the activating handle. All manual pull stations shall be single-action type. False alarm stopper covers shall be provided over all manual pull stations in new buildings and major modernizations where the mounting boxes have been recessed and the 4" maximum protrusion in the path of travel required by ADA can be maintained. Capital Improvement Projects typically have the pull stations surface-mounted and will **require the shallow false alarm boxes to be used to** meet the 4" maximum protrusion requirement. Modify the specification appropriately.

Audible Notification Appliances (Horns) – Placed in accordance with Section BC 907.5.2.1. Specifically, they shall be placed in all corridors and elsewhere, where required by the NYC Building Code, to provide audibility of 15 dBA above the average ambient levels. Refer to Chapter 18 of NFPA 72-1**6** for audible requirements. Horns shall be wall-mounted with their tops above the finished floor at heights not less than 90" and below the finished ceiling at distance not less than 6".

Visual Annunciator (Strobes) – Placed in accordance with BC 907.5.2.3. Specifically, they shall be wall-mounted in places of instruction, corridors, places of assembly, library, shops, music rooms, toilets and elsewhere where required by the NYC Building Code. Strobes shall be unobstructed by other objects, visible from any position in the area and shall be a maximum of 15 ft. from end of the corridor. Strobes shall be wall-mounted such that the entire strobe lens is located **below** 96" above the finished floor or 6" below the ceiling, whichever is less in height. Strobe lights shall not be required in staircases. If three or more strobes are in the same room or adjacent space within the field of view, they shall be synchronized. Ceiling-mounted strobes are allowed where wall-mounted strobes cannot provide proper coverage.

Audible and Visual Notification Appliances (Horn/Strobes) – Where horn location coincides with strobes, use combination horn/strobe type. Horn/Strobes shall be wall-mounted such that the entire lens is located **below** 96" above the finished floor or 6" below the ceiling, whichever is less in height. If three or more strobes are in the same room or adjacent space within the field of view, they shall be synchronized.

Area Smoke Detector - Placed in all mechanical rooms, oil tank rooms, electrical switch gear rooms, electric closets, telecommunications room and closets, audio/video storage rooms, paint storage, elevator lobbies, top of elevator shafts **if shaft is provided with sprinkler per Section 2.27.4.2 of ASME 17.1-2013 as modified by Appendix K, Chapter K1, of the 2022 NYC Building Code (i.e. sprinklers in hydraulic elevator pits)**, elevator machine rooms, locations requiring smoke control systems (stage, atriums, etc.), storage rooms containing flammable materials (book storage, grounds equipment room, custodian's storage) and over cross-corridor doors where magnetic door holders are provided. Smoke detector layout shall comply with NFPA 72-**16 as modified by** Appendix **Q,** Section **Q107, of the 2022 NYC Building Code.** Spacing shall not exceed the limitations of UL listing for the specific smoke detectors.

Duct Smoke Detectors – Place where required by code. Duct detectors placed in roof-top mounted/exterior equipment and exterior ducts shall be weatherproof type.

Heat Detectors – Placed in boiler rooms, other mechanical rooms being fed with fuel oil, generator rooms/enclosures, kitchens and culinary art rooms, and other locations where smoke detectors are required but cannot be installed due to environmental conditions (temperature below 32°F) or potential false alarms. Heat detector layout shall comply with NFPA 72-1**6** as **modified by Section Q107.** Spacing shall not exceed the limitations of UL listing for the specific heat detectors. Heat Detectors in the oil burning equipment rooms shall shut down fuel oil transfer pumps to that equipment.

Flame Detectors - Ultraviolet (U/V) explosion-proof flame detectors shall be installed in all rooms containing natural gas piping at a pressure of 15 psi or greater.

Carbon Monoxide Detectors – Refer to DR7.3.13 for details

Gas Leak Detection - Provide a gas leak detection connection via monitoring module to the fire alarm system with separate and distinct central station notification meeting the requirements of Section BC 918 for projects utilizing gas (not typical of new installations as heating and domestic hot water is to be provided using heat pump systems). Verify with the mechanical engineer (review product literature) that existing gas leak detection has the required dry contacts to make the connection.

Metal Wire Guards – Provide in all gymnasiums and playrooms for visual and audible notification appliances. Also provide guards for such devices in corridors, bathrooms and locker rooms for high schools where the devices are below the 8'-0" requirement or accessible from a window sill or other similar structure.

Kitchen Hood Fire Suppression System (Ansul system) - Shall be interconnected to the fire alarm system and the activation of the fire suppression system shall be indicated as an alarm on the Fire Alarm System.

Digital Alarm Communicator Transmitter (DACT) and Central Station Monitoring - Shall be provided as follows:

1. For any new fire alarm system installations and fire alarm panel replacements - all manual and automatic detection devices connected to the fire alarm system shall send the following signals to the Central Station:

   - Manual Alarm - manual pull stations,
   - Sprinkler Alarm - sprinkler system waterflow switches,
   - Automatic Fire Alarm - area smoke detectors, duct smoke detectors, heat detectors, flame detectors, kitchen Ansul systems,
   - Carbon Monoxide Detectors - system-connected CO detectors.
   - Supervisory signals - sprinkler system tamper switches, fire/sprinkler booster pump status (power failure, pump running, phase reversal), water tank low air pressure), **generator run/fail**
   - Trouble signals - general trouble signal from the Fire Alarm Panel.

2. When there is a sprinkler booster pump/fire pump installation in an existing building without fire alarm panel replacement, supervisory signals; sprinkler system tamper switches, fire/sprinkler booster pump status (power failure, pump running, phase reversal), water tank low air pressure, **generator run/fail** shall be monitored by the Central Station. If existing panel does not have central station monitoring, provide an external DACT.

3. When there is no sprinkler booster pump/fire pump in the fire protection system and there are more than **6** sprinkler heads being installed in an existing building per fire zone, the sprinkler system waterflow switches and tamper switches shall be monitored by a central supervisory station. If existing panel does not have central station monitoring, provide an external DACT.

4. **Optional: IP with Cellular Interface is used for applications where Plain Old Telephone (POTs) lines are not available or where Managed Facility Voice Network (MFVN) analog lines do not provide a stable interface. All network and cellular connection shall be approved by FDNY and shall have a FDNY Certificate of approval.**

Smoke Control System – Refer to Item 3 above

Voice/Alarm Communication System for Group A Spaces **and Atriums – Based on the limited number of occupants (<100) that this Design Requirement would apply, the code requirements for these systems would typically not apply to these schools.**

Fire Alarm Control Panel Bypass Key-Switch – New fire alarm systems designed under the **2022** NYC Building Code do not require **the use of a** fan shutdown **bypass key switch** during daily fire alarm testing **as they** are to be programmed to prevent the fan-shut down during testing. However, when a project is assigned due to continuing failure of dampers during fan shut down due to daily testing of a fire alarm system that does not have a bypass key switch, install a key-switch to bypass the circuits controlling dampers and fan shutdown during daily testing:

Procedure for the installation of the bypass key-switch in existing Fire Department approved Fire Alarm System

1. During the scope/schematic phase, the Engineer of Record shall file for a site-specific variance to allow the addition of the bypass switch to the existing fire alarm panel. Variance request shall be sent to the NYC Fire Department, Bureau of Fire Prevention - Chief of Technology Management and reference Fire Prevention Index # 0707030

2. The site-specific variance request shall indicate the school name and address. This request shall include a copy of the Fire Department Letter of Approval of the existing system and a copy of the Certificate of Fitness of the person designated to test that specific fire alarm system
3. Fire Department Chief of Technology Management will respond in writing, granting a site-specific variance.
4. Fire Department site-specific variance shall be scanned by the Engineer of Record and placed on the Fire Alarm System drawings for filing with the Bureau of Fire Prevention.
5. The Engineer of Record shall comply with all the Fire Department requirements indicated in the site-specific variance.

E. Design and Filing Strategy for Addition Projects

1. The decision on filing strategy will be decided early in the design process and is based on several factors, especially the size of the addition, age of the building, and types of spaces being added.

2. The Authority's preferred approach is that building additions are to be designed and filed as new buildings. As such, the fire alarm for the new addition will be a separate new system. Determination of how to address the existing building's system is as follows:

a) The fire alarm of the existing building is to be retained, when possible. Determination as to whether the alarm can be retained is dependent on several conditions:

- If the system is an antiquated system, such as the Acme system installed under prior codes, the system is to be replaced.

- If the existing panel is sized that it can receive additional devices required due to the work or spaces being created in the existing building and is operational, the system can remain. Verify fan operation and shut down is working. If minor repairs are needed to the system, the work can be sent to the Division of School Facilities through Capital Plan Development and Implementation for repairs. If repairs cannot be made by DSF, the repair work will need to be included with the existing building work.

- If the existing building fire alarm system requires expansion due to additional devices required for the work or spaces being created in the existing building and cannot be expanded without replacing the panel, replace the existing system.

- If the fire alarm system of the existing building requires replacement, the fire alarm system is to be designed and filed as a separate project from the fire alarm of the new addition. Ensure the fans and other systems are operational to allow required connections for fan shut down. If minor repairs are needed to the system, the work can be sent to the Division of School Facilities through Capital Plan Development and Implementation for repairs. If repairs cannot be made by DSF, the repair work will need to be included with the existing building work. The decision as to which Contract performs the work will be decided during design.

b) A remote annunciator for each of the building's alarm system (existing building and new addition) is to be placed at the general office, custodian's office, and the security desk at the main entrance, depending on where these spaces are to be located, except where

the system panel is already located in one of those locations. In addition, a remote annunciator is to be placed at both fire alarm panels for the other's system. The annunciator at the security desk can be omitted if it is near the fire alarm panel at the building entrance.

c) Verify the existing ansul system is operational and connected to the system and approved by the FDNY Fire Suppression Unit, if the kitchen is not being moved to the addition. If the system is not approved and the kitchen is to remain in the existing building, a decision will need to be made to request for an upgrade to the ansul system and connection to the fire alarm or revision to kitchen equipment to avoid needing to install a new ansul system.

3. Addition projects filed as an Alt 1 are required to be integrated into the existing buildings alarm. This will typically require the existing buildings alarm to be replaced as part of the project to ensure the system will function, unless the fire alarm has been recently replaced and is functioning.

4. The Letter in Part **H** of this Design Requirement provides the strategy agreed to by the FDNY and is to be included in the Fire Alarm Drawings.

F. Capital Improvement Program Projects

1. For CIP projects where the fire alarm system is affected by the work and devices will need to be added or changed, the reasoning in Paragraph E.2 above can be followed in determining if the existing system can remain.

2. For Fire Alarm Replacement Projects, ensure the fans and other systems are operational to allow required connections for fan shut down. If minor repairs are needed to the system, the work can be sent to the Division of School Facilities through Capital Plan Development and Implementation for repairs. If repairs cannot be made by DSF, the repair work will need to be included in the scope of the CIP project.

3. Ensure that existing water pressure switches or water flow detectors on sprinkler and/or standpipe systems are operational and can be adjusted and tested to provide a 30-second alarm notification delay with an activation of 90 seconds maximum. Coordinate with the Fire Protection Engineer. If existing devices are fitted with retarding chambers but cannot be adjusted to meet those notification requirements (or are not fitted with such chambers and chambers cannot be added) required by FDNY (the authority having jurisdiction), replace existing devices with new water flow detectors.

G. Requirements for the Engineering Plans.

1. Engineering plans shall contain all information in accordance with the Section BC 907.1.1. The sequence of operations shall be shown in the input/output matrix in the form prescribed by NFPA 72-1**6**. **S**igned and sealed drawings in **PDF format** shall be provided for filing **online** with the Fire Department.

2. The Engineer-of-Record shall be responsible for any modifications of the design drawings required to obtain the Fire Department plan approval.

3. Upon completion of the project **and the fire alarm is successfully installed and tested prior to FDNY inspection**, the Master Electrician will prepare and sign a set of as-builts,

including the revised input/output matrix. The Engineer-of-Record shall visually inspect the fire alarm installation and compare the As-built to the Contract drawings and if agreed and correct to the best of his/her knowledge, will sign and seal the as-built and the Contractor will submit to FDNY to facilitate their inspection. Once the letter of approval is attained from FDNY, submit one set of signed and sealed "AS-BUILT" riser drawings in 24" x 36" and one set of signed and sealed "AS-BUILT" drawings reduced to 11" x 17" to the NYC Department of Buildings. **(For new projects if the approved plans do not match the As-Built drawings, a new PAA needs to be filed with FDNY prior to inspection since the As-Built and FDNY approved plans must match.)**

H. Relevant Documents

* The 20**22** NYC Building Code.
* The 20**22** NYC Mechanical Code.
* NFPA 72, National Fire Alarm Code, **2016** Edition, as modified **by Appendix Q, Chapter Q107, of the 2022 NYC Building Code.**
* NYC Electrical Code, including 1 RCNY 4000.
* Fire Department Letter approving the bypassing of the circuits controlling dampers and fan shutdown during daily testing (For existing systems without shutdown)
* Letter to FDNY, accepted by FDNY, outlining SCA filing strategy for Addition Projects (to be included on addition project drawings)

JUL-31-2007 15:58 Z S ENGINEERING 5163286195 P.02/03

The City of New York

FIRE DEPARTMENT
9 METROTECH CENTER BROOKLYN, N.Y. 11201-3857

July 23, 2007

JUL 25 2007

Mr. Zygmunt Staszeski
ZS Engineering PC
99 Tulip Avenue
Floral Park, NY 11001

Re: Testing of Interior Alarm System in Public Schools, Fire Prevention index # 0707030

Mr. Zygmunt Staszewski

The Bureau of Fire Prevention acknowledges your letter dated June 26, 2007 concerning the above referenced subject matter and NYC School Construction Authority. The Bureau concurs with your assessment that the required daily testing of public school alarm systems for those building that contain HAVC equipment that require shut-down during alarm activation, places unnecessary stress on HAVC components.

The Bureau will accept fire alarm programming that will bypass damper and fan shutdown **PROVIDING THAT:**

1. During daily tests, a key switch shall be used to bypass the circuits that control dampers and fans shutdown.
2. The damper and fan bypass function shall be automatically restored to the normal un-shunted condition within forty-five minuets, if not done so manually before forty-five minuets.
3. The operation of the daily test shall be by a certificate of fitness holder
4. A log of daily fire alarm tests shall be maintained
5. Variance to install this bypass feature shall be site specific

JUL-31-2007 15:58 Z S ENGINEERING 5163286195 P.03/03

Testing Interior Fire Alarm. Public Schools
FPI # 0707030
July 23, 2007

6. The following documentation must be submitted with each variance.

   A. A copy of the certificate of fitness of the person designated to test the alarm

   B. A copy of the IFA approval letter issued by the Bureau

The Bureau of Fire Prevention may require additional requirement to ensure the integrity of the alarm system and safety of the public. When responding to this letter, kindly address your correspondence to Jack Taddeo, Chief of Technology Management and reference FPI# **0707030**

Signed

Jack Taddeo, Battalion Chief
Chief of Technology Management
Bureau of Fire Prevention
718 99 2377

TOTAL P.03

February 22, 2019

Department of Education

Chief Thomas Pigott
Chief of Technology Management
FDNY Bureau of fire Prevention
9 MetroTech Center 3rd Floor
Brooklyn, NY 11201

RE: Fire Alarm Filing Strategy – Public Schools
Additions filed as New Buildings – Revision

Dear Chief Pigott:

The NYCSCA would like to update you on our new filing strategy. We are in the process of constructing several new school buildings in all five boroughs. After our Agency has completed the feasibility study for each new building in accordance with the Administrative Section of the Building Code Administrative Sect. 28.2-901.9.4.1, & BC 1101.3.2 the determination for the filing category will be selected.

If the value of the new addition construction design meets/exceeds 50% and or 60% of the value of the existing building, then such new addition building will be filed as a "NEW BUILDING" in compliance with all the applicable codes. As a result of the NB filing classification, no ADA (triggered by 50%) or Fire Protection Systems (triggered by 60%) upgrades are required to be implemented to the existing building that was built in accordance with the governing Building Codes at that time. If the value of the new construction addition is less than either 50% of the value of the existing building, then the application will be filed as an "ALTERATION TYPE I", and will comply with all requirements outlined in the Administrative Code Sect. 28.2-901.9.4.2.

Requirements for New Building Filing:

1. New address with separate main entrance
2. Schedule A reflecting the Use and Floor Identification exclusive to the NB
3. New services/utilities directly related to the NB
4. Independent Egress
5. Fire wall separation between buildings, rating of new to match existing – ranging from 1 hr. -3hr
6. **New IFA panel located at main entrance with remote annunciation to custodian's office, main offices and Security station in the existing building as appropriate to the design.**
7. All ADA requirements as pertained to the governing code
8. FA plans will only reflect the details of the new building as per the related Schedule A, with any portion(s) of the existing building associated with the NB
9. **Connecting path of convenience between existing and new building – From the new building to the existing building – installed signage "Not An Exit" and from the existing building to the**

30-30 Thomson Avenue
Long Island City, NY 11101
718 472 8000 T
718 472 8840 F

new building (where necessary as per design). Installed signage to read "In Case of Fire - Access to Voluntary Fire Rescue Room".

Requirements for New Addition- Filed as Alteration Type I:

1. New addition building is connected to existing building as one building
2. Shares a common building address
3. Schedule A reflects the Use and Floor Identification for both buildings
4. Services and systems are and can be extended to provide coverage for both buildings
5. Shared Egress
6. One fire alarm system will provide coverage for both building using the existing "Phasing Agreement" between the NYCSCA and FDNY.

The filing types for these new school buildings will be depicted in section # 5 of the PW-1 and will be reflected in the BIS. All associated filings will follow suit accordingly, included that of the Fire Alarm application/plans.

Chief Pigott, the NYCSCA would appreciate FDNY Technology Management's support on this strategic approach, while maintaining the current phasing agreement still on record. This will enable us all to work well together toward a common vision without compromising the safety of the occupants or the general public.

If you have any questions, concerns or require further clarification, please do not hesitate to contact me immediately.

Sincerely,

Gordon Tung, P.E.
Vice President
New York City School Construction Authority

Gordon Tung, P.E.
Vice President
Construction Management

CC:
T. Shah – FDNY
R. Bonavita – FDNY
M. Yohan - FDNY
T. Sakin - FDNY
D. Choy – SCA
G. Roussey - SCA
B. Barrett - SCA
E. Abneri - SCA

7.3 Low Voltage Systems

7.3.3 Main Telecommunications Room and Intermediate Telecommunications Closet

Description/Design Approach:

A. Main Telecommunications Room (MDF)

A Main Telecommunications Room (MDF) shall be provided to house the main control equipment of the following systems:

- Local Area Network
- Telephone System
- Sound, Intercom and Teacher Activated Security System and Clock System
- Internet Protocol Digital Video Surveillance (IPDVS) System
- Building Management BACnet System
- **Video Intercom System**

The MDF shall not be placed in a cellar or basement and shall be centrally located on an upper floor of the school, but not in a space below a roof.

For a DIIT 'Small' school (student population of less than 40 students), a dedicated MDF is not required and a 1/4 height cabinet is to be provided. For a DIIT 'Medium' School (Student population greater than 40 students but less than or equal to 1000 students, a minimum of 150 sq. ft. is to be provided, proportionally 10' x 15,' though the POR requires a slightly larger size to account for installation of the BACnet cabinet if space is available. For a DIIT 'Large' school (student population of greater than 1000), a minimum of 300 sq. ft. of proportional width and length (not narrow and long) is to be provided. For existing schools and additions, if this area cannot be achieved due to the building layout and space restrictions, the equipment can be split into two separate rooms totaling the required square footage. If the space is not available, discussions with DIIT shall be held to determine alternate solutions. A 1/4" = 1' scale drawing of the MDF showing all the equipment and their electrical requirements shall be included in the Contract Documents. As a minimum, a 3'-0" clearance shall be provided on two sides (front and back) of the system equipment racks. Refer to the latest DIIT Standard of the v**7** series (refer to SCA website for latest version) for equipment and clearances, which are to be provided, in addition to required power requirements for the room and cabinets. Not all equipment such as the BMS cabinet are shown and must be located in the room and thus rooms will typically need to be larger than the minimum indicated.

Designers are to ensure that interferences such as columns and braces are accounted for and do not reduce the area or prevent the equipment from being installed with the appropriate clearances.

B. Intermediate Telecommunications Closet (IDF)

Intermediate Telecommunications Closets (IDF) shall be centrally located and stacked. The number of IDFs required shall be dictated by a 100-meter maximum distance to any data/telephone/IPDVS outlet. In addition, if the 100-meter distance is not exceeded, the data/telephone/IPDVS cabling shall be homerun to the MDF.

The IDF size shall be 10 feet by 10 feet minimum and a 3'-0" minimum clearance shall be provided on two sides (front and back) of the equipment racks. Refer to the latest DIIT Standard of the v**7** series (refer to SCA website for latest version).

Designers are to ensure that interferences such as columns and braces are accounted for and do not reduce the area or prevent the equipment from being installed with the appropriate clearances.

C. Physical security for access to the MDF and IDF shall be provided.

D. Refer to Design Requirement 6.2.28 for the HVAC requirements of the MDF and IDF.

E. Refer to the Room Planning Standards for the layouts of the MDF and IDF (Room Planning Standards layouts #12-25, #12-26 and #12-31), along with latest DIIT Standard of the v**7** series (refer to SCA website for latest version).

7.3 Low Voltage Systems

7.3.4 Telephone System

Description/Design Approach:

A. General

1. The intent is to provide a school-wide Telephone System. The Contract Documents shall provide for a Telephone Cabling System including wiring, raceway, boxes and outlets. The Telephone System hardware including the PBX, racks, telephone instruments, cable manager, call accounting PC, printer and power supplies will be furnished and installed by the DOE/Division of Instructional and Information Technology (DIIT).

2. The Telephone System and the Data Cabling System shall be integrated as much as possible in common raceways.

B. Equipment and Locations

1. Main Distribution Frame (MDF) shall be an open-type distribution frame located in the Main Telecommunications Room (MDF room). The PBX, the Cable Manager, the Call Accounting System, Printer and RJ21X interface terminals should also be housed at the Main Telecommunications Room.

2. Desk telephone outlet shall be provided in all administrative areas, offices and security desk.

3. Wall telephone outlet in lock box shall be provided in every room of instructions and Places of Assembly.

4. Wall telephone outlet without lock box shall be provided in utility rooms, storage rooms greater than 200 sq. ft., mechanical rooms, elevator machine room, supply rooms and vault room.

5. Dedicated phone lines (not through the PBX) shall be provided for the Intrusion Alarm System, Fire Alarm System, Elevator Intercom System, **Chairlift Intercom,** and the nurse's office.

6. Loud Bell is to be placed in noisy areas including the auditorium, gymnasium, gymatorium, student cafeteria, kitchen and the boiler room. A loud bell may be required in other noisy areas; however, this will be addressed on a case-by-case basis and will be determined by the DIIT Project Manager.

C. Cabling

1. Entrance Cables: To ensure the ability to add lines in the future, the DIIT Project Manager will request the local telecommunications company (Telco) to provide a 100 or 200 pair service cable to the building D-Mark Point, which is to be located in the Main Telecommunications Room. To facilitate this, the Designer is to coordinate with the DIIT Project Manager and show two (2) 4" conduits running from the building Point of Entrance to the D-Mark Point in the MDF room on the drawings. This will facilitate running both copper and fiber optic lines. In addition, the drawings shall also indicate a poly-twine drag to be left

in the conduits so that the Telco can pull the service cable. In addition to the service cable, the Telco will also pull two (2), #22 AWG, solid core, 4-wire, individual shielded twisted pair, T-1 spec cables, terminated at both ends with RJ-48 jacks as needed.

The engineer shall transmit two copies of the Site Plan indicating the requested Point of Entry and the location of the Main Telecommunications Room along with the request letter (See samples at end of Design Requirement).

2. Riser Cabling for the voice system shall consist of a 6–strand, 50/125-µ, multi-mode fiber optic cable riser. Termination at the Main Telecommunications Room and Intermediate Telecommunications Rooms shall be at a rack-mounted interconnecting unit. Individual strands shall be fanned out and terminated with LC connectors in an interconnect plate with twelve interconnect sleeves, following proper manufacturer's specifications for bend radius and strain relief. In addition to the fiber backbone for voice connectivity, six (6) Category-6 cables shall be installed between the MDF and each IDF to provide a copper voice backbone for analog and/or other out-of-band network devices that require copper connectivity to the MDF room. The Category-6 cables shall be terminated on a 24 port Category-6 patch panel in each IDF; at the MDF these cables shall also be terminated on Category-6 patch panels; port count dependent upon the total number of copper riser cables installed. In all cases, the patch panel(s) shall be mounted in the voice communication rack directly under the fiber optic interconnect enclosure. One (1) 1U horizontal wire manager shall be installed immediately below the category 6 patch panel(s) in each room. Riser cabling of the data system is described in DR 7.3.5.

3. Horizontal Cables connect the MDF room or IDFs to each telephone station. Horizontal cable shall be one 4-pair, #23 AWG solid copper conductors, unshielded twisted pair Category 6 (Cat 6) cable. The Cat 6 cable shall be white in color.

4. Ladder racks shall be installed to manage cables in the Main Telecommunication Room and intermediate telecommunication closets where a bundled group of voice cables span a horizontal space greater than 18 inches.

D. Cable Termination

1. RJ21X Interface Terminals - The entrance cables shall be terminated at RJ21X Interface Terminals, which are supplied and installed by the Local Telephone Carrier and are to be mounted on the MDF.

2. MDF and IDF - At the telecommunication rooms (MDF room and/or IDF, depending upon cable design), the Authority's cabling vendor will terminate every pair of every voice and data cable on the Cat 6 compliant patch panel(s). Voice and data cables will be cut down on Cat 6 compliant patch panels with Cat 6 RJ-45 type, eight conductor, and modular receptacles.

3. Telephone Stations - The Cat 6 cable shall be terminated at an eight-conductor RJ-45 jack, configured as per EIA/TIA T568B jack designation.

4. Administrative Areas - The voice and data cables, consisting of one (1) four-pair Cat 6 cable for voice and one (1) four-pair Cat 6 cable for data, shall be terminated at a duplex combination faceplate consisting of two RJ-45 jacks.

5. Intrusion Alarm - The dedicated phone line for the system, consisting of one (1) four-pair Cat 6 cable, shall be terminated at one RJ-31X jack.

6. Fire Alarm System- The dedicated phone lines for the system, consisting of two (2) four-pair Cat 6 cables, shall be terminated at RJ-31X jacks.

7. Elevator Intercom – One dedicated phone line for each system, consisting of one (1) four-pair Cat 6 cable, shall each be terminated at a separate faceplate consisting of an RJ-45 jack.

8. Nurses Office – In addition to the standard phone and data to be provided to each nurse's desk, provide the following for the nurse's office/suite: voice and data cables consisting of one (1) four-pair Cat 6 cable dedicated phone line for the voice, one (1) four pair Cat 6 cable dedicated phone line for fax and one (1) four-pair Cat 6 cable for data, which shall be terminated at a triplex combination faceplate consisting of three RJ-45 jacks. The nurse's office phone is to be a dedicated line for the phone and fax, not through the PBX.

9. **Chairlift Intercom – One dedicated phone line for each chairlift, consisting of one (1) four-pair Cat 6 cable, shall each be terminated at a separate faceplate consisting of an RJ-45 jack at the chairlift. Chairlift is usually located in auditorium/gymatorium or other locations where provided for accessibility requirements.**

E. Power Requirements

The Telephone System PBX shall be provided with a dedicated 30-Amp, 120-Volt, circuit connected to the Emergency Panel. The Telephone System peripheral equipment (call accounting PC, printers, MAT terminal, power supplies) shall be provided with two (2) duplex, 20-amp, 120-Volt receptacles connected to a dedicated circuit in the Emergency Panel. The PBX should be independently grounded with a #6 AWG ground wire to the water service ground system via telecom room ground bus.

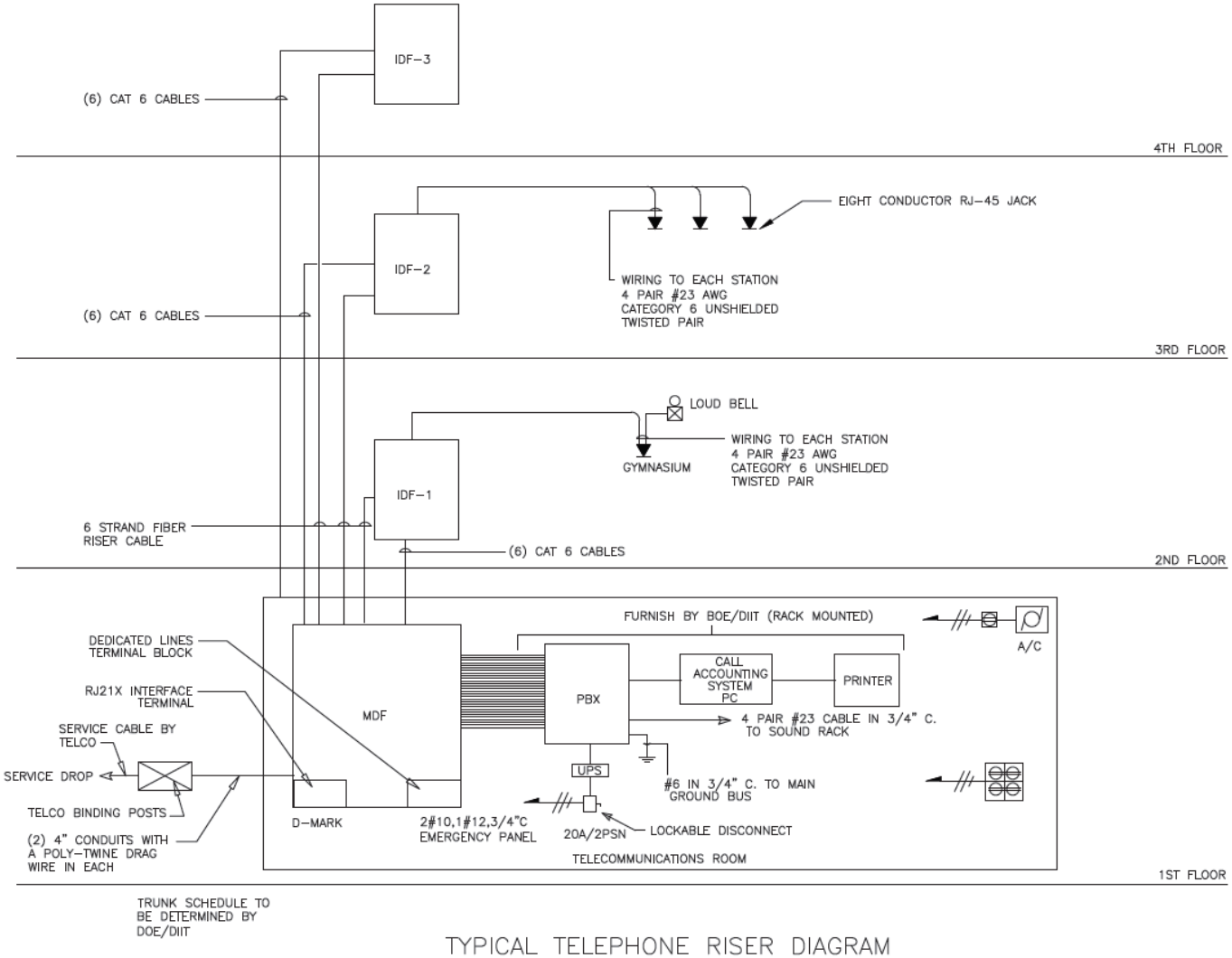
F. Coordination with the DOE/DIIT

At the Schematic Design Phase of a Capacity Project, the Project Engineer shall inform DOE/DIIT as to the type of project (addition, new building, etc.). DOE/DIIT shall advise the Project Engineer on the estimated cost for furnishing and installing the telephone system. The Project Engineer shall report said estimated cost in the Schematic Report for documenting same as separate item under Furniture & Equipment. DOE/DIIT will use these funds, when approved, to compensate their installing contractor.

When ordering the phone lines (MFVN Communications) for the Fire Alarm system, coordinate with DOE/DIIT to order the optional battery backup to be good for 8 hours of standby power supply as required by NFPA 72-16 A.3.3.151(3).

The Telephone System design documents, including riser diagram and floor plans, shall be submitted to DOE/DIIT for review and approval during the 60% and 100% design phases for Capacity Projects.

G. Relevant Conceptual Sketches
Typical Telephone System Riser Diagram
Sample letter requesting service to the Local Telephone Company



TYPICAL TELEPHONE RISER DIAGRAM

NOT TO SCALE

November 10, 1998

Verizon Communications Inc.
227 East 38th Street
New York, N.Y. 10016

Attention: **Name of Outside Plant Engineer**
Verizon Communications Inc.

RE: Kingsborough High School for the Sciences (New School)
2001 Oriental Blvd.
Brooklyn NY
Request for Telephone Service

Dear Mr. xxxxx:

The NYC School Construction Authority, in conjunction with the Department of Education, is currently preparing plans and specifications for the construction of a new High School for the Sciences on the Kingsborough Community College campus. The building will be a permanent four-story structure with no Cellar.

We are requesting an underground telephone service from Shore Boulevard into the building. The Main Telecommunications Room is located on the second floor. We propose to install two (2) 4" conduits from the Main Telecommunications Room to a point in the street one-foot from the curb line.

Enclosed please find two copies of the Site and Service Plan indicating the Main Telecommunications Room location. Kindly return one copy indicating the approved Point of Entry and any other information pertaining to the service.

Should you have any questions on this project, please do not hesitate to contact me at xxxx.
Please address your reply to the undersigned.

Sincerely,

xxxxx
Project Engineer

cf: SCA/A&E Design Manager
Project Architect

Enclosures
Site and Service Plan

7.3 Low Voltage Systems

7.3.5 Data Cabling Network

Description/Design Approach:

A. General

1. The intent is to provide high-speed data network-cabling infrastructure for administrative and instructional use. The Contract Documents shall provide for a Local Area Network (LAN) cabling infrastructure including wiring, raceway, boxes, outlets, patch panels, cabinets and racks.

2. The Local Area Network and the Telephone System cabling shall be integrated as much as possible in common raceway.

3. A Wireless Network Infrastructure shall be provided for use in accordance with the Department of Education's Division of Instructional and Information Technology (DOE/DIIT) requirements. As per **the latest** DIIT Standard **of the v6 series (refer to SCA website for latest version)**, wireless is to be provided throughout the entire school to provide the building with 100% wireless coverage.

4. Projects that include a building management control system shall also be provided with an additional backbone riser for the BACnet network system (coordinate with HVAC Design Requirement 6.2.20).

5. A separate isolated network shall be provided for the IP-Based Sound, Intercom and Teacher Activated Security System.

B. Equipment and Locations

1. Data-Main Distribution Frame (MDF) shall be an open type frame located in the Main Telecommunications Room (MDF room).

2. Wall Cabinet: Wall-mounted cabinet shall be installed in High-Density Rooms (rooms with 16 or more computers)

3. Patch Panels provide physical connectivity from the Main Telecommunications Room and Intermediate Telecommunication Closets (IDF) to the data outlets. Also, the patch panels provide cross connection between the MDF room and IDFs. Patch panels shall be housed in the MDF room, IDFs and at the High Density Room wall cabinet. The patch panels shall be sized to account for the port count plus 20% spare.

4. Data Outlets shall be provided at every area of instruction, every office including all cubicles, places of assembly, library, media centers, vault room, security desk and where required by the Point of Sale (POS) System and Comprehensive Attendance, Administration and Security System (CAASS).

5. The LAN hardware including switches, routers, communications servers, and un-interruptible power supplies (UPS) will be furnished and installed by the Computer Integrator contracted by the SCA/Furniture & Equipment Department.

6. BACnet wall data enclosures in the intermediate telecom closets will be furnished under Division 15 and installed under Division 16.

7. Provide enclosed rack and wall mounted cabinets in MDF and IDF locations for the IP-Based Sound, Intercom and Teacher Activated Security System.

C. Cabling

1. Entrance Cables - The Telecommunication Service Provider is responsible for providing and terminating the Wide Area Network (WAN) data circuits at the Main Telecommunications Room. DOE/DIIT is responsible for ordering the WAN circuits and assuming all installation responsibilities and expenses associated with the installation and operation of the circuits. The WAN provides the schools with connectivity to the Internet and administrative applications through the DOE computer facility at Metro Tech.

2. Riser Cables connect the Main Telecommunications Room or MDF to each Intermediate Telecommunications Room or IDF. Riser cabling for data shall consist of a 24-strand, 50/125-µ multi-mode fiber optic cable. The 24-Strand fiber optic cable shall be terminated at the MDF in rack mounted interconnect units with LC type connectors and shall be terminated at the IDF in rack mounted interconnect units with LC type connectors. Individual strands shall be fanned out and terminated with LC connectors in an interconnect plate with twelve interconnect sleeves, following proper manufacturer's specifications for bend radius and strain relief. Riser cabling of the phone system is described in DR 7.3.4.
.

3. Horizontal Cables connect the data outlets to the MDF or LDF. The horizontal cable shall be 4-pair, #24 AWG solid copper conductors, and unshielded twisted pair (UTP) Cat 6 communications cable. For the DOE's participation in a demand response program, a separate Cat 6 cable shall be run from a patch panel in the MDF/IDF to the main electrical room to within 3-5 feet of the electrical utility meter, terminated in the room with a box, cover, and chase nipple. Provide 6 feet of cable rolled up and tagged.

4. Horizontal Fiber Connections
Connect clinics and high-density areas directly to the MDF with 12-strand, 50/125µ, multi-mode fiber optic cable.

5. All UTP, fiber optic cable, patch panels and other components must adhere to performance levels specified in the TIA/EIA-568-A standards. Plenum grade cable shall be used only in plenum spaces.

D. Cable Termination

1. Cat 6 cables shall be terminated in an RJ-45 modular type eight-pin connector with outlets configured as per TIA/EIA T568B jack designation. At the MDF/IDF, cables shall be terminated on Cat 6 patch panels, and both ends of the cable shall adhere to TIA/AIA-568-B convention and shall be straight runs with no cross over.

2. BACnet backbone CAT 6 riser shall be terminated in an RJ-45 patch panel in the Main Telecommunications Room and with RJ-45 jacks in the Intermediate Telecommunication Closet data enclosures.

3. The BACnet data riser will have one network cable for each router that is located on each floor of the project as needed

E. Horizontal Cabling and Termination

1. Areas of Instruction shall be provided with five Cat 6 cable drops. Two of the Cat 6 cable drops shall be placed at the front wall of the instructional area by the instructor's desk. These cables shall be terminated in one duplex outlet. One Cat 6 cable drop is for student's use and shall be placed in the back of the room under the computer counter. The fourth cable drop shall be located at the entrance door for future use. The fifth cable drop is for the Wireless Access Point (WAP) as outlined below. Rooms larger than 1250 SF will likely have one additional Cat 6 cable drop as outlined below under "Wireless Network Infrastructure".

2. High-Density Rooms (rooms with over 16 computers/peripherals, library and media centers) shall receive a fiber run to guarantee a high-speed connection from the switch in addition to the Category-6 data drops described above. The fiber run shall consist of a 12-strand 50/125-µ multi-mode fiber optic cable (50 Micron OM4 spec), run from the designated classroom/office directly to the MDF. Termination of fibers in high-density areas must be with LC connectors mounted within a duplex fiber communication outlet or a combination faceplate in conjunction with one or more of the Category-6 cable(s). The fiber optic cable shall be terminated within the Wall Cabinet. In general, this fiber run shall include one termination in each high-density area. The DOE Project Manager will work with site administration to determine the appropriate numbers on a site-by-site basis.

3. General Assembly Areas (Auditorium, Gymnasium and Cafeteria) and Library shall be provided with a minimum of three Cat 6 drops as located on the individual Room Planning Standard and an additional Cat 6 drop for the Wireless Access Points as outlined below under "Wireless Network Infrastructure".

4. Administrative Areas shall be provided with two Cat 6 cable drops for each user. One Cat 6 cable is for data connected to the LAN and the other is for voice connected to the Telephone System. These cables shall be terminated in one duplex combination voice/data outlet and shall be placed according to the architectural layout. There shall also be a cable drop for the Wireless Access Point to serve the areas

5. Point of Sale (POS) System: A data outlet and a duplex, dedicated, 20-Amp, 120-Volt, receptacle shall be provided for each of the POS Stations in the Student's Servery and Teacher's Servery. A POS Station data outlet and receptacle shall be placed at the beginning and end of each of the serving lines in the servery. For High Schools only, a data outlet and a duplex, dedicated, 20-Amp, 120-Volt, receptacle shall be provided near the main building entrance. In the student cafeteria at the Intermediate, Junior and High Schools, dedicated data outlets and duplex, 20-Amp, 120-Volt, receptacles shall be provided for each POS Kiosk as follows:

# of student	# of POS Kiosk
1 – 750	1
751 – 1500	2
1501 and more	3

6. Comprehensive Attendance, Administration and Security System (CAASS): For Intermediate and High Schools, provide at least two data outlets and duplex, dedicated, 20-Amp, 120-Volt, receptacles at each of the student building entrances and one data outlet and duplex receptacle at each entrance to student locker rooms, library and cafeteria. The CAASS data outlet and duplex receptacle shall be placed at the corridor wall next to the room entrance doors.

7. Wireless Network Infrastructure: Cat 6 cable drop shall be provided from the MDF room or IDF to all areas of the building to provide at least one drop for each Wireless Access Point provided. Based on the **latest** DIIT standards **of the** v**6 series**, for areas of instruction the WAP is to be placed **at** the **front wall** of the classroom **at the ceiling level, but no higher than 10'-0" if the ceiling is higher**. If the front wall of the classroom is adjacent to the front wall of the classroom next door, the location of the WAP in one of the rooms must be located to the back of the room. The floor layout shall be such that there shall be no WAPs directly behind each other. Rooms larger than 1,250 sq. ft. shall have a minimum of two dedicated Cat 6 drops installed for two WAPs. Cluster suites shall be provided with only one Cat 6 drop if the total area is less than 1,250 sq. ft. Space the WAPs located in hallways, mechanical spaces, etc., to provide complete coverage. Ensure the Architect indicates in the room schedule under "Owner Supplied, Contractor Installed" the WAP and type of bracket (ceiling mount or wall mount) to be provided.

   a. The Authority's Computer System Integrator will assist the Design team in determining the final locations of the WAPs in common areas, mechanical areas, and rooms above 1250 sq. ft. during the design phase. The designer shall modify the standard locations provided on the Room Planning Standards with the revised locations as required by the latest DIIT standard and recommended by the Computer Systems Integrator. A survey and/or walk through might be required by the system Integrator/DIIT to optimize the system if provided in an existing school.

   b. The integrator will submit the suggested WAP locations in a marked-up floor plan along with network design package (WNDP). A&E is to request review by DIIT prior to completion of the project.

   c. The Authority's System Integrator is required to submit CAD Floor Plans of the school with WAP locations for common areas and those over 1250 sq. ft. to DIIT along with other final As-Built documents as a deliverables no later than two weeks after the integration at the school is completed.

8. The UTP cabling installation is required to be tested by the installer prior to acceptance from jack-to-jack (Permanent Link Testing) to Cat 6 performance standard EIA/TIA 568-B.2-1 using approved field test equipment and methodology as per the above standard.

F. Power Requirements

1. The number of receptacles for each cabinet/rack is dependent on size of the school (based on school population per DIIT) as defined by **the latest** DIIT Standards **of the v6 series**. Also refer to DR 7.3.3.

DIIT Small School (less than 40 students)

Volts/Amps	Outlets	Voice and Data
110v/20 Amp	quad (5-20R)	1

DIIT Medium School (40 to **1000** students)

Volts / Amps	Outlets	IPDVS	Data	Core Switch	Voice	Plywood
110v/20 Amp	single (5-20R)					
110v/20 Amp	duplex (5-20R)				1	
110v/20 Amp	quad (5-20R)	2				1
110 /30 Amp	Single (L5-30R)	1				
220v/30 Amp	Single (L6-30R)		2	2	**1**	

Note: System Integrator will determine if two data/core switch cabinets are required during design. DIIT diagram shows one, but two may be needed.

DIIT Large School (greater than **1000** students)

Volts / Amps	Outlets	Voice	Core Switch	Patch Panel	Class. Conn.	IPDVS	Plywood
110v/20 Amp	single (5-20R)						
110v/20 Amp	duplex (5-20R)						
110v/20 Amp	quad (5-20R)	1				2	1
110v/30 Amp	Single (L5-30R)					1	
220v/30 Amp	Single (L6-30R)	1	2	2	2		

2. IDF power requirements are as follows:

Volts/Amps	Outlets	Voice	Data Patch Panel	IPDVS	Class. Conn.
110v/20 Amp	quad (5-20R)	**1**	**0**	2	
220V/30 Amp	Single (L6-30)		**0**		**2**

3. Two duplex, dedicated, 20-Amp, 120-Volt, receptacle shall be provided inside the Wall Cabinet at the High Density Room.

4. Refer to latest DIIT Standards for actual numbers based on the equipment, which is based on number of classrooms. The Authority's Computer System Integrator will assist the Design team in determining the final power requirements based on the DIIT standards during the design phase.

5. BACnet requirements:

   a. Provide four duplex dedicated, 20 Amp, 120 Volt, receptacles at least two feet apart near the BACnet Data cabinet in the Main Telecommunications Room.

   b. Provide one Quad Receptacle (110V) to telecom plywood backboard in MDF for the powering of the Data Fiber MUX.

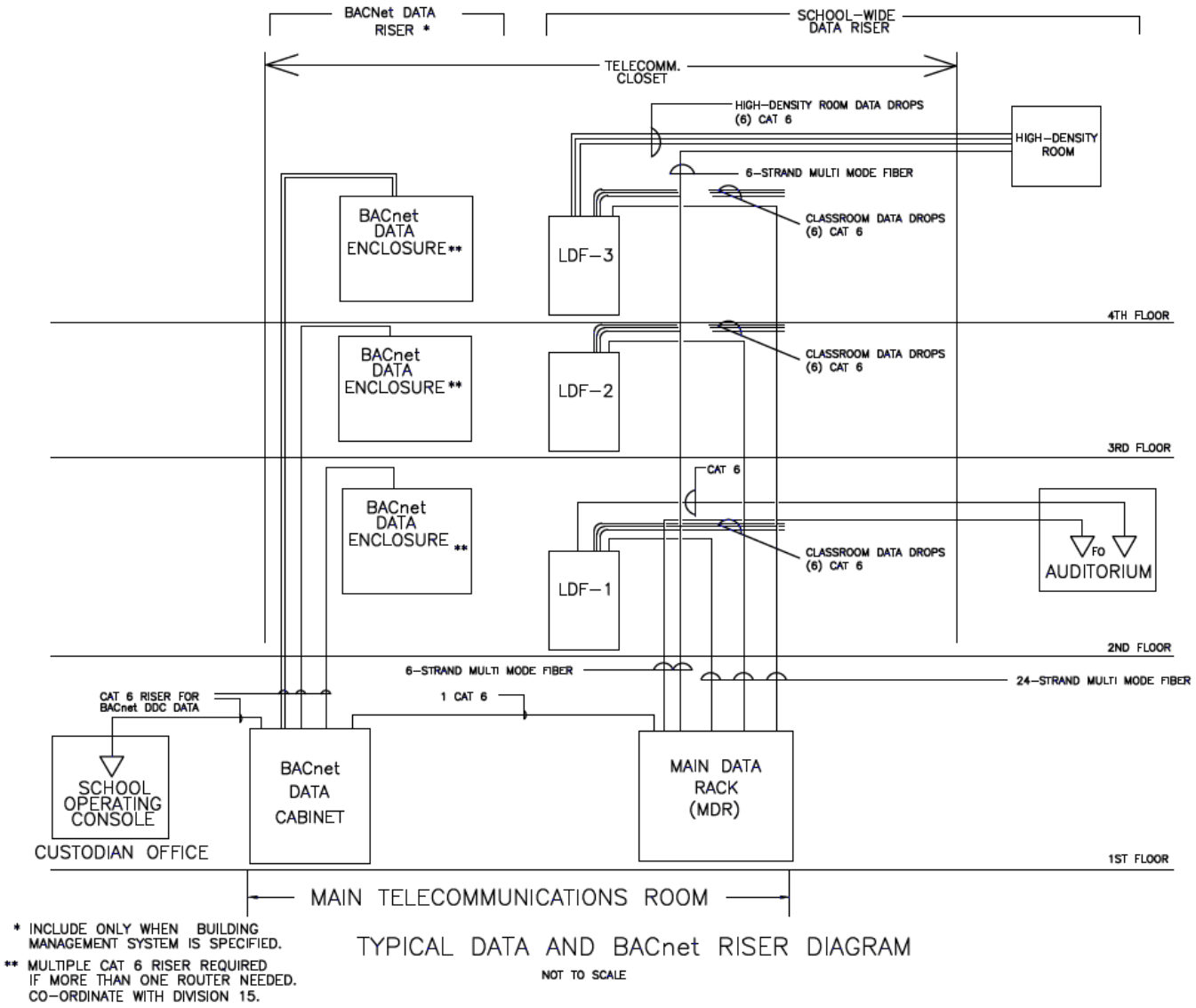
   c. Provide three quad, dedicated, 20-amp, 120 Volt, receptacles (type 5-20R), located at least two feet apart within three (3) feet of the data cabinet in all Intermediate Telecommunications Rooms.

G. Coordination with the DOE/DIIT

The Data/BACnet Cabling design documents, including riser diagram and floor plans, shall be submitted to DOE/DIIT for review and approval during the 60% and 100% phase.

H. Relevant Conceptual Sketch

Typical Data/BACnet Cabling Riser Diagram. **Refer to the latest DIIT standard (see the SCA website) for the latest data riser requirements, as the standard is updated regularly**.



Note: 6-strand fiber shown to high-density room to be 12-strand. **Refer to the latest DIIT standard (see the SCA website) for the latest data riser requirements, as the standard is updated regularly**.

7.3 Low Voltage Systems

7.3.6 Intercommunication Systems

Description/Design Approach:

A. Holding Areas, Areas of Rescue Assistance, Fire Rescue Areas, and Areas of Refuge Intercommunication System

1. A dedicated two-way voice communication system shall be provided to connect Holding Areas, Areas of Rescue Assistance, Fire Rescue Areas, and Areas of Refuge to all General and Custodian offices.

2. The units in the Custodian and General offices shall be master station, wall type units. Staff Stations in the Holding Areas, Areas of Rescue Assistance, and Fire Rescue Areas shall be wall mounted with call pushbuttons.

3. Note that systems utilizing telephone type instruments for either master or staff units are not acceptable.

4. Addition projects

   For most projects, the addition with its new elevator(s) will be making the existing building accessible, and thus there will not be existing Holding Rooms/Areas of Rescue Assistance. Provide a new intercommunications system, with staff stations in the Fire Rescue Areas of the addition and in the newly created Area of Rescue Assistance/Holding Room/**Fire Rescue Area**, if applicable, in the existing building, connected to master stations in the general office and custodial office. If the existing building already has a Holding Room/Area of Rescue Assistance/Fire Rescue Room, investigate the existing system and determine the requirements based on the following:

   a. General office to remain in existing location

      1) If existing system is functional, existing system is to remain. New spaces in new addition are to be provided with a new system with the new master station adjacent to the existing. If existing system can be expanded to receive new Staff Stations, the new Staff Stations can be connected to the existing Master Station.
      2) If existing system is not functional, remove the existing and provide a new system for the new and existing spaces, with the master station in the custodial and general offices.

   b. General office in addition building

      1) If existing system is functional, existing system is to be extended with twisted pair to a new master station in the new custodial and general offices of the addition. The new spaces in the addition are to be provided with a separate system with the master station adjacent to the existing building master station in the new custodial and general offices.
      2) If existing intercommunication system is not functional, remove existing and provide new system for the new and existing spaces, with the master station in the new custodial and general offices.

B. Elevator Intercommunication System

1. The elevator car station (hands-free, wall type unit, furnished under Specifications Division 14) shall have an auto-dialer. Provide a telephone set, as part of school telephone system, in each elevator machine room.

2. Connect the automatic dialing, hands-free station in the elevator car to a dedicated telephone line. The elevator car station shall automatically dial a programmed number connecting the passenger to the **security desk, general office, and** DOE Alarms Central Station to alert the security personnel that there is a problem in the elevator and identify visually which elevator is initiating the call.

3. Provide a CAT 6 cable from the elevator machine room to each location listed below and also provide a local monitor/viewer (approximate panel size: 21"Hx25"Wx6"D) by elevator vendor at each location to view the camera feed from each of the elevators in an emergency condition:
   a. Elevator machine room
   b. Security desk in Lobby
   c. General Office
   d. At the Fire Command Center (FCC) within a high rise (delete at security desk if FCC is in vicinity of security desk)

4. Provide a UPS in elevator machine room for emergency backup (4 hours) when an emergency generator is not provided for a building for the two-way communication/visual requirements as per Section 2.27.1.1.5 of Appendix K, Chapter K1, of 2022 NYC Building Code.

C. Wheelchair Lift Intercommunication System

1. The wheelchair lift (hands-free, furnished under Specifications Division 14) shall have an auto-dialer.

2. Connect the automatic dialing, hands-free station in the lift to a dedicated telephone line. The lift station shall automatically dial a programmed number connecting the passenger to the **security desk, general office and** DOE Alarms Central Station to alert the security personnel that there is a problem on the lift and identify which lift, if there is more than one in the school, is initiating the call.

7.3 Low Voltage Systems

7.3.8 Sound Intercommunication and Teacher Activated Security System

Description/Design Approach:

A. General

1. An IP-based school-wide Sound, Intercom and Teacher Activated Security System (Sound System) shall be provided with the following functions:

   - Public Address system for general announcements.
   - Two-way communication system between two stations and between station and any speaker, including each speaker in the corridor.
   - Privacy system to prevent eaves-dropping through classroom speaker.
   - Tone generation for emergency call from classrooms to central station.
   - All spaces, as well as each speaker in the corridor, shall be assigned a space number and the zone to which it is to be assigned, which shall be shown on plans. Include an operation matrix on the Drawings to indicate each operational zone and the space number assigned to each zone.

2. The system shall cover the Main Building, all Additions, Mini-Buildings, Temporary Classroom Units and Temporary Classroom Buildings, where applicable. For building additions, the system shall be designed as follows:

   a. Main office to remain in existing location

      1) If existing building sound system is a functional analog system, convert the analog system to digital with a conversion panel at the existing sound rack and connect the IP panel of the addition to the conversion panel via a fiber connection. The system will have two phones, one for the existing system and one for the new system, with a relay being installed between the two systems to permit all call with either phone.

      2) If existing building sound system is not functional or can't be expanded for new devices required for the number of reconfigured spaces requiring such, remove existing analog system of the existing building and provide a new IP-based system for the new and existing portions of the building at the existing rack location in the existing building.

   b. Main office to be located in new addition building

      1) If existing building sound system is a functional analog system and the rack can remain within the reconfigured space without moving the rack, convert the analog system to digital with a conversion panel at the existing sound rack and connect to the new IP Panel located in the addition using a fiber connection. The system will have two phones, one for the existing system and one for the new system, with a relay being installed between the two systems to permit all call with either phone.

      2) If existing system is not functional, can't be expanded for new devices required for the number of reconfigured space requiring such, or the existing rack would need to be moved because of the repurposing of the space, remove existing analog system

of the existing building and provide a new IP-based system for the new and existing portions of the building with IP Panel located in the addition.

3. Places of Assembly, such as Auditoriums, Gymnasiums, Gymatoriums, Cafeterias, Cafetoriums, Multi-purpose Rooms, and Dance Studios/Classrooms**/Exercise Room** shall have their own Local Sound System. Each of these Local Sound Systems shall be fully interconnected to the Main Sound System and shall incorporate an audio amplification system for the hearing impaired. **Provide a fire alarm override for all local sound systems to disable the local sound system when the fire alarm system goes into alarm to allow the fire alarm notification devices to be heard. All call override will still work if announcements will need to be made on the public address system.**

4. The Main Sound System shall automatically override any Local Sound System for general announcements. The system shall have the capability to make a general announcement from any station connected to the Main System or from a dedicated microphone connected to the Local Sound System.

5. When replacing the Sound system in retrofit installations and the existing system is in working condition, the drawings shall state the existing system is not **to** be removed until the new system is complete and removal approved by the SCA.

B. Local Sound System Requirements

1. Gymnasium

   a. A Gymnasium without a partition requires a single local sound system with a single channel amplifier.

   b. A Gymnasium that is partitioned into two sections requires a single local sound system configured with a dual channel amplifier so that announcement can be made individually for each section of the Gymnasium and combined for the entire gymnasium.

2. Gymatorium/Cafetorium

   The Gymatorium/Cafetorium requires one local sound system with two amplifiers to drive two separate sets of speakers:

   a. When being used as the gymnasium/cafeteria, the designated gymnasium/cafeteria amplifier shall drive the ceiling speakers utilized for the gymnasium/cafeteria function. If the Gymatorium is partitioned, the amplifier shall be a dual channel and configured so that announcements can be made individually for each section of the Gymatorium and combined for the entire Gymatorium. Ensure spec is appropriately modified.

   b. When being used as the auditorium, the designated auditorium amplifier shall drive the wall-mounted speakers utilized for the auditorium function.

   c. A mixer shall be used to control the switching operation between the two amplifiers.

3. Audio Amplification System for the Hearing-Impaired

   a. An audio amplification system is required to be installed in all spaces with a local Public Address system as per ADA 2010.

b. Capacity Projects
- Provide a whole area induction loop system in accordance with Section **BC** N102 in the Cafeteria/Cafetorium. Utilize wire embedded in the slab system. If the project does not have such space, discuss with SCA A&E management as to the alternate location.
- Provide FM type system in accordance with Section **BC** N104 in the remaining spaces with the local sound system, such as Gymnasium, Gymatorium, multi-purpose room, Dance Studio/classrooms**/Exercise Room** and auditorium. If any of these spaces is part of a stand-alone structure or the only Public Assembly space in an addition, the induction loop system is to be used rather than the FM type, as LL 51/17 requires at least one induction loop system per building. If there is a technical issue in installing the induction loop in a space, discuss with SCA A&E management.

c. CIP Projects
- When renovating a space requiring an assistive listening system or replacing a local sound system and the cost is greater than $950,000, install the Induction Loop System as the assistive listening system, as at least one system in the building is required to be an Induction Loop system as required by LL 51/17. The loop system is to be installed in the floor and depending on the finish flooring shall utilize either wire placed in grooves cut into the floor slab or copper tape. However, if the cost of installing the induction loop system is greater than 5% of the construction cost of the project, the induction loop is not required as allowed by LL 51/17 and an FM system is to be installed.

d. At the security desk, a local induction loop system is to be provided as required by LL 51/17.

4. Clock System

a. Provide an integrated Sound/Clock System in new construction and in retrofit applications where the approved Scope Report provides that the existing clock system is to be replaced.

b. Where the Sound and Clock Systems are not to be integrated, as in the case of a retrofit application where the existing Clock System is to remain, provide a separate independent Sound System.

C. Equipment and Locations

1. Central Control Sound Rack shall be placed in the Main Telecommunications Room where available; otherwise in or near General Office. For system replacement in existing buildings, Central Control Sound Rack shall be installed at the same location.

2. Combination Speaker/Clock Assemblies (integrated speaker/clock assemblies) shall be provided in new construction and in retrofit applications where the existing Clocks System is being replaced. Install in areas of instruction, offices, and teacher's cafeteria/lounge.

3. Speaker Assemblies shall be provided in toilet rooms off corridors, Dance Studios**/Exercise room** and Places of Assembly such as Auditorium, Cafeteria, Gymnasium, Multi-purpose Room and Gymatorium. Horn type speakers shall be provided in corridors, play-yard,

mechanical rooms, and large storage spaces. Kitchen speakers shall be all-environment loudspeakers. Provide speakers in stairwells on alternate floors where required for audibility.

4. Privacy/Call-in Switches shall be provided in each classroom, areas of instruction, teacher's lounge, teacher's cafeteria, and all small offices. Locate privacy switch in the front of classroom near the corner adjacent to the exterior wall. The privacy/call-in switches shall not be mounted near the door.

5. Volume Control for Speaker (In High Schools only) shall be provided in each office.

6. Administrative Control Stations (ACS) shall be provided in General Office, Assistant Principal Offices, Principal's Office, D75 Administrative office and Custodian's Office. Outlets for ACS shall be installed at 18" A.F.F. near the desk.

7. Local Sound Systems shall be provided in Places of Assembly (Auditorium, Gymnasium, gymatorium, Cafeteria/Lunchroom, Cafetorium, Multi-purpose room) and Dance Studio/Classrooms**/Exercise Room**. The amplifiers shall be installed in a secure area not readily accessible to the public. **All local sound systems shall have an override to allow the fire alarm to be heard when the fire alarm is in alarm.**

   a. The Auditorium and auditorium portion of the Gymatorium/Cafetorium sound system shall be provided with four microphone outlets mounted in front of the stage at 18" A.F.F. All other local sound systems shall each be provided with three microphones outlets mounted at 18" A.F.F. except when the Gymnasium is partitioned, for which two microphones shall be provided in each section.

   b. Audio Amplification System for the Hearing-Impaired shall be provided with each local sound system as follows:
      - FM System
        Single channel receivers with headsets, teleloops, and silhouette coils shall be furnished in accordance with the required minimums of Table 219.3 of 2010 ADAAG (based on the population of each space). A calculator based on the table can be found on the following web page: https://www.williamssound.com/ada-calculator.
      - Induction Loop System
        Loop wiring with HPDE shielding is to be installed in the concrete slab for new construction and either the same wiring cut in the slab or copper tape depending on substrate for existing buildings. Consult with a certified installer for proper installation (certified installers to be found on the manufacturers' websites). Provide headsets that are compatible with the induction loop system for use by people without the t-coil hearing as per that required by Table 219.3 of 2010 ADAAG.

7.3 Low Voltage Systems

7.3.9 Clock System

Description/Design Approach:

A. General

The Clock System shall be fully integrated with the **IP-based** Sound System **(thereby requiring a CAT 6 cable per clock)**, especially when a new Central Control Sound Rack is being installed or where one is available in the building.

1. Where the Sound/Clock Systems are fully integrated, all wiring for secondary clocks shall be routed to the Central Control Sound Rack in common raceway with the Sound System. The program master clock shall be installed in the Central Control Sound Rack.

2. Where the Sound/Clock Systems are NOT integrated, an independent clock system shall be provided with its own master program clock.

B. Equipment and Locations

Master Program Clock (where required) shall be provided near the Central Control Sound Rack in the Main Telecommunications Room or in the General Office.

Combination Speaker/Clock Assemblies shall be provided in new construction and in retrofit applications where the existing Sound System is being replaced. Install in Areas of Instruction, Offices and Teacher's Cafeteria/Lounge.

Single-Faced Clocks shall be provided in Places of Assembly (Auditorium, Cafeteria/Lunchroom and Gymnasium). In retrofit application where the Sound System is not being replaced, install in Areas of Instruction, Offices, **and** Teacher's Cafeteria/Lounge.

Double-Faced Clocks shall be provided in the middle of corridors.

Time Card Recorder shall be provided in the General Office and Kitchen.

C. Wireless Clock System

The Wireless Clock System shall be provided only for projects in existing buildings as a stand-alone system. When installing a new Sound System and Clock System, Specification Section 16791 Self-Corrective Clock System shall be used.

Single faced clocks shall be provided in Areas of Instruction, Offices, Teacher's Cafeteria/Lounge and Places of Assembly (Auditorium, Cafeteria/Lunchroom, Gymnasium **and Gymatorium**)

Double-Faced Clocks shall be provided in the middle of corridors.

7.3 Low Voltage Systems

7.3.10 Intrusion Alarm System

Description/Design Approach:

A. General

An Intrusion Alarm System shall be installed to detect intruders when the school is unoccupied and to control the exterior doors while the school is occupied. The Intrusion Alarm System shall be programmed to independently and individually control each of the following spaces: kitchen/cafeteria, computer rooms, corridors and exterior doors.

B. Equipment and Locations

1. Main Control Panel with digital communicator for central station monitoring shall be provided in Custodian's Office.

2. Detectors with protective guards shall be provided
   - In all Corridors on all floors to protect the entire length
   - Boiler Room with accessible windows, only
   - Rooms and areas with windows having valuable equipment such as Sound System and Video Equipment
   - Computer Rooms, Laboratories and Shops
   - Rooms and areas accessible from, or adjacent to low roofs
   - Rooms with more than four computers on First Floor not on street side of building
   - Principal's Office, General Office and Custodian's Office
   - Kitchen and Food Storage Rooms with windows
   - Auditorium
   - Medical offices
   - School-based Health Clinics

3. Magnetic Contact Switches shall be located at
   - All exterior doors
   - Entry doors to Food Storage, Vault Room and Record Storage Rooms, if not provided with detectors
   - **MDF, IDF, and Elevator Machine Rooms**
   - Doors to rooms and closets storing valuable equipment such as computers, sound and video equipment and musical instruments

4. Panic Switches shall be located at the General Office, Custodian's Office, Nurse's Office, lobby security desk (if there is one) and Principal's Office. All Panic switches shall transmit a silent alarm to DOE Central Station via the digital communicator.

5. Alphanumeric Consoles shall be provided at
   - Control Panel with ability to control each partition
   - Main Entrance Vestibule
   - Custodial Entry (if different than Main Entrance Vestibule)
   - Kitchen Entry (if different than Custodial Entry)

6. Alarm Devices
   - Exterior Siren and Strobe shall be provided on exterior wall at minimum 20 feet above grade, mounted inconspicuously on either side of the main entrance at second floor level.
   - Interior Sirens shall be provided in Lunchroom, in corridor near General Office and in corridors on each floor.

   All sirens shall be equipped with cut-off switches and battery backup power

7. Dry Contacts
   - The control panel shall have dry contacts to be connected to and thus receive signals from other systems to utilize the auto-dialer and send an alarm signal. Drawings shall show the wiring from the other systems connected to the panel. The following systems shall be connected to the panel:
     - Boilers in existing buildings without a BMS connected to central host
     - Emergency generator

C. Zones

Each passive infrared detector shall be connected to a separate zone with a unique address. If having each detector as a separate zone exceeds the zone capability of the main control panel, then multiple detectors in the same space may be wired as a zone.
Computer Rooms located close to each other may be in one zone. Kitchen and kitchen storage rooms located close to each other may be in one zone.
Door switches for a given entry vestibule with multiple doors may be wired as a zone.

D. Monitoring

1. The DOE Central Station Alarm Unit shall provide monitoring of the school Intrusion Alarm System.

2. The system shall have a programmable chime option, which provides a three-beep tone at the alphanumeric console whenever a perimeter door is violated while the system is disarmed. This chime feature shall provide School Security with the ability to monitor perimeter doors from a Central Guard Station. The chime mode shall be turned on/off directly through the keypad by entering a valid security code.

E. Building Addition Projects

1. Custodian office to remain in existing location

   a. If existing panel is of sufficient size to receive new devices, devices from addition are to be connected to the existing panel.

   b. If existing panel cannot receive new devices, replace panel with larger panel to receive existing devices and devices from the addition.

   c. If existing system is antiquated and/or terminal devices of existing system are not operational, provide a new single system for the existing building and addition.

2. Custodian office in addition building

    a. If existing system is operational and panel can remain, connect existing panel to new panel with fiber connection. Verify with system manufacturer.

    b. If existing system is antiquated and/or terminal devices of existing system are not operational, or existing panel cannot remain in the existing location, provide a new single system for the existing building and addition.

F. Programming and Coordination with DOE

The DOE Security Unit will order telephone line (terminated in RJ31-X) and program account number and operator codes.

7.3 Low Voltage Systems

7.3.12 Auxiliary Signal System

Description/Design Approach:

A. General

An Auxiliary Signal System shall be installed to annunciate audio/visual alarm from various system signals as indicated below. The system shall also incorporate main entrance and kitchen delivery door pushbutton annunciations.

B. Equipment and Locations

1. Indicator Panels shall be provided in Custodian's Office and, **for existing buildings, the** Boiler/Mechanical room.

   At minimum, the auxiliary signal system shall annunciate the following in the Indicator panels:

   a. Sump pump high level alarm signal.
   b. Sewage ejector pump high level alarm signal
   c. Oil leak detection system signal
   d. Indoor chiller refrigerant monitor
   e. RPZ Leak Detection System signal.
   f. Entrance door pushbuttons
   g. Kitchen delivery door pushbutton
   h. Pushbutton station in General Office.
   i. Hydraulic elevator sump pump

2. Low voltage vibrating bells shall be located at

   a. All corridors
   b. Kitchen near Dietician office – **This bell shall be tied to the kitchen delivery door entrance button only.**
   c. Custodian office
   d. Boiler/Mechanical Rooms

3. Entrance pushbuttons shall be located at building main entrance and kitchen delivery door. A pushbutton station with multiple call buttons shall be located in General Office.

4. A Bell Transformer shall be provided in the electric switchboard room with sufficient power output to drive all bells of the system with full volume.

5. Addition Projects

a. Custodian office to remain in existing location

1) If existing system is functional, existing system is to remain. A new system with panel placed adjacent to the existing panel(s) is to be provided for listed items provided in the addition. Designer is to determine if panel is a recent

system that could possibly be expanded. If so, listed items in the addition can be added to the existing panel.

2) If existing system is not functional, remove existing system and provide a new system for the new and existing spaces with the master station in the same spaces of the building.

b. Custodian office in addition building

1) If existing system is functional, existing system is to be extended with fiber to the new units in the new custodian office in the addition. A new separate panel is to be placed in the existing building boiler/mechanical room with those listed items of the addition building connected to the new panel.

2) If existing system is not functional, remove existing and provide a new system for the new and existing spaces with the indicator panel in the new custodian's office and the existing boiler/mechanical room.

7.3 Low Voltage Systems

7.3.13 Carbon Monoxide Detection and Alarm Systems

Description/Design Approach:

A. General

A carbon monoxide detection and alarm system shall be provided in accordance with Section BC 9**15**.2 of the 20**22** NYC Building Code **for projects with fuel burning equipment**. Detectors shall conform to UL 2075 and shall annunciate locally in addition to sending the signal to the Fire Detection and Alarm System.

1. Power: Primary and back-up power for the carbon monoxide detectors that are part of the Fire Detection and Alarm System or stand-alone Carbon Monoxide Detection and Alarm System shall be through that system.

2. Fuel-burning equipment: Any equipment that burns fossil fuel or biofuel and thus can produce carbon monoxide (CO)

B. New Schools, Leased Buildings (Change of Use), Major Modernizations and Additions, Fire Alarm Replacement Projects:

1. Applicability: As the standard for new schools and many CIP projects will be the use of heat pump systems for heating and domestic hot water, CO detection will typically only be used with biofuel burner replacement projects and fire alarm replacement projects.

2. Unoccupied Spaces (Section BC **915.2**)

Installation: Carbon monoxide detectors/sensors shall be installed in unoccupied spaces within buildings such as rooms containing fuel-burning boilers, water heaters, emergency generators, and other spaces with vented fuel burning equipment that can potentially create CO and connected to the Fire Detection and Alarm System (see DR 7.3.1 and DR 7.3.15). Detectors shall be placed as follows:

a. Adjacent to water heater, above the vent of the water heater in the vicinity of the barometric damper

b. Above the breeching of the boilers

c. Adjacent to other fuel-burning equipment (unit heaters, duct furnaces, etc.) located within the building. (Install detectors above the exhaust flue).

d. Above the emergency generator exhaust for generators interior to the building (not in the enclosure of a packaged UL2200 exterior unit)

Operation: Upon detection of carbon monoxide, the detectors/sensors shall send a supervisory signal to the fire alarm control panel as indicated in paragraph C below and shall electrically shut down all **carbon monoxide producing equipment except generators**.

3. Occupied Spaces (Section BC **915.2**)

Installation: Carbon monoxide detectors/sensors shall be installed and connected to the Fire Detection and Alarm System (see DR 7.3.01 and DR 7.3.15) in occupied spaces as follows

a. Provide detectors/sensors in the following occupied spaces containing carbon monoxide producing equipment.

- Auto Shops
- Indoor Loading Dock
- Rooms with **carbon monoxide-producing equipment in accordance with Sections BC 202 and BC 915.2 including furnaces, boilers, water heaters, cooking appliance,** gas clothes dryers**, apparatus, appliances, or any device that burns natural gas**

Kitchens, science labs, and grounds equipment rooms are not considered spaces with carbon monoxide producing equipment and thus do not require carbon monoxide detectors/sensors.

b. Provide carbon monoxide detectors/sensors in corridors of the floors with the carbon monoxide producing equipment and one floor above and below such space at a spacing of 60 feet on center, or less if required by the manufacturer of the carbon monoxide detector.

c. Carbon monoxide detectors/sensors shall be located within 18” of the ceiling and spaced every 60’ on center, or as specified by the manufacturer.

d. For buildings with an A-3 occupancy, **Section** BC **915.1.2** also applies and with it Rule §908-01(d). As such, occupiable rooms or spaces greater than 75 SF on the same floor as, one story above, or one story below, the CO producing equipment that do not have mechanical ventilation are required to have CO detectors.

For schools that have indoor parking garages: Provide HVAC carbon monoxide detection system tied to the mechanical ventilation controls as per **the 2022** NYC Mechanical Code to avoid requiring the ventilation system to run continuously. In addition, provide carbon monoxide detectors/sensors in the parking garage spaces at intervals specified by the manufacturer and in all occupied spaces of the floor on the story where the garage is located as well as below (if any) and the floor above the enclosed parking garage.

4. Operation

a. Evacuation code shall not be sounded through the fire alarm horns upon CO detection. The specific CO detector in alarm will sound “Temporal 4" code through the built-in sounder base.

b. CO detectors shall be monitored for alarms by a fire alarm addressable module and upon activation sound an alarm tone at the Fire Command Center and Remote Annunciators.

c. A separate “CO Alarm” signal shall be sent to the Central Station through the DACT for Fire Department notification. CO sensors/detectors on each floor shall be monitored for

troubles by a fire alarm addressable module and upon activation sound a trouble tone at the Fire Alarm Panel and Remote Annunciators. In addition, a general trouble signal shall be sent to the Central Station through the DACT.

d. Activation of a CO detector shall electrically shut down all **carbon monoxide-producing equipment except generators**.

C. Schools Undergoing Indoor Combustion Equipment Upgrades, including fuel-burning Boilers, Water Heaters, and Emergency Generators in those same spaces **and existing Fire Alarm System is not being replaced**.

1. Applicability: As the standard for most CIP projects will be the use of heat pump systems for heating and domestic hot water, stand-alone CO detection will typically only be used with biofuel burner replacement projects and indoor emergency generator installation projects.

2. Installation: Carbon monoxide detectors/sensors in unoccupied spaces shall be installed and connected to a stand-alone carbon monoxide detection and alarm system connected to central station in unoccupied spaces as follows, depending on the Work type and location. The panel shall be placed adjacent to the schools Fire Alarm Control Panel:

a. Adjacent to water heater, above the vent of the water heater in the vicinity of the barometric damper.

b. Between the boilers, above the breeching of the boilers.

c. Adjacent to other fuel-burning equipment (unit heaters, duct furnaces, etc.) located within the building. (Install detectors in the vicinity of the exhaust flue).

d. Above the emergency generator exhaust (for indoor generators)

3. Operation

a. The specific CO detector in alarm will sound “Temporal 4" code through the built-in sounder base.

b. CO detectors shall be monitored for alarms by an addressable module and upon activation sound an alarm tone at the COACP (Carbon Monoxide Alarm Control Panel) and Remote Annunciators.

c. A “CO Alarm” signal shall be sent to the Central Station through the DACT for Fire Department notification. CO sensors/detectors shall be monitored for troubles by the addressable module and upon activation sound a trouble tone at the CO Detection and Alarm Panel. In addition, a general trouble signal shall be sent to the Central Station through the DACT.

d. Activation of a CO detector shall electrically shut down all **carbon monoxide-producing equipment except generators**.

D. Schools Undergoing Indoor Combustion Equipment Upgrades, including fuel-burning Boilers, Water Heaters, and Emergency Generators with items placed in newly created spaces **and spaces do not require new FA devices.**

1. Applicability: As the standard for most CIP projects will be the use of heat pump systems for heating and domestic hot water, stand-alone CO detection will typically only be used with biofuel burner replacement projects and indoor emergency and standby generator installation projects.

2. In addition to following the requirements for unoccupied spaces as applicable for the cases in **C** above, follow the requirements for occupied spaces as indicated **in B above.**

E. Relevant Documents

* The 20**22** New York City Building Code

* **1 RCNY Rule §908-01 Fire Protection Systems**

7.3 Low Voltage Systems

7.3.14 HVAC Remote Annunciation System

Description/Design Approach:

A. General

In order to notify the Department of Education of failures to the school's mechanical systems, a remote annunciation system connected to the school's intrusion alarm system is to be provided. Indicate the required wiring on the Drawings as defined below. In all cases, the Division of School Facilities (DSF) or its assigned intrusion alarm Contractor will program the intrusion alarm digital communicator (autodialer) to initiate a specific code (same for all schools). The central alarm monitoring station will follow protocol set by the Division of School Facilities for notification.

B. New Schools, Leased Buildings, Major Modernizations, Additions with full BMS/DDC systems

A twisted pair of conductors (AWG#16, dry contact) is to be connected to **the nearest BACnet controller** of the BMS and run to the intrusion alarm panel and connected.

C. Boiler Replacement Projects

A twisted pair of conductors (AWG#16, dry contact) shall be run in parallel from each of the boiler control panels to the intrusion alarm panel**. Additionally, a Cat-6 Ethernet Cable with RJ-45 connection ends shall be run from the boiler master control panel to the school's main internet switch rack and terminated on a port designated by the Project Connect Team and DIIT.**

1. For Boiler Replacement projects without a funded Intrusion Alarm Replacement project **as part of the Design bundle**: The twisted pair is to be indicated on the Drawings to be left unconnected, with the note,"Connection to intrusion alarm panel by others." (The Division of School Facilities or its assigned intrusion alarm Contractor will subsequently connect to the intrusion alarm panel and program the digital communicator to provide the required messaging). **The CAT-6 Ethernet cable shall be run from the Boiler Master Panel to the Main Internet Switch location and terminated on the port assignment location designated by the Project Connect Team and DIIT.**

2. For Boiler Replacement projects with a funded Intrusion Alarm Replacement **project as part of the Design bundle**: The twisted pair is to be connected to the intrusion alarm panel. **The CAT-6 Ethernet cable shall be run from the Boiler Master Panel to the Main Internet Switch location and terminated on the port assignment location designated by the Project Connect Team and DIIT.**

7.3 Low Voltage Systems

7.3.15 Fire Detection and Alarm System with Emergency Voice/Alarm Communication

Description/Design Approach:

A. General

The fire detection and alarm system shall be a Manual and Automatic Fire Alarm System with Emergency Voice/Alarm Communication System and Central Office Connection provided in accordance with Section BC 907.2.3 of the 2022 NYC Building Code, with additional requirements per Section BC 907.2.13 for high-rise buildings (buildings greater than 75 feet in height as defined by the 2022 NYC Building Code). This system shall be a fully supervised, microprocessor-based multiprocessing system with individually addressable devices connected to a central station. Buildings Bulletin 2009-018 issued by the Department of Buildings is to be used as a reference guide for the design, installation, operation, and testing of fire alarms in high-rise buildings.

1. Provide an Auxiliary Radio Communication (ARC) System for high-rise buildings, which shall be in accordance with Section BC 916. The ARC system is separate from the fire alarm system except that it is powered through the fire alarm system's fuse cutout. The ARC system is to be filed separately from the Fire Alarm System with the FDNY.

2. Presignal Event/Non-Event mode capabilities must be provided for A occupancies in the building with occupant loads of >1,000 or have a stage and an occupant load >75 per Section BC 907.2.1.

3. For CIP projects that do not have a generator, refer to DR 7.1.2 for requirements for secondary source of emergency power for emergency voice/alarm communication.

B. Fire Alarm System Coding

1. Upon activation of an alarm-initiating device (smoke detector, manual station, sprinkler water flow switch) in all buildings other than high-rise buildings, the system shall sound a Temporal 3 tone followed by voice communication on all floors in accordance with Section BC 907.5.2.2.

2. In high-rise buildings, upon activation of an alarm-initiating device (smoke detector, manual station, sprinkler water flow switch) the system shall sound a Temporal 3 tone followed by voice communication on the floor of incidence, one floor above and one floor below in accordance with Section BC 907.5.2.2.

C. Smoke Control

1. Smoke control and stair pressurization systems shall be provided for systems required by Sections BC 403 and BC 405 (Refer to DR 6.2.10) and shall be designed in accordance with Sections BC 909 and BC 1023.11. Coordinate with HVAC engineers.
   - Smoke control and stair pressurization systems shall be activated by any of the following:
     - Automatically by area or duct smoke detectors
     - Automatically by sprinkler waterflow switches
     - Manually by the Fire Fighter's Smoke Control Station

- Smoke control and **s**tair pressurization system activation shall be immediately initiated after receipt of appropriate automatic or manual activation command.
- Activation of the smoke control system shall send an alarm to the Central Station.
- The smoke control system shall be connected to the FACP via a UL 864 listed Fire Fighter's Smoke Control Station. This station shall provide status and manual override control of all automatic smoke control devices associated with the smoke control system, as well as manual control of Post-Fire Smoke Purge systems.
- The Fire Fighter's Smoke Control Station shall override any other building controls that may be controlling smoke control equipment from any control point other than the Fire Fighter's Smoke Control Station.

2. Post-Fire Smoke Purge System shall be designed in accordance with Section BC 917.
   - Post-fire smoke purge systems are not intended to be life safety system. They are typically operated after the fire has been extinguished.
   - Post-fire smoke purge systems are manually controlled from the Post-Fire Smoke Purge panel. (If there is a smoke control system in place, then the post-fire smoke purge system is manually controlled from the Fire Fighter's Smoke Control Station).

3. Ensure drawings show a detail showing the supervised auxiliary fan shut-down relay within 3'-0" of each starter contact or motor control starter. As per NFPA 72, it is acceptable to have the supervised auxiliary fan shut down relay within 3'-0" of interposing UL 864-9th edition listed relays on the same rung of the ladder logic that connects to the starters to shut them down directly. Use of a cascading series of relays beyond the permitted interposing relay(s) to shut down the fans is not code compliant.

D. Equipment and Locations

As per Buildings Bulletin 2013-012, the fire alarm panel, data gathering panels (DGP), terminal transmission boxes (TTB), and all associated fire alarm wiring shall not be installed in stair enclosures.

Fire Alarm Control Panel (FACP), including Post-Fire Smoke Purge controls, where required, and Fire Fighter's Smoke Control Station, where required – Placed in the main lobby, near the main entrance. Provide microphone and voice control for the building wide one-way voice communication and, where required, the pre-signal system for the place of assembly.

Fire Command Center (FCC), including FACP**,** Post-Fire Smoke Purge controls, where required, and Fire Fighter's Smoke Control Station, where required – Placed in the main lobby, near the main entrance for high-rise buildings.

Voice/Alarm Communication System for Group A Spaces (Pre-signal system) – Voice/alarm communication system, integrated with the fire alarm system is required in Group A-3 spaces **(**most schools) with an occupancy of 1000 or more. In addition, Section BC 410.8 requires stages (i.e. has drop down curtains) in an assembly space with an occupancy of 75 or more to be provided with such system per Section BC 907.2.1. Schools typically utilize platforms, unless a performing arts auditorium is provided, as curtains are sliding and Architect is to ensure the platform is labeled as such.

For schools where the presignal is required by 907.2.1.1 (places of assembly with 1000 or more or those with a stage and an occupancy of 75 or more), provide a paging microphone, LCD annunciator, and associated switches and program for presignal Event/Non-Event mode as

required by Section 23.8.1.2.3 of NFPA 72-16 as modified by Appendix Q107 of the 2022 NYC Building Code. Provide a warden phone to communicate to the base building FACP or Fire Command Center as applicable. Pre-signal unit must be located within view of the assembly area, with the rear of the assembly area the preferred space but may be required to be elsewhere to avoid being in play areas of Gymatoriums. System design is as follows:

1. In non-event mode, the speaker/strobes in the assembly activate immediately.

2. In the event mode, speaker/strobes within the assembly area do not activate upon activation of an initiating device within or outside the assembly area but are indicated at the assembly area presignal panel and acknowledged by the operator. If not acknowledged within 180 seconds by the operator, the presignal system shall activate regardless of where the alarm initiates within the building. If the alarm is generated within the assembly area it shall automatically activate all signals throughout the building except the signals within the assembly area unless the 180 second timer expires.

3. Manual announcement capability for the presignal panel shall be limited to the assembly area only. The main building panel microphone system must be able to make announcements in the assembly area and thus must have a speaker selector switch that activates the assembly zone space. Upon activation of the Event Mode Key Switch on the presignal system and the activation of the microphone for paging to the area or manual switch at the location, the auditorium sound system shall be silenced and the general house lighting shall come on.

4. Refer to DR 7.1.2 for requirements for secondary source of emergency power when a pre-signal system is provided.

Uninterruptible Power Supply (UPS) – Typically to be located inside a dedicated 2-hour fire-rated enclosure with smoke detector. Provide split system as required by size of the UPS to maintain proper temperature of room **for battery as per manufacturer recommendation (77°F)**. UPS sized as per NYC Electrical Code 760.41(c)1 to supply entire FA system along with the emergency voice alarm communication sized for 24-hour supervisory operation followed by full load operation for 6 hours for systems with voice communication (Note: 45 minutes of voice and alarm operation at maximum connected load shall be considered equivalent to 6 hours of total system operation.) UPS similar to Online Power. **UPS shall be labeled "FA UPS for FA USE ONLY". Provide monitoring module at fire alarm panel to indicate when UPS is running on battery. Send trouble signal to fire alarm control panel and central station when UPS fails as per Section 10.6.4.3 of NFPA 72-2016.**

Data Gathering Panels – Typically to be located inside a dedicated 2-hour fire-rated enclosure (preferably the telecom closet), with one provided for every 3 floors. When required by site conditions to be located in a 2-hour fire-rated stair, an egress study shall be performed to ensure the panel does not decrease the required width of the stair, though panel can potentially be placed at a higher level if it can safely be accessed from a step ladder. Additionally, panels installed in stairs are to be protected from vandalism.

Printer - Placed in the Custodian's Office

Remote Annunciator – Placed in the General Office

Manual Pull Station – Placed in accordance with Section BC 907.4.2. Specifically, they shall be provided at each door leading to legal exit in corridors, lobbies, places of assembly and as required to meet the NYC Building Code travel limitations of 200'. The height of the manual pull

stations shall be a minimum of 3'-6" and maximum of 4'-0" measured vertically from the floor level to the activating handle. All manual pull stations shall be single-action type. False alarm stopper covers shall be provided over all manual pull stations in new buildings and major modernizations where the mounting boxes have been recessed and the 4" maximum protrusion in the path of travel required by ADA can be maintained. Capital Improvement Projects typically have the pull stations surface-mounted and will require the shallow false alarm boxes to be used to meet the 4" maximum protrusion requirement. Modify the specification appropriately.

Audible Notification Appliances (Speakers) – Placed in accordance with Section BC 907.5.2.1. Specifically, they shall be placed in all corridors and elsewhere, where required by the NYC Building Code, to provide audibility of 15 dBA above the average ambient levels as determined by NFPA 72-16. Refer to Chapter 18 of NFPA 72-16 for other requirements. Speakers shall be wall-mounted with their tops above the finished floor at heights not less than 90" and below the finished ceiling at distance not less than 6". Speakers shall also be placed within stairway on every other floor to ensure intelligibility of system and speakers set to appropriate taps (1/4watt) to provide audibility and intelligibility of 15 dBA above average ambient levels.

Visual Annunciator (Strobes) – Placed in accordance with Section BC 907.5.2.3. Specifically, they shall be wall-mounted in places of instruction, corridors, places of assembly, library, shops, music rooms, toilets and elsewhere where required by the NYC Building Code. Strobes shall be unobstructed by other objects, visible from any position in the area and shall be a maximum of 15 ft. from end of the corridor. Strobes shall be wall-mounted such that the entire strobe lens is located below 96" above the finished floor or 6" below the ceiling, whichever is less in height. Strobe lights shall not be required in staircases. If three or more strobes are in the same room or adjacent space within the field of view, they shall be synchronized. Ceiling-mounted strobes are allowed where wall-mounted strobes cannot provide proper coverage.

Audible and Visual Notification Appliances (Speaker/Strobes) – Where speaker location coincides with strobes, use combination speaker/strobe type. Speaker/Strobes shall be wall-mounted such that the entire lens is located below 96" above the finished floor or 6" below the ceiling, whichever is less in height. If three or more strobes are in the same room or adjacent space within the field of view, they shall be synchronized. Speaker/strobes shall also be in classrooms (1/4 watt), student toilets (1/4 watt), and locker rooms (1/2 watt) to ensure intelligibility of system and speakers set to appropriate taps to provide audibility and intelligibility of 15 dBA above average ambient levels.

Area Smoke Detector - Placed in all mechanical rooms, oil tank rooms, electrical switch gear rooms, electric closets, telecommunications room and closets, audio/video storage rooms, paint storage, elevator lobbies, locations requiring smoke control systems (smoke proof enclosures, stage, atriums, etc.), elevator machine rooms, storage rooms containing flammable materials (book storage, grounds equipment room, custodian's storage) and over cross-corridor doors where magnetic door holders are provided. Smoke detector layout shall comply with NFPA 72-16 as modified by Appendix Q, Section Q107. Spacing shall not exceed the limitations of UL listing for the specific smoke detectors.

Duct Smoke Detectors – Place where required by code. Duct detectors placed in roof-top mounted/exterior equipment and exterior ducts shall be weatherproof type.

Heat Detectors – Placed in boiler rooms, other mechanical rooms with equipment being fed with fuel oil, generator rooms/enclosures within the building/roof, kitchens and culinary art rooms, **concession stand,** top of elevator shafts if shaft is provided with sprinkler per Section 2.27.4.2 of ASME 17.1-2013, as modified by Chapter K1 of Appendix K of the 2022 NYC Building Code (i.e.

sprinklers in hydraulic elevator pits), and other locations where smoke detectors are required but cannot be installed due to environmental conditions (temperature below 32°F) or potential false alarms. Heat detector layout shall comply with NFPA 72-16 as modified by Section Q107. Spacing shall not exceed the limitations of UL listing for the specific heat detectors. Heat Detectors in the oil burning equipment rooms shall shut down fuel oil transfer pumps to that equipment.

Flame Detectors - Ultraviolet (U/V) explosion-proof flame detectors shall be installed in all rooms containing natural gas piping at a pressure of 15 psi or greater.

Carbon Monoxide Detectors – Refer to DR7.3.13 for details.

Gas Leak Detection - Provide a gas leak detection connection via monitoring module to fire alarm system with separate and distinct central station notification meeting the requirements of Section BC 918. Coordinate with mechanical engineer for aux contact on existing gas leak detection panel.

Metal Wire Guards – Provide in all gymnasiums and playrooms for visual and audible notification appliances. Also provide guards for such devices in corridors, bathrooms and locker rooms for high schools where the devices are below the 8'-0" requirement or accessible from a windowsill or other similar structure.

Kitchen Hood Fire Suppression System (Ansul system) - Shall be interconnected to the fire alarm system and the activation of the fire suppression system shall be indicated as an alarm on the Fire Alarm System.

Digital Alarm Communicator Transmitter (DACT) and Central Station Monitoring - Shall be provided as follows:

1. For any new fire alarm system installations and fire alarm panel replacements – all manual and automatic detection devices connected to the fire alarm system shall send the following signals to the Central Station:

    - Manual Alarm – manual pull stations,
    - Sprinkler Alarm – sprinkler system waterflow switches,
    - Automatic Fire Alarm – area smoke detectors, duct smoke detectors, heat detectors, flame detectors, kitchen Ansul systems,
    - Carbon Monoxide Detector – system-connected CO detectors.
    - Supervisory signals – sprinkler system tamper switches, fire/sprinkler booster pump status (power failure, pump running, phase reversal), water tank low air pressure), generator run/fail
    - Trouble signals – general trouble signal from the Fire Alarm Panel.

2. When there is a sprinkler booster pump/fire pump installation in an existing building without fire alarm panel replacement, supervisory signals; sprinkler system tamper switches, fire/sprinkler booster pump status (power failure, pump running, phase reversal), water tank low air pressure, generator run/fail shall be monitored by the Central Station. If existing panel does not have central station monitoring, provide an external DACT.

3. When there is no sprinkler booster pump/fire pump in the fire protection system and there are more than 6 sprinkler heads being installed in an existing building per fire zone, the sprinkler

system waterflow switches and tamper switches shall be monitored by a central supervisory station. If existing panel does not have central station monitoring, provide an external DACT.

4. Optional: IP with Cellular Interface is used for applications where Plain Old Telephone (POTs) lines are not available or where Managed Facility Voice Network (MFVN) analog lines do not provide a stable interface. All network and cellular connection shall be approved by FDNY and shall have an FDNY Certificate of approval.

Smoke Control System – Refer to Section C above

Fire Alarm Control Panel Bypass Key-Switch – New fire alarm systems designed under the 2022 NYC Building Code do not require the use of a fan shutdown bypass key switch during daily fire alarm testing since pull stations do not affect fan shutdown.

Local Sound System Overrides – New fire alarm systems designed under the 2022 NYC Building Code provide local sound system overrides so in event of fire alarm condition the fire alarm notification devices can be heard.

E. Survivability from Attack by Fire (typically for High-rise buildings)

1. For buildings with evacuation zones, such as high-rise buildings, fire alarm systems shall be designed and installed such that attack by fire within an evacuation signaling zone shall not impair control and operation of the notification appliances outside the evacuation signaling zone as per Section 23.10.2 of NFPA 72-16. Loop isolators shall be utilized on every floor whenever a Data Gathering Panel serves more than one floor or fire zone.

2. All circuits necessary for the operation of the notification appliances shall be protected until they enter the evacuation signaling zone that they serve. Any of the following methods shall be considered acceptable as meeting the requirements of this subsection:

   a. A 2-hour rated cable or cable system
   b. A 2-hour rated enclosure
   c. Performance alternatives approved by the NYC Department of Buildings and Fire Department.

F. Design and Filing Strategy for Addition Projects

1. The decision on filing strategy will be decided early in the design process and is based on several factors, especially the size of the addition, age of the building, and types of spaces being added.

2. The Authority's preferred approach is that building additions are to be designed and filed as new buildings. As such, the fire alarm for the new addition will be a separate new system. Determination of how to address the existing building's system is as follows:

   a. The fire alarm of the existing building is to be retained, when possible. Determination as to whether the alarm can be retained is dependent on several conditions:

      - If the system is an antiquated system, such as the Acme system installed under prior codes, the system is to be replaced.

- If the existing panel is sized that it can receive additional devices required due to the work or spaces being created in the existing building and is operational, the system can remain. Verify fan operation and shut down is working. If minor repairs are needed to the system, the work can be sent to the Division of School Facilities through Capital Plan Development and Implementation for repairs. If repairs cannot be made by DSF, the repair work will need to be included with the existing building work.

- If the existing building fire alarm system requires expansion due to additional devices required for the work or spaces being created in the existing building and cannot be expanded without replacing the panel, replace the existing system.

- If the fire alarm system of the existing building requires replacement, the fire alarm system is to be designed and filed as a separate project from the fire alarm of the new addition. Ensure the fans and other systems are operational to allow required connections for fan shut down. If minor repairs are needed to the system, the work can be sent to the Division of School Facilities through Capital Plan Development and Implementation for repairs. If repairs cannot be made by DSF, the repair work will need to be included with the existing building work. The decision as to which Contract performs the work will be decided during design.

b. A remote annunciator for each of the building's alarm system (existing building and new addition) is to be placed at the general office, custodian's office, and the security desk at the main entrance, depending on where these spaces are to be located, except where the system panel is already located in one of those locations. In addition, a remote annunciator is to be placed at both fire alarm panels for the other's system. The annunciator at the security desk can be omitted if it is near the fire alarm panel at the building entrance.

c. Verify the existing ansul system is operational and connected to the system and approved by the FDNY Fire Suppression Unit if the kitchen is not being moved to the addition. If the system is not approved and the kitchen is to remain in the existing building, a decision will need to be made to request for an upgrade to the ansul system and connection to the fire alarm or revision to kitchen equipment to avoid needing to install a new ansul system.

3. Addition projects filed as an Alt 1 are required to be integrated into the existing buildings alarm. This will typically require the existing buildings alarm to be replaced as part of the project to ensure the system will function, unless the fire alarm has been recently replaced and is functioning.

4. The Letter in Part I of this Design Requirement provides the strategy agreed to by the FDNY and is to be included in the Fire Alarm Drawings.

5. The Letter in Part I of this Design Requirement needs to be provided to FDNY and is to be included in the Fire Alarm Drawings when filing for the UPS as a secondary power source for new fire alarm systems in existing buildings.

G. Capital Improvement Program Projects

1. For CIP projects where the fire alarm system is affected by the work and devices will need to be added or changed, the reasoning in Paragraph **F**.2 above can be followed in determining if the existing system can remain.

2. For Fire Alarm Replacement Projects, ensure the fans and other systems are operational to allow required connections for fan shut down. If minor repairs are needed to the system, the work can be sent to the Division of School Facilities through Capital Plan Development and Implementation for repairs. If repairs cannot be made by DSF, the repair work will need to be included in the scope of the CIP project.

3. Ensure that existing water pressure switches or water flow detectors on sprinkler and/or standpipe systems are operational and can be adjusted and tested to provide a 30-second alarm notification delay with an activation of 90 seconds maximum. Coordinate with the Fire Protection Engineer. If existing devices are fitted with retarding chambers but cannot be adjusted to meet those notification requirements (or are not fitted with such chambers and chambers cannot be added) required by FDNY (the authority having jurisdiction), replace existing devices with new water flow detectors.

4. For capital improvement projects where new fire alarm systems are installed in existing buildings without generators, provide a UPS for secondary power source for fire alarm system in accordance with NYC DOB letter included in relevant documents and file with the fire alarm plans with FDNY.

H. Requirements for the Engineering Plans.

1. Engineering plans shall contain all information in accordance with Section BC 907.1.1. The sequence of operations shall be shown in the input/output matrix in the form prescribed by NFPA 72-16. Signed and sealed drawings in PDF format shall be provided for filing online with the Fire Department.

2. The Engineer-of-Record shall be responsible for any modifications of the design drawings required to obtain the Fire Department plan approval.

3. Upon completion of the project and the fire alarm is successfully installed and tested prior to FDNY inspection, the Master Electrician will prepare and sign a set of as-builts, including the revised input/output matrix. The Engineer-of-Record shall visually inspect the fire alarm installation and compare the As-built to the Contract drawings and if agreed and correct to the best of his/her knowledge, will sign and seal the as-built and the Contractor will submit to FDNY to facilitate their inspection. Once the letter of approval is attained from FDNY, submit one set of signed and sealed “AS-BUILT” riser drawings in 24” x 36” and one set of signed and sealed “AS-BUILT” drawings reduced to 11” x 17” to the NYC Department of Buildings. (For new projects if the approved plans do not match the As-Built drawings, a new PAA needs to be filed with FDNY prior to inspection since the As-Built and FDNY approved plans must match.)

4. For projects with new fire alarm systems in existing buildings where there is no generator, provide a new UPS as secondary power source for the new fire alarm system. The NYC DOB letter must be submitted with the filing drawings. Drawings for each submission must also contain written description of practical difficulty for each building making use of the letter.

Sample description of practical difficulty to be written in notes on filing drawings:

a. Lack of space to support the installation of a new generator system within an existing building or on an existing lot.

b. Existing buildings structural system lacks capacity to support the weight of generator and its associated system equipment. (if applicable)

I. Relevant Documents

* The 2022 New York City Building Code.

* The 2022 NYC New York City Mechanical Code.

* NFPA 72, National Fire Alarm Code, 201**6** Edition as modified by Appendix Q, Section Q107, of the 2022 NYC Building Code.

* NYC Electrical Code, including 1 RCNY 4000.

* Fire Department Letter approving the bypassing of the circuits controlling dampers and fan shutdown during daily testing (For existing systems without shutdown).

* Letter to FDNY, accepted by FDNY, outlining SCA filing strategy for Addition Projects (to be included on addition project drawings).

* Letter from NYC Department of Buildings, Re: Fire Alarm Secondary Power Source and Uninterruptible Power Systems, outlining the submission requirements for utilizing UPS for new fire alarm system for existing buildings that do not have a generator.

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The City of New York

FIRE DEPARTMENT
9 METROTECH CENTER BROOKLYN, N.Y. 11201-3857

July 23, 2007

JUL 25 2007

Mr. Zygmunt Staszeski
ZS Engineering PC
99 Tulip Avenue
Floral Park, NY 11001

Re: Testing of Interior Alarm System in Public Schools, Fire Prevention index # 0707030

Mr. Zygmunt Staszewski

The Bureau of Fire Prevention acknowledges your letter dated June 26, 2007 concerning the above referenced subject matter and NYC School Construction Authority. The Bureau concurs with your assessment that the required daily testing of public school alarm systems for those building that contain HAVC equipment that require shut-down during alarm activation, places unnecessary stress on HAVC components.

The Bureau will accept fire alarm programming that will bypass damper and fan shutdown **PROVIDING THAT:**

1. During daily tests, a key switch shall be used to bypass the circuits that control dampers and fans shutdown.
2. The damper and fan bypass function shall be automatically restored to the normal un-shunted condition within forty-five minuets, if not done so manually before forty-five minuets.
3. The operation of the daily test shall be by a certificate of fitness holder
4. A log of daily fire alarm tests shall be maintained
5. Variance to install this bypass feature shall be site specific

February 22, 2019

Department of Education

Chief Thomas Pigott
Chief of Technology Management
FDNY Bureau of fire Prevention
9 MetroTech Center 3rd Floor
Brooklyn, NY 11201

RE: Fire Alarm Filing Strategy – Public Schools
Additions filed as New Buildings – Revision

Dear Chief Pigott:

The NYCSCA would like to update you on our new filing strategy. We are in the process of constructing several new school buildings in all five boroughs. After our Agency has completed the feasibility study for each new building in accordance with the Administrative Section of the Building Code Administrative Sect. 28.2-901.9.4.1, & BC 1101.3.2 the determination for the filing category will be selected.

If the value of the new addition construction design meets/exceeds 50% and or 60% of the value of the existing building, then such new addition building will be filed as a "NEW BUILDING" in compliance with all the applicable codes. As a result of the NB filing classification, no ADA (triggered by 50%) or Fire Protection Systems (triggered by 60%) upgrades are required to be implemented to the existing building that was built in accordance with the governing Building Codes at that time. If the value of the new construction addition is less than either 50% of the value of the existing building, then the application will be filed as an "ALTERATION TYPE I", and will comply with all requirements outlined in the Administrative Code Sect. 28.2-901.9.4.2.

Requirements for New Building Filing:

1. New address with separate main entrance
2. Schedule A reflecting the Use and Floor Identification exclusive to the NB
3. New services/utilities directly related to the NB
4. Independent Egress
5. Fire wall separation between buildings, rating of new to match existing – ranging from 1 hr. -3hr
6. **New IFA panel located at main entrance with remote annunciation to custodian's office, main offices and Security station in the existing building as appropriate to the design.**
7. All ADA requirements as pertained to the governing code
8. FA plans will only reflect the details of the new building as per the related Schedule A, with any portion(s) of the existing building associated with the NB
9. **Connecting path of convenience between existing and new building – From the new building to the existing building – installed signage "Not An Exit" and from the existing building to the**

30-30 Thomson Avenue
Long Island City, NY 11101
718 472 8000 T
718 472 8840 F

new building (where necessary as per design). Installed signage to read "In Case of Fire - Access to Voluntary Fire Rescue Room".

Requirements for New Addition- Filed as Alteration Type I:

1. New addition building is connected to existing building as one building
2. Shares a common building address
3. Schedule A reflects the Use and Floor Identification for both buildings
4. Services and systems are and can be extended to provide coverage for both buildings
5. Shared Egress
6. One fire alarm system will provide coverage for both building using the existing "Phasing Agreement" between the NYCSCA and FDNY.

The filing types for these new school buildings will be depicted in section # 5 of the PW-1 and will be reflected in the BIS. All associated filings will follow suit accordingly, included that of the Fire Alarm application/plans.

Chief Pigott, the NYCSCA would appreciate FDNY Technology Management's support on this strategic approach, while maintaining the current phasing agreement still on record. This will enable us all to work well together toward a common vision without compromising the safety of the occupants or the general public.

If you have any questions, concerns or require further clarification, please do not hesitate to contact me immediately.

Sincerely,

Gordon Tung, P.E.
Vice President
New York City School Construction Authority

Gordon Tung, P.E.
Vice President
Construction Management

CC:
T. Shah – FDNY
R. Bonavita – FDNY
M. Yohan - FDNY
T. Sakin - FDNY
D. Choy – SCA
G. Roussey - SCA
B. Barrett - SCA
E. Abneri - SCA

NYC Buildings

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Technical Affairs and Code Development

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To: **Thomas Fariello, RA**
Vice President of the Environmental and Regulatory Compliance Unit,
NYC School Construction Authority

From: **Gus Sirakis, P.E.**
Deputy Commissioner, Development and Technical Affairs

Date: **July 18, 2024**

Re: **Fire Alarm Secondary Power Source and Uninterruptable Power Systems**

This letter is in response to the NYC School Construction Authority (SCA) letter, dated May 6, 2024 and sent by Thomas Fariello RA, Vice President of the Environmental and Regulatory Compliance Unit, pertaining to SCA's request that uninterruptable power system (UPS) batteries serve as the secondary power sources for new fire alarm (FA) systems having voice communication capability. This is part of the work involved in upgrading several existing public schools, and would be in lieu of providing generators in accordance with 2022 Building Code (BC) section 2702.1.2 requirements, which states,

*"**2702.1.2 Stationary generators.** Stationary emergency and standby power generators required by this code shall be listed in accordance with UL 2200."*

FA systems having voice communication capability will be required in these public schools having Occupancy Class A and E areas, pursuant BC 907.2.1 and BC 907.2.3 respectively, and such FA systems with voice communication capability must be provided with an approved emergency power source pursuant BC 907.5.2.2.5, which requires that the emergency power source be designed and installed in accordance with BC 2702 and the 2011 New York City Electrical Code (NYC EC). BC 2702.1 Installation, states,

"Emergency power systems and standby power systems shall be installed in accordance with the New York City Electrical Code, NFPA 110 and NFPA 111".

2011 NYC EC subsection 760.41 (B), which prohibits the use of batteries as an as-of-right secondary power source for fire alarm circuits, states in part,
"…
***(B) Secondary Power Source**. Where an emergency power system is provided or required to be provided for emergency system loads, the fire alarm circuits shall be provided with a secondary power source. Batteries shall not be a substitute for connection to a secondary power source. The secondary power source shall comply with the requirements for emergency power systems and/or emergency generator that are used for emergency systems loads."*

However, NYC EC subsection 700.12(C) allows UPS batteries to provide power for emergency systems, in lieu of generators, if special permission is given by the Department of Buildings. Such special permissions are routinely sought by the SCA and granted by the Department. NYC EC subsection 700.12(C) states in relevant part,

NYC Buildings

*"(C) **Uninterruptible Power Supplies.** Uninterruptible power supplies may be used to provide power for emergency systems only where special permission is granted for such use."*

The preceding NYC EC sections amended the 2008 National Electric Code (NEC) to limit the use of UPS. However, UPS batteries are currently safer as the associated technology has greatly advanced during the past 15 years. Consequently, amendments to Article 760.41 of the draft NYC EC (Intro #436-2024) will allow UPS to be used as a secondary power source for fire alarm systems as of right in certain instances. In light of the preceding, the Department anticipates the issuance of a Buildings Bulletin (BB) that will allow use of UPS as a secondary power source for fire alarms without the need to obtain special permission. The Department plans to issue BB prior to the enactment of (Intro #436-2024) that is now awaiting New York City Council approval.

1 RCNY 4000-01(b)(2) requires applicants to submit special permission requests, to the Department, which include a practical difficulty and an equally safe alternative. **1 RCNY 4000-01(b)(2**) states, in part, for "**special permission"**

***(2) Special permission.** Request for special permission must be made electronically and comply with the following: (i) Demonstrate practical difficulty and provide supporting documentation. (ii) Proposed equally safe alternative methods must be included.*

As a result of recent advances in UPS battery technology and the anticipated NYC EC update, the Department views the use of UPS systems as being a safe alternative to new generators when located in certain existing SCA school buildings, and under certain conditions. Furthermore, current code requirements to provide new generators as secondary power sources for the FA systems having voice communication presents a hardship for SCA, when secondary power sources were not required to be installed in existing school buildings. As such the Department recognizes the following as practical difficulties:

- Lack of space to support the installation of a new generator system within an existing building or on an existing lot.
- Existing building's structural system which lacks capacity to support the weight of an additional generator and its associated system equipment.

Based on the preceding, the Department grants SCA's request for UPS batteries to serve as the secondary power sources for new FA systems having voice communication capability, in lieu of providing generators, which is part of the upgrade work for several existing public schools without the submission of a site specific special permission provided the following conditions are met:

1. UPS batteries used shall be limited to Lead Acid technology. Lithium ion shall not be permitted without a site-specific special permission.
2. The room containing the UPS and associated system components shall have enclosures that are 2-hour fire-resistance-rated. The ventilation of such room must comply with the requirements in 2022 Mechanical Code (MC) section 502.4. Compliance with Fire Code (FC) section 608 is also required with respect to indoor battery installation, including but not limited to ventilation, fire suppression, smoke detection and monitoring.
3. The UPS battery system must comply with the NFPA 111-2013, *Standard on Stored Electrical Energy Emergency and Standby Power Systems,* and must comply with all additional requirements as prescribed in NFPA 72-2016, which allows the use of such batteries as the secondary power supply.
4. UPS batteries and system components must have UL 1778, UL 1989 and UL 1481 listings.
5. If a trouble signal is received in the building's FA system from to the UPS, no assembly areas (Occupancy Classification "A") within the building can remain occupied if such UPS trouble signal reveals that the UPS

NYC Buildings

is completely discharged/non-operational. In such instance occupation within the assembly areas shall be permitted when Fire Guard(s) are provided as per FC 901.7.2.2, or the UPS and corresponding trouble signal is corrected.

6. The UPS must be dedicated to the FA system and cannot supply or provide back-up to any other electrical load.
7. The UPS must be sized in accordance with NYC EC 760.41(C)(1) for the entire school FA system.
8. Submitted application drawings must reference this letter. Drawings for each application must contain, as required, written descriptions of the practical difficulty for each building making use of this letter.
9. FA system applications and drawings shall be submitted to FDNY for review and approval by their plan examination unit.

Sincerely,

Gus Sirakis
Deputy Commissioner
Development and Technical Affairs

cc.
Joseph Ackroyd, Assistant Commissioner, Department of Buildings
Thomas J. Currao, Chief, Fire Department of New York
Rocco Bonavita, Director, Fire Department of New York

7.3 Low Voltage Systems

7.3.16 Internet Protocol Digital Video Surveillance System using Digital Cameras

Description/Design Approach:

A. General

1. An Internet Protocol Digital Video Surveillance (IPDVS) system using Category 6 cabling shall be integrated with the LAN network infrastructure components to minimize duplication of cable, wiring and communications infrastructure. The IP camera is connected to a Category 6 Cable to carry the video, and control signals, camera power injectors to supply PTZ cameras for heater and blower operation (IDF or MDF). The finished infrastructure initially shall serve to deploy an IP--based video signaling system but shall be "as installed" capable of serving an IP-based signaling format in the future without any substantial changes to the infrastructure as built.

2. The video surveillance network consists of IP camera, IP-enabled video capture points and an application server running proprietary software to process and manage the video feeds. At the telecommunication closets, that forwards the digital video to the central video server(s) in the Main Telecommunication Room, using the network backbone of the school. Both live and archived video images can be viewed locally on administrative LAN and remotely over DOE WAN. The servers are sized to retain archived video from all cameras for 60 days.

3. For Capacity projects, Cameras are purchased and installed by the Contractor. For CIP projects, the SCA's Furniture and Equipment Department will purchase the cameras for installation by the Contractor.

4. For Capacity projects, the IPDVS System shall be installed in the following buildings:
- Stand-alone buildings
- Additions - The type of camera installation for addition projects is to be decided on a case-by-case basis in consultation with Capital Plan Management. In general, provide an integrated system for the existing building and addition. When an integrated system is being provided, the MDF for the entire complex will typically be created in the addition and thus house the IPDVS **in the data** rack.
  - If the decision is made to not replace the functional analog camera system in the existing building, refer to DR 7.3.17 and utilize Section 16783 and provide analog cameras in the addition.
  - If the decision is made to replace the cameras in the existing building, provide digital camera system in accordance with Section 16785. Existing wiring may be used to the greatest extent possible, but the analog cameras in the existing building shall be replaced.
- Leased facilities with a long-term lease of 7 years or longer and the approval of the SCA.

B. Equipment and Locations

1. The Contract Documents shall provide for IP cameras and Category 6 cabling to telecommunication closets, including wiring, raceway, boxes, outlets, **and** patch panels **in the data cabinet** in telecommunication closets and **data** cabinet in Main Telecommunication Room.

2. Every site receives a main viewing station including a computer with two (2) 20" LCD monitors. The main viewing station for CIP projects may be in a secure office or at the main entrance. A console may be required if the main viewing station is to be located at the main entrance.

3. The System Integrator (SI), contracted by the SCA/Furniture & Equipment Department, will furnish and install the system hardware, Camera power injector, network switch(es), router(s) and application server(s) running proprietary software to process and manage the video feeds. Additionally, the SI will furnish and install a computer with monitor(s) for the main viewing station.

4. Cameras shall be provided at following locations:

- All exterior doors
- At selected Hallways at selected Stairwells
- Cafeteria
- Auditorium
- At selected outdoor locations (to cover playground, athletic field, main entrances, loading docks, parking lot)
- Additional cameras may be used to monitor sensitive areas such as: vestibules, storage areas, etc.
- Areas outside all student locker rooms
- MDF Rooms
  - Locate cameras to capture door and as much of the telecommunications equipment racks as possible, regardless of location of IPDVS rack in school.
  - If MDF room is too small to accommodate the camera, place the camera outside the room to capture the door provided the door is in a public location (e.g., corridor). If door is in an instructional area (e.g., library, classroom), do not provide camera unless it can be focused only on the door and not pointed at the students or teachers**.**

5. In order to respect the privacy of students and staff, cameras are not permitted in rest rooms, locker rooms, instructional rooms, administrative offices, and guidance offices.

6. Designer shall show the optimum location of cameras on plan and draw a proposed field of view with a dotted line. Each camera shall be clearly labeled on plans and riser diagram with a unique number beginning with C1-01 or E1-01 ("C"=Interior Camera, "E"=Exterior Camera "1"=floor, "01"=camera number) and increasing in increment of 1.

7. The video surveillance system capacity is dependent on the school type and capacity and shall be designed as per the following guidelines:

a. <u>For CIP Projects:</u>

Based on detailed site survey and walk-thru with school, Integrated Service Center, central and NYPD personnel

Number of Cameras	Area (square feet)
6-20	Less than 50K
16-40	50K-100K
32-64	100K-200K

48-80	200K-350K
64-96	More than 350K

b. For Capacity Projects:

School Type	Number of Cameras	Area (square feet)
ECC	6-10	45,000
PS/IS 660	16-32	95,000
IS/HS 800	32-48	104,000*
HS 1660	48-72	215,000*

* Based on 130 SF per student

C. Power Requirements

Provide one twist lock receptacle 30-Amp, 120-Volt on separate dedicated circuits with NEMA L5-30R at the main telecommunications room **or telecommunication closet housing the IPDVS server in the data rack** to power the UPS for the single server and two (when the camera count requires dual server) L5-30R for dual server configuration. **The receptacles shall be placed near the Data cabinet housing the Video Surveillance.**

D. Internet Protocol Digital Video Surveillance System Signage

Provide a video surveillance signage at all entrances (indoor & outdoor) and school main lobby. The signage shall read “This building is under video surveillance that may be monitored and/or recorded at any time”. For capacity projects, signage is provided as per Section 10400. For CIP projects, signage is provided as per Section 16786.

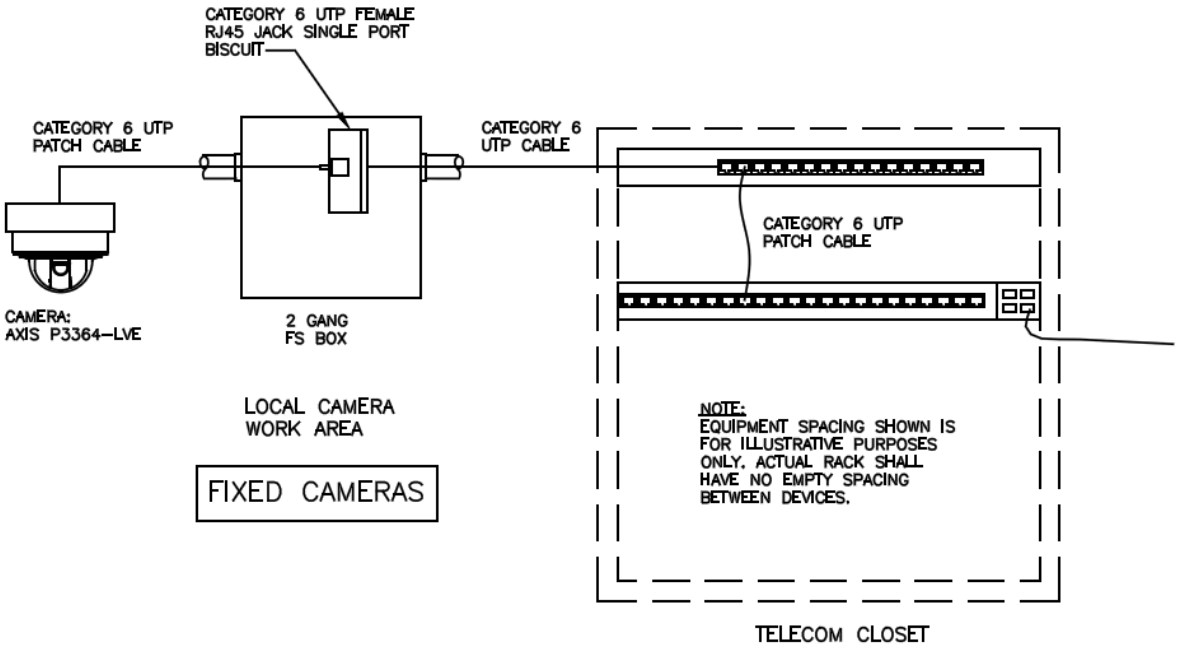
E. Coordination

1. Coordinate system design with DIIT (via SCA/F&E’s System Integrator), DOE Office of School and Youth Development, DOE Integrated Service Center and NYPD School Safety Division.

2. Capacity Projects only: During construction, submit a copy of the Contractor’s shop drawings after review and mark-up to the Authority’s Systems Integrator. The integrator’s comments are to be incorporated into the Contract after concurrence with the Authority’s A&E Department.

F. Conceptual Sketches

- Camera Wiring Details (Fixed/PTZ)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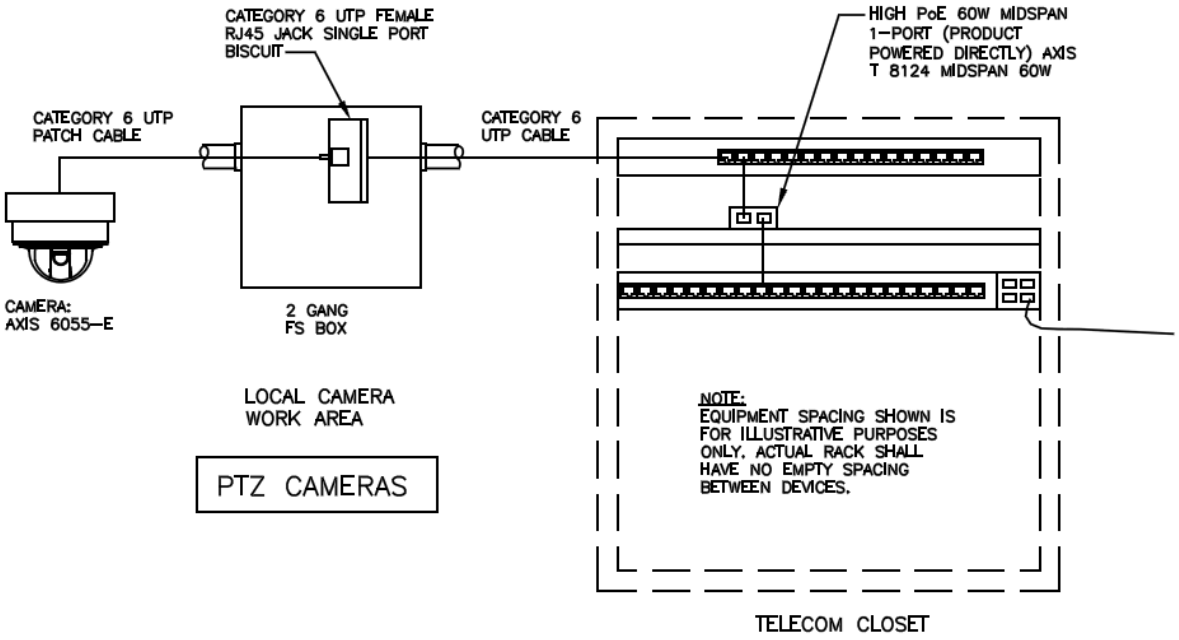
RJ45 JACK SINGLE PORT
BISCUIT
CATEGORY 6 UTP
PATCH CABLE
CATEGORY 6
UTP CABLE
CATEGORY 6 UTP
PATCH CABLE
CAMERA:
AXIS P3364-LVE
2 GANG
FS BOX
LOCAL CAMERA
WORK AREA
FIXED CAMERAS
NOTE:
EQUIPMENT SPACING SHOWN IS
FOR ILLUSTRATIVE PURPOSES
ONLY. ACTUAL RACK SHALL
HAVE NO EMPTY SPACING
BETWEEN DEVICES.
TELECOM CLOSET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RJ45 JACK SINGLE PORT
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CATEGORY 6 UTP
PATCH CABLE
CATEGORY 6
UTP CABLE
CAMERA:
AXIS 6055-E
2 GANG
FS BOX
LOCAL CAMERA
WORK AREA
PTZ CAMERAS
NOTE:
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ONLY. ACTUAL RACK SHALL
HAVE NO EMPTY SPACING
BETWEEN DEVICES.
TELECOM CLOSET

7.3 Low Voltage Systems

7.3.17 Internet Protocol Digital Video Surveillance System for Capacity Addition Projects

Description/Design Approach:

A. General

1. An Internet Protocol Digital Video Surveillance (IPDVS) system to be provided in schools is typically to be designed per DR 7.3.16 utilizing digital cameras. However, the type of camera installation for addition projects is to be decided on a case-by-case basis in consultation with Capital Plan Management. If the decision is made to replace the existing analog camera system in the existing building, follow DR **7**.3.16. If the decision is made not to replace the functional analog camera system in the existing building, this DR is to be followed and utilize specification Section 16783 in the Contract Documents, providing analog cameras in the new addition. Category 6 cabling shall be integrated with the LAN network infrastructure components to minimize duplication of cable, wiring and communications infrastructure. The NVT Power Supply Passive Receiver Hub (NV-8PS13-PVD) integrates power, video, and control signals for camera over a single Category 6 cable. A separate cable shall be provided for outdoor PTZ camera's heater and/or blower from a local power supply (IDF or MDF). The finished infrastructure initially shall serve to deploy an analog-based video signaling system but shall be "as installed" capable of serving an IP-based signaling format in the future without any substantial changes to the infrastructure as built.

2. The video surveillance network consists of analog cameras, IP-enabled video capture points and an application server running proprietary software to process and manage the video feeds. At the telecommunication closets, the video encoder converts the analog video from the cameras into networked digital streams that forward the digital video to the central video server(s) in the Main Telecommunication Room, using the network backbone of the school. Both live and archived video images can be viewed locally on administrative LAN and remotely over DOE WAN. The servers are sized to retain archived video from all cameras for 60 days.

3. In general, provide an integrated system for the existing building and addition. When an integrated system is being provided, the MDF for the entire complex will typically be created in the addition and thus house the IPDVS **in the data** rack.

B. Equipment and Locations

1. The Contract Documents shall provide for analog video cameras and Category 6 cabling to telecommunication closets, including wiring, raceway, boxes, outlets, patch panels, **and** NVT Power Supply Passive Receiver Hub **in the data cabinet** in telecommunication closets and **data** cabinet in Main Telecommunication Room.

2. Every site receives a main viewing station including a computer with two (2) 20" LCD monitors.

3. The System Integrator (SI), contracted by the SCA/Furniture & Equipment Department, will furnish and install the system hardware, including video encoder(s), network switch(es), router(s) and application server(s) running proprietary software to process and manage the video feeds. Additionally, SI will furnish and install a computer with monitor(s) for the main viewing station.

4. Cameras shall be provided at following locations:
- All exterior doors
- At selected Hallways
- At selected Stairwells
- Cafeteria
- Auditorium
- At selected outdoor locations (to cover playground, athletic field, main entrances, loading docks, parking lot)
- Additional cameras may be used to monitor sensitive areas such as: vestibules, storage areas, etc.
- Areas outside all student locker rooms
- MDF Rooms
  - Locate cameras to capture door and as much of the telecommunications equipment racks as possible.

5. In order to respect the privacy of students and staff, cameras are not permitted in rest rooms, locker rooms, instructional rooms, administrative offices, and guidance offices.

6. Designer shall show the optimum location of cameras on plan and draw a proposed field of view with a dotted line. Each camera shall be clearly labeled on plans and riser diagram with a unique number beginning with C1-01 or E1-01 ("C"=Interior Camera, "E"=Exterior Camera "1"=floor, "01"=camera number) and increasing in increment of 1.

7. The video surveillance system capacity is dependent on the school type and capacity and shall be designed as per the following guidelines:

School Type	Number of Cameras	Area (square feet)
ECC	6-10	45,000
PS/IS 660	16-32	95,000
IS/HS 800	32-48	104,000*
HS 1660	48-72	215,000*

* Based on 130 sqft. per student

C. Power Requirements

Provide one twist lock receptacle 30-Amp, 120-Volt on separate dedicated circuits with NEMA L5-30R at the main telecommunications room **or telecommunication closet housing the IPDVS server in the data rack** to power the UPS for the single server and two (when the camera count requires dual server) L5-30R for dual server configuration. **The receptacles shall be placed near the Data cabinet housing the Video Surveillance.**

D. Internet Protocol Digital Video Surveillance System Signage

Provide a video surveillance signage at all entrances (indoor & outdoor) and school main lobby as per specification section 10400. The signage shall read "This building is under video surveillance that may be monitored and/or recorded at any time."

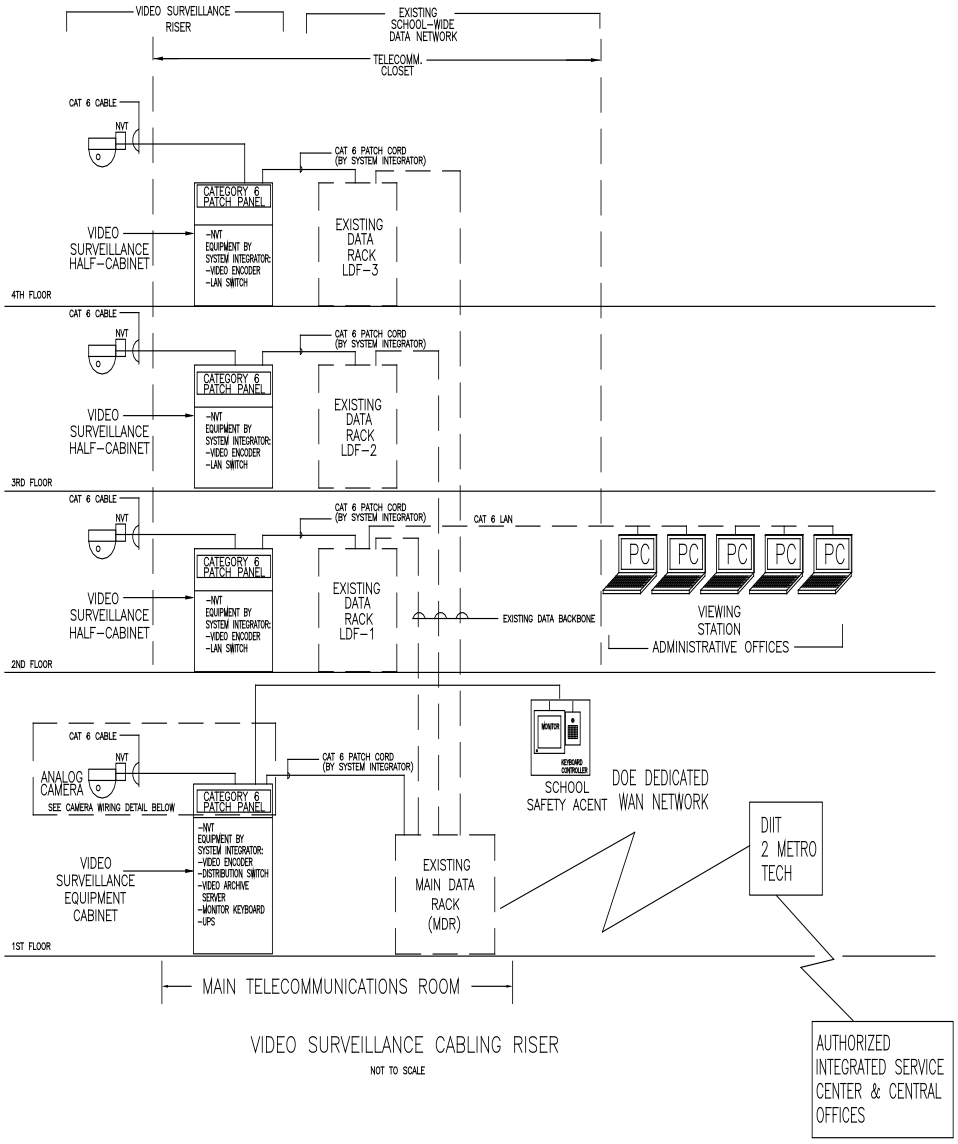
E. Coordination

1. Coordinate system design with DIIT (via SCA/F&E's System Integrator), DOE Office of School and Youth Development, DOE Integrated Service Center and NYPD School Safety Division.

2. Capacity projects only: During construction, submit a copy of the Contractor's shop drawings after review and mark-up to the Authority's Systems Integrator. The integrator's comments are to be incorporated into the Contract after concurrence with the Authority's A&E Department.

F. Conceptual Sketches

- Video Surveillance Cabling Riser Diagram
- Camera Wiring Detail



Requirement Applies to: ✔ **New Construction** **Major Modernizations** ✔ **Capital Improvement Projects**

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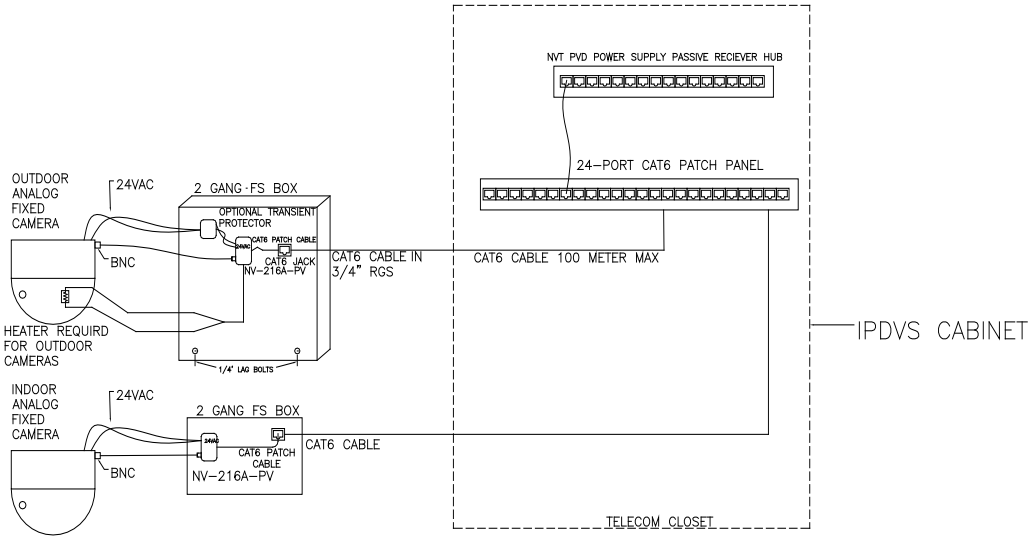

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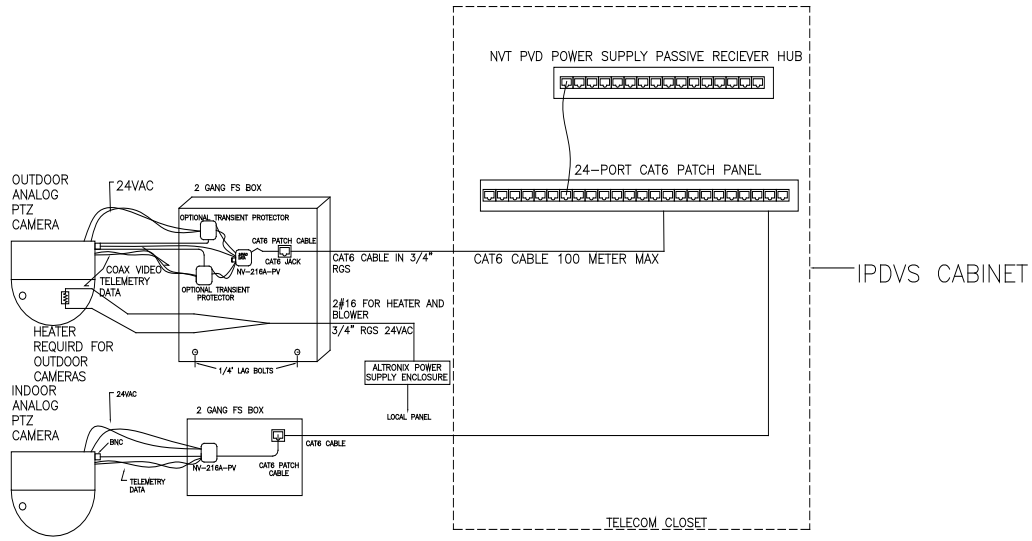

Requirement Applies to: ✔ **New Construction** **Major Modernizations** ✔ **Capital Improvement Projects**

7.3 Low Voltage Systems

7.3.18 Miscellaneous Low Voltage Drawing Requirements

Description/Design Approach:

A. The following items shall be shown or taken into account on the Electrical Drawings:

1. Ensure that a heat trace system is provided for the walk-in freezer unit condensate lines and is coordinated with the Kitchen Consultant and Architect. System shall be shown on the Drawings and shall be connected to the freezer unit's controller so it only comes on during the defrost cycle. Ensure any other heat trace required is also shown.

2. Ensure that the time clock/PA speaker required for the dietician's office and kitchen is shown on the drawings.

3. Ensure that the location of the Electronic Time Recorders for outside the Dietician's office and the recorder for the General Office are coordinated with the Architect and shown on the Electrical Drawings with associated power.

4. Provide data for the Kitchen POS system at both ends of the serving line.

5. Ensure the location of the remote receptacle/pad (MTU) for the water meter provided with the meter and wiring from the meter to the receptacle is shown on the electrical Drawings. Location of the remote receptacle/pad is to be on the outside of the building fronting the street. Wire shall be installed in conduit.

6. Ensure that a #12 copper earth ground for the utility meter/demarcation box is shown on the drawings, placed in a conduit.

7. Ensure that the cabling between the elevator card reader in the custodian's office and the elevator(s) machine room that is specified in Division 14 is shown on the drawings. Provide a Cat 6 line or when required, as these are many times the distance between the spaces is over the 100-meter maximum limit for a Cat 6 cable run, fiber cable.

8. Ensure that the door release system is shown on the drawings, with a CAT6 cable, OSDP Cable and #18 cable runs from a designated door at the main entrance and the exterior kitchen door used to receive deliveries to the nearest MDF/IDF. Provide a CAT6 and #18 cables to the security desk for the door release and panic button connection.

9. Ensure that corridor clocks are shown to be on the opposite wall from the fire alarm system strobes in order that the strobes are not visually blocked by the clock.

10. Athletic Fieldhouses

a. Provide data connection for POS systems for specialty spaces associated with the fieldhouse, such as the concession stand and ticket booth.

b. Provide voice connection for specialty spaces associated with the fieldhouse, such as the concession stand and ticket booth.

c. Provide PA system speaker in concession stand. PA speaker shall be connected to the fieldhouse PA system.

d. Press box shall have the following: wireless controls for the scoreboard, data connection from the fieldhouse and microphone input tied into the PA system located in the fieldhouse. If press box is too far from the fieldhouse, solutions such as a ruggedized switch in a Nema 3R enclosure within the press box shall be provided for data connections, with fiber runs provided from the fieldhouse to the press box.

7.4 Seismic Design

7.4.1 Electrical Seismic Design Criteria

Description/Design Approach:

A, As per Section BC 1613.1 of the **2022** NYC Building Code, every new school building structure and portions thereof, including nonstructural components (architectural, MEP, fire protection) along with their permanent attachments and supports to the structure, shall be designed and constructed to resist the ground motion resulting from earthquake events in accordance with ASCE 7–**16**, excluding Chapter 14 and appendix 11A. The Seismic Design Category will be determined by the structural Engineer of Record and indicated on the structural drawings

B. Per Section BC 1601.2.3, the determination as to whether seismic requirements apply to an alteration shall be made in accordance with the 1968 NYC Building Code and interpretations by the Department of Buildings relating to such determinations. Refer to Local Law 17/1995 and TPPN 4/99. Any applicable seismic loads and requirements, including for the bracing of electrical systems and equipment, shall be permitted to be determined in accordance with Chapter 16 of the **2022** NYC Building Code or reference standard RS 9-6 of the 1968 NYC Building Code

C. If an existing building is required to meet seismic requirements as per the criteria described in DR 3.1.3 and a waiver from the Department of Buildings (DOB) cannot be obtained, the electrical retrofit work must then meet such requirements.

1. For new additions projects, any electrical item in the existing building shall also meet the seismic requirements of the addition if they are integrated with systems in the new addition that are required to function after an earthquake.

D. New School Buildings and Additions constructed after LL17/1995 went into effect are subject to the seismic requirements of the New York City Construction Code and are considered Risk Category III, “Buildings and other structures that represent a substantial hazard to human life in the event of failure” for seismic design as per Table BC 1604.5.

1. Seismic Design Category shall be determined by the project structural engineers. The Seismic Design Category for a structure is determined in accordance with Section BC 1613. The Seismic Design Category is to be indicated on the Structural Drawings (Refer to Detail 0100054a) and Component Importance Factors related to electrical shall be indicated on the electrical drawings. (Refer to Standard Detail 1650301a).

2. Component Importance Factors (I_p) are prescribed in **Chapter 13 of** ASCE 7-**16**. The default value for typical components in normal service is I_p=1.0. The following components have I_p=1.5 (Refer to Standard Details 1650301a for a specific listing of common items):

   a. Life safety components required to function after an earthquake. This includes fire alarm, emergency generator systems, automatic transfer switches, UPS, transformers for life safety systems, emergency and exit lighting, distribution panels that drive life safety equipment (e.g. smoke control fans, fire pump controllers), etc. Functioning after an earthquake means just long enough to evacuate the building as opposed to functioning as a disaster relief center. Per Section 13.2.2 **of ASCE 7-16**, active electrical equipment that must remain operable following the design earthquake ground motion shall be certified by the manufacturer as operable whereby active parts or energized components

shall be certified exclusively on the basis of approved shake table testing in accordance with Section 13.2.5, analysis or experience data in accordance with Section 13.2.6, unless it can be shown that the component is inherently rugged by comparison with similar seismically qualified components. Evidence demonstrating compliance with this requirement shall be submitted for approval by the SCA after review and acceptance by the Contractor's registered design professional.

b. Components with I_p=1.0 located above or in proximity to components of MEP items with I_p=1.5 which could damage the I_p=1.5 equipment shall be braced.

3. For Seismic Design Category B, all electrical components are exempt from the seismic requirements.

4. For Seismic Design Category C, all electrical components with I_p=1.0 are exempt from the seismic requirements.

5. For Seismic Design Category C, all electrical components with I_p=1.5 shall be designed and constructed to seismic requirements.

6. Appropriate seismic coefficients to be utilized in the design of seismic resistance for the electrical system shall be those listed in Table 13.6-1 of ASCE 7-**16**.

7. Electrical system components along with their attachments or supports to the structure shall be designed in accordance with Section 13.4 of ACE 7-**16**. They shall be bolted, welded or otherwise positively fastened without consideration of the frictional resistance produced by the effects of gravity. A continuous load path of sufficient strength and stiffness between the component and the supporting structure shall be provided. The component forces shall be those as determined by the calculations outlined in Section 13.3.1.

9. Electrical system components shall be designed as per Section 13.6.**3 of ASCE 7-16** in that the seismic resistance force for the electrical system component shall match the seismic forces and the relative displacement as prescribed by the calculations outlined in Section 13.3. Conduits, cable tray and other electrical distribution systems (raceways) shall be designed according to Section 13.6.5.

10. Light Fixtures and lighted signs that are supported by chains and meet the requirements listed in Section 13.6.1 of ASCE 7-16.

11. When seismic design is required, generic seismic bracing details shall be shown on the contract drawing bid set. A note shall be added stating, "Details are shown to illustrate the scope of work. Contractor's registered professional engineer shall provide calculations and be responsible for providing signed/sealed coordinated shop drawings indicating locations of seismic braces and the required connection details to file with the DOB/BCC".

12. All bracing devices shall be qualified through either analysis or be tested and certified in accordance with ICC-ES AC 156. Local NYC accelerations are to be used when computing seismic inertia forces. Pre-approvals based on independent testing are preferred to pre-approvals based on calculations. Where pre-approved devices are not available, submittals based on independent testing are preferred. Calculations (including the combining of tensile and shear loadings) to seismic bracing designs must be stamped by the Contractor's Registered Professional Engineer with at least five years of seismic design experience in non-structural building components in New York State.

13. All attachments of hangers and bracing shall be positive attachments that shall be cast-in-place anchors, drill-in wedge anchors, or a welded or bolted connection to structure. Drill-in wedge anchors shall be epoxy adhesive based and shall have an evaluation report number from ICC-ES verifying their allowable loads. Double-sided beam clamps are required for bracing. Anchors must be certified for use in cracked concrete.

E. The following note is to be included on the electrical drawings:

"For all items that are required to have seismic supports or restraints, seismic plans and seismic restraint calculations shall be prepared, sealed, and submitted by a Professional Engineer licensed in the State of New York engaged by the Contractor. The Engineer shall provide installation supervision of all seismic supports and restraints. The Contractor's Registered Professional Engineer shall submit signed and sealed affidavit stating that the installation is in full compliance with the signed/sealed shop drawings."