



ELECTRICAL SYSTEMS SCOPING GUIDELINES

1.0 GENERAL GUIDELINES

2.0 ELECTRICAL SYSTEMS

2.1 Introduction

The following 'Scoping Guidelines' are provided to clarify the intended scope of assigned Capital Improvement Program (CIP) projects related to 'Electrical Systems' and provide direction on how to approach the investigation and scoping of the work for the 'DOE Referred Items' as well as 'SCA Additional Recommended Items' in Scope Reports. These guidelines are intended to supplement the requirements of the General Scoping Guidelines and the requirements of the Scoping Process outlined in Section II of the CIP Project Manual.

Refer to the SCA Design Standards for further design and technical requirements including, but not limited to, the SCA Design Requirements and Standard Specifications. When published, refer to the *Deep Carbon/Energy Master Plan (DC/EMP)* for carbon reduction and energy conservation measures to be potentially included in the scope, if available for this building.

The intent of a CIP Electrical Systems project is to perform repair or replacement of deficient system components within the existing electrical systems that were identified in the latest Building Condition Assessment Survey (BCAS) report, and to include any carbon reduction/energy conservation measures related to these deficient system components that have been identified in a Deep Carbon/Energy Master Plan, when available and applicable. The scoping intent is to bring the system(s) into good repair and ensure that repair and replacement of deficient system components are evaluated for compliance with the current NYC Energy Conservation Code and the Green House Gas Emission (GHGE) reduction targets per LL97

2.2 Project Definition (LLW's and Nodes)

An "Electrical Systems" Project is identified by Capital Category or 'LLW number' with one or more components, referred to in the Capital Plan as "nodes".

CIP projects are typically generated from information gathered in the most recent BCAS report and when funding is authorized by Capital Plan Management (CPM). Generally, projects are created to address deficiencies of system components (nodes) with BCAS rating '5' (Poor)* or 4' (Between Fair and Poor). In many cases however, one or more additional components (nodes) may be identified with BCAS rating of '3' (Fair). Further development of the CIP project may involve GHGe reduction measures generated from a Deep Carbon/Energy Master Plan (DC/EMP) project approved by CPM.

The Designer should carefully examine the latest BCAS report and current or previous DC/EMP (if applicable) and identify the system components related to the selected 'nodes' that constitute the components to be addressed within the 'DOE Referred Items'. Related components that are needed to accomplish the repair or replacement of the referred 'node(s)' or stated level for GHGe/energy reductions should also be included within the scope of the 'DOE Referred Items'. An annotated copy of the applicable pages of the BCAS report is to be included in the appendix of the Scope Report to



clearly identify the specific components, cited deficiencies, and condition rating by hand-written notation, arrows, highlighting, etc.

As indicated, components are typically included in the Capital Plan based on a BCAS condition rating of 4 or 5 (Poor or between Fair and Poor). However, an Electrical repair/upgrade may also include related components rated 3 (fair) if they are possibly needed to fulfill the intent of the project. The project intent is to design for all the nodes that are assigned to the project in the plan, but the designer must review these related 'rated 3' items to determine if the work is, in fact, required to accomplish the repair of the rated 4 or 5 items and should be included in the scope of work.

As with all designated or undesignated components, it is important for the designer to determine the appropriate amount of work to be performed, not just to replace all the components identified by the designated Node(s). Statements such as "...the system is old and requires replacement" are not adequate.

Cost effectiveness, maintainability and overall functionality are very important to the SCA and DOE. The designer must consider those factors and use good judgment in determining the amount of work to be performed. The designers should consult the SCA Design Project Manager (DPM) or Design Manager (DM) for guidance when the designer is in doubt on how to proceed.

The Capital Plan intent is to provide the appropriate amount of work required for the listed nodes to bring them to good repair, not to replace all the Electrical System components or provide enhancement for them. The CIP project assignments are specific as to the components of work to be scoped – they are not intended to upgrade entire Electrical Systems.

* BCAS rating is based on a scale of 1 thru 5, where 1 is rated as a building component in good condition and 5 is rated as poor where the component needs to be replaced or it is a component that has outlived its life expectancy.

2.3 Comprehensive Scoping Approach

The following Sections of this Scoping Guideline have the descriptions of the major Electrical Capital Categories that may be funded in the Capital Improvement Program. The categories and associated nodes have been mostly generated from the BCAS report. In general, the designer, in conjunction with the Sustainability Consultant when there is a DC/EMP, is required to perform a comprehensive and thorough inspection of the funded Electrical Capital Categories and prepare a detailed Scope Report to include findings and recommendations.

A DC/EMP identifies those feasible carbon reduction measures recommended for CIP project scopes in addition to meeting the NYCECC. These additional measures are needed to meet Local Law 97 of 2019 and NYC's 80x50 carbon reduction targets. Any additional scope will require approval by CPM. For future carbon reduction measures that may be included in the DC/EMP, the DC/EMP considers an order of magnitude estimate, the carbon reduction and energy saving potential.

It is imperative to provide a historical, detailed narrative describing the electrical upgrades the building has undergone including the LLW# & Design# and approximate date of completion. The designer must check THE Project Tracking System (PTS) and the Electronic Documents database (EDOCs - formerly Alchemy) to review the previous electrical design projects. The Scope Report should also have



photographs attached showing the equipment and devices. All major observations stated in the findings must be supported with cross-referenced photographs.

The Scope Report/scoping plan must identify issues including, but not limited to, the following for Electrical Systems projects:

- Relocation and redistribution of circuit loading.
- Availability of HVAC system capacities for new electrical equipment.
- Availability of Kitchen electrical distribution equipment and support of new appliance installation.

The goal is, in a cost-effective manner, to upgrade the electrical systems to serve the school premises for the foreseeable future.

2.4 Investigation & Documentation of Findings

Perform investigations including site visits for visual inspections as appropriate to the scope of work. Arrange for meetings with Con Edison, custodian, and/or electricians as required. If a DC/EMP has previously been performed for this building, a review of the report should be made by the designer and Sustainability Consultant and a pre-scoping meeting scheduled. Recommendations from the report applicable to the project scope should be included, reviewed, commented on and evaluated to determine if the recommendations are to be pursued and funding sought for the additional scope. Document findings using photographs and annotated drawings. Record the locations and extent of deficiencies on copies of plans and/or elevations and include in the Appendix of the Scope Report.

2.5 Meetings and Site Investigations with School Personnel

The designer shall meet with the school's Custodian, Principal, and other designated school staff during the investigation to identify existing electrical problems, review the status of outstanding building violations related to the electrical system and/or specific school current and future needs, including other renovations or additions being planned that may impact the funded project.

The designer must interview the school personnel and identify deficiencies during the investigation and include their findings in the Scope Report:

- Review history of branch and/or feeder overloads
- Review tripping of circuit breakers or fuses. (Overloads, Short circuit, Arc Fault, or Ground Fault)
- Review existing System and Branch Circuit Metering System – Connection to Monitoring Service
- Determine with DIIT if the IP infrastructure can support the additional loads included in the project, if applicable.
- Inspection of connected loads to determine load reduction strategies.
- Review existing circuit time clock installation
- Review history of electrical fires
- Review of major electric loads and electrical components in the building
- If relocation of electrical equipment is being proposed, the designer must request written approval from the school personnel

It is important when meeting with the school staff to be clear that the intent of the project is to address the repair or replacement of items listed in the Capital Plan as deficient and to bring those Electrical



Systems into good repair. Any additional deficient items not part of the Capital Plan may be noted as recommendations for future repairs by DSF as maintenance or for a future CIP project. If additional work beyond the stated DOE Referred Capital Category or designated 'nodes' is recommended concurrent with the current project, it may be included as "SCA Additional Recommended Items".

Minutes of meetings with school personnel should be included in the Scope Report.

2.6 Construction Phasing

The designer must develop one or more construction plan concepts, including phasing of the work. The proposed construction plan concepts should be presented and discussed with SCA representatives during the Scope Phase and documented in the Scope Report. The constructability and feasibility of implementing one or more construction plan concept should be discussed with SCA representatives from A&E and Construction Management for approval during the Scope Phase for further development and inclusion in the Contract Documents. The construction plan should identify issues including, but not limited to, the following for Electrical Systems projects:

- Path of delivery of major equipment or required temporary demolition
- Location of suggested temporary service distribution when there is electrical service work.
- Identify long-lead items for manufacture and delivery of any special equipment related to the project

2.7 Correspondence with Utility Company and DOB

During the Scope Phase, the designer must arrange for a meeting at the site with the Utility Company to obtain all necessary information for the new or reinforced electrical service. Any work involving modification or replacement of existing service equipment and/or switchboard(s) requires that a load letter be prepared to inform the Utility Company of the proposed work. The load letter should describe the proposed scope of work; list the new loads and largest motor size(s) and request for the available short circuit current.

To avoid delay, the load letter to the Utility Company should be prepared and dispatched upon Scope approval. The designer should receive from the Utility Company information relative to the requirements for property line box or end box, meter pans, meter blocks, current transformer cabinets, meter wiring, and other equipment in connection with the electrical service and available short circuit current.

The SCA should be copied on all the correspondence with the Utility Company and DOB including:

- Correspondence with the Utility Company, including the load letter.
- Correspondence requesting variances and/or waivers of specific codes and standards to the DOB, where full compliance is not feasible or where alternative approaches are proposed to address noncompliance of existing system components.

2.8 Surveys, Tests & Probes

As soon as possible following the initial site visit at the start of scoping, identify surveys, tests and probes that will be required to confirm conditions and assist in determining findings. Although the schedule may not permit the performance of all investigative testing during this phase, requests for



investigative work should be initiated during Phase 1 so that the work can be performed at the onset of Phase 2. If surveys or tests are necessary in order to develop recommendations, the AEO shall notify the DPM immediately and a revised schedule should be proposed.

3.0 ELECTRICAL SYSTEMS

Nodes: *The Electrical Systems Capital Category may include some or all of the following nodes:*

- *Electrical Service Switch*
- *Switchboard*
- *Panelboard*
- *Transformer*
- *Grounding System*
- *Emergency Generator Set*
- *Lightning Protection*

Design Requirements: *Refer to SCA Design Requirements under Section 7.1, Power Distribution, and other relevant sections for further design and technical requirements.*

Deep Carbon/Energy Master Plan: *Refer to DC/EMP if available for the building for carbon reduction and energy conservation requirements.*

3.1. General

The school building shall be supplied by only one service as per NEC 230.2 unless it is sufficiently large to make two or more services necessary. The additional services requirements shall be coordinated with the utility company and the SCA. Provide the dates and complete information about all electrical systems renovations.

3.2. Electrical Distribution System (Ref: DR 7.1.1)

When the Electrical Systems category includes the nodes, Switchboard and/or Panelboards, the designer is required to inspect and evaluate the existing electrical system from the point of the utility entry to the last utilization point. During the scoping, the designer has to justify the need to upgrade or to keep the existing electrical system including the service equipment and the distribution. The emphasis of the investigation should be on the items listed in the nodes. However, due diligence is required and the entire system should be inspected and evaluated including:

- Electric Service: Type of Electric Service (120/208 Volt or 277/480 Volts, 3-phase, 4-wire) and number/size of service entrance conductors and wiring method.
- Equipment schematic diagrams and connection schedules.
- Property Line Box or Service End Box:
 - Designer to describe the Property Line Box or Service End Box and all conduits and conductors from the box to the service switch(s).
 - The utility will usually require a Property Line Box where the property line exceeds 5 feet from the building line. In this case, the designer must verify the box existence and request the Utility Company for information on the condition, size, utility ducts supplied and the quantity, ratings, insulation type of the service entrance conductors. At the scoping phase, in particular where



service upgrade will be recommended, reasonable effort must be made to learn about the Property Line Box to ascertain whether it is suitable to remain in a service upgrade.

- In rare cases where property lot encloses several buildings, high-tension distribution may be used for distribution to different buildings. In these cases, the designer should provide relevant information including primary switch, transformer types and ratings, metering information, indoor vault and location for all of the above.
- The Utility will likely require a Service End Box where the property line is less than 5 feet and where the utility terminates directly inside the Electrical/Switchboard Room. The Service End Box needs to be inspected and complete data provided in the Scope Report.
- During the scoping phase, the designer should schedule a field visit in the presence of the Utility Company to obtain all necessary information.
- Where major service and distribution equipment is recommended for replacement and justification has been presented, the following needs to be evaluated:
 - If two points of entry exist, the designer should investigate with the Utility Company the possibility of consolidating services to one. Investigate penalties or additional costs imposed by utilities for consolidation.
 - Characteristics of the Utility Metering and Cabinets including sub-metering and totalizing equipment.
 - Power characteristics of the fire pump assemblies (hp) and emergency power generation equipment (kW)

3.2.1. Switchboards (Main and Sub-Distribution Boards (Ref: DR 7.1.1))

- Bus configuration, current, and voltage ratings.
- Short-circuit current rating of switchboards and overcurrent protective devices.
- Type of overcurrent protective devices (Fused Switch, Circuit Breaker).
- Type of switch or switchboard (front access, front and rear access, live front).
- Evaluate physical condition of the main switchboard and sub-distribution boards and associated feeders and equipment. Condition assessment data including, but not limited to, appearance and functionality and monitoring system.
- Consolidate extraneous disconnect switches into the new distribution board where possible. Provide explanation where consolidation is not recommended.
- Approximate age of equipment.
- Provide switchboard manufacturer current status.
- Conformance to codes and SCA standards.
- Provide and place emphasis on any findings of existing hazardous conditions such as exposed live parts, abnormal sounds emanating from the equipment, wet conditions, overheating.

3.2.2. Panelboards (Ref: DR 7.1.1)

- Evaluate every panelboard (Power, Receptacle, Lighting and/or dedicated panelboards) throughout the school and directly associated feeders and equipment.
- Describe panelboard types (circuit breaker or switch fuse), bus configuration, voltage, current rating, number of spares and spaces available.
- Condition and operation status of the panelboard.
- Conformance with codes and SCA standards (no surface mounted panels shall remain in corridors).



- Manufacturer's name.
- Approximate date of installation.
- Evaluate existing branch circuit loads and identify spare breakers deficiencies.
- Evaluate cabinet and gutter size.
- If panelboards replacement is recommended, evaluate possible use of existing back boxes
- Auditorium, boiler and shop panels may have special requirements including emergency power off. Obtain all necessary information of the existing status or use of space to establish whether these requirements still apply.
- Establish status of shop/labs program at the school, determine whether replacement of unused shop/lab panels in the rooms is necessary, and if so determine requirement of emergency shut off.
- Identify problems and present solutions with the existing panelboards enclosure, such as existing cabinets are not deep enough, existing cabinets are mounted too high, existing cabinets are not large enough to support desired additional spares where a deficiency of circuits has been identified.
- The proposed design should maximize spare breakers in new panelboards.
- Where possible, eliminate dual feeder arrangements and split bus construction.
- Identify split bus construction locations required for other than dual feeder applications such as Auditorium, Boiler Room, Shops.
- Verify that all electrical equipment has adequate space and location for typical maintenance and code required clearances.

3.2.3. Electrical/Switchboard Room (Ref: DR 7.1.1)

- Evaluate the room conditions for modernization/upgrade, code compliance and environmental requirements.
- Provide all room modification requirements including lighting to conform to the new equipment layout.
- If major service and distribution equipment is recommended for replacement, provide for dual egress requirements where service equipment is over 1200 amperes and board lineup is over six feet or justify using allowable exceptions. Non-compliance must be supported by documentation showing approval of the New York City Department of Buildings.
- Any service equipment of 1,000 KVA or more (new or modified) is required to be filed by the Contractor with the NYC Department of Buildings Electrical Plan Review and triggers clearance requirements and egress and hardware requirements that must be accounted for in the design. As the Contractor is required to hire a licensed design professional to file with NYC DOB EPR, the designer needs to coordinate and ensure the design will work. The specifications require the Contractor to produce an overcurrent protective device coordination study to be submitted and approved by NYC DOB prior to final inspection. The Contractor is required to provide a final signoff from the NYC DOB Electrical Inspection Unit.
- Provide all current citations, observable violation information (i.e. clearances, inadequate short circuit ratings, door or room construction fire rating, water pipes in vicinity or running over equipment, gas meter in same room etc.).



3.3. Grounding System (Ref: DR 7.1.1)

The designer should evaluate the condition and suitability of the existing grounding mean and conformance to current codes and SCA standards. The designer should investigate the condition (bonding corroded) of the Grounding Bus Bar installation and connection to the main water service pipe details.

3.4. Transformers (Ref: DR 7.1.1)

- When the utility company requires a transformer vault, 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) 839 9666.
- The vault shall be such dimensions as to permit the installation of all Electrical Equipment. In accordance with NYC 2011 Electrical Code. The vault shall be of fireproof construction with minimum rating of three hours.

3.5. Emergency Generator Set (Ref: DR 7.1.2)

- An emergency generator, rated for stand-by operation, shall be provided in schools meeting any of the following conditions as per the Chapter 27 of the 2014 NYC Building Code:
 - 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 of 15,000 square feet per floor or more (Section BC 2702.2.20).
 - A total gross floor area of 100,000 square feet or more (Section BC 2702.2.20).
- The Generator shall be sized to accommodate all required systems (see DR 7.1.2).
- Designer shall locate the generator such that the vent pipe shall terminate at least 10 feet from any appliance air inlet or any flue gas outlet of any appliance. Designer shall show location of generator on the Drawings. Refer to Design Requirement DR 7.1.1.

3.6. Lightning Protection (Ref: DR 7.1.5)

A lightning protection system shall be provided for boiler replacement projects installing a stainless steel liner. Since only the liner is to be protected, the system will not obtain a master label certification.

3.7. Related Work

3.7.1 Architectural/Structural

Identify any requirements for mounting of panels or equipment, support or anchorage. Also, include any impacts to existing finishes, walls, egress requirements (doors).

3.7.2 HVAC

Identify any impacts to existing HVAC items.



3.7.3 Plumbing

Identify any impacts to existing Plumbing or Fire Protection systems.

3.7.4 Electrical

Identify any impacts to existing electrical items to remain in place.

3.8. Design

3.8.1 Load and Short Circuit Calculations

- One of the most crucial factors in evaluating the existing electrical system is the consideration of the existing spare capacity and the capacity to handle expected growth. Expected growth should be limited to load increases for projects currently funded in the Five Year Capital Plan. In all cases, load calculations should be limited to the actual anticipated load.
- The designer should obtain the electric energy and demand readings for the last three years to determine the spare capacity of the existing system. The designers should contact DCAS Division of Energy Management, Richard Risickella, Senior Analyst, Account Management P: (212) 386-6322, rrisicke@dcas.nyc.gov.
- Calculations for service upgrades shall utilize the NEC 2008 Article 220.86 for schools. Thus, total new service will have capacity to, generally, handle existing peak demand and projected loads addition.

3.8.2 Drawings

- Prepare 1/4" scale plan drawings of each Electrical/Switchboard Room for both demolition and new work. All equipment should be shown to scale for proper review of existing and new clearances. All major equipment including service switches, current transformer cabinets, meters, pull boxes, conduit, raceways, service end, panelboards, disconnect switches etc. must be shown. All dimensions shall be indicated on the Drawing including height, width and depth of each unit and mounting height above floor.
- Dimensioned plans, elevations, sections, and details, including required clearances and service space around equipment.
- A scaled elevation of the main service and distribution board showing actual number of sections required, major conduit banks, and any major structural beams that may interfere with this work. Indicate slab-to-slab dimensions.
- Scaled site plan (if required) showing property line and property line manhole (proposed and new), concrete duct bank general routing and all other pertinent service information.
- One line diagram; first two levels of protection should be coordinated with the switch and fuse type used.
- Power & Lighting Riser diagram showing all panelboards distribution/sub-distribution boards with existing conduit feeder arrangement and new proposed modifications. Project intent must be clear (i.e. what will be replaced and what is existing to remain must be



defined. The riser must show all existing distribution with the equipment to be replaced or to remain.

- Identify major conduit routing and pull boxes locations and or possible installation issues.
- Identify vertical conductor support requirement issues. (Applicable to high-rise buildings).
- Indication of grounding points and methods.
- Part plan legend designating all equipment in existing and new layouts.
- Concrete encased duct bank detail where service disconnects is not at the point of entry to building envelope. Include section of duct-bank showing all major turns.
- Show concrete housekeeping pads where service equipment is below grade.
- Describe construction installation (phasing) plan including provision for power.
- Describe mobilization of major equipment plan.
- Indicate possible location of temporary distribution boards feeding the building.
- Per the specifications, any service equipment of 1,000 KVA or more is required to be filed by the Contractor with the NYC Department of Buildings Electrical Plan Review. The Contractor is required to hire a licensed design professional to file with NYC DOB EPR and the Contractor is required to produce an overcurrent protective device coordination study to be submitted and approved by NYC DOB prior to final inspection. The Contractor is required to provide a final signoff from the NYC DOB Electrical Inspection Unit.
- In general, existing distribution panelboard feeder conduits should be re-used. If feeders are to be replaced, maximize the size of the replaced feeder to allow the maximum number of feeders in the conduit allowed by code. The designer should evaluate the feasibility of increasing the feeder overcurrent protection by increasing the switchboard rating or by increasing the footprint of switchboard.

4.0 BUILDING LIGHTING SYSTEMS

Nodes: *Nodes for Lighting projects can generally be found under specific room types such as Classrooms, Corridors, Administrative Space, Auditoriums, Gymnasiums, Athletic Fields, Playground Redevelopment, etc. One or more of the following nodes may be included:*

- *Lighting Fixtures – High efficiency LED. (Pendant, Recessed or Surface Mounted)*
- *Exterior Athletic Field Lighting – High Efficiency LED*
- *Exterior Security Lighting (Covered under Section 9, School Safety Systems)*

Design Requirements: *Refer to SCA Design Requirements under Section 7.2, Lighting Systems, and other relevant sections for further design and technical requirements.*

Deep Carbon/Energy Master Plan: *Refer to DC/EMP if available for the building for carbon reduction and energy conservation requirements.*

4.1 General

The Scope Report should include:

- Condition and operation status of the existing lighting system, meeting SCA standards and requirements, approximate date of installation, adequacy of interior and exterior lighting systems, quantity, type, location, condition and wattage of each lighting fixture.



- Information about lighting controls.
- Information about existing wiring and controls shall be part of the existing findings.

The Designer shall indicate the location and condition of all existing lighting panel(s).

4.2 Lighting Fixtures (Interior; Ref: DR 7.2.1)

- Luminaires shall be high efficiency LED. Lighting replacement shall be performed with the current most efficient available technologies and lighting fixtures.
- The number of different luminaires shall be limited as much as possible. Custom luminaires shall be avoided.
- Provide computer generated lighting calculations for all areas of work

4.3 Athletic Field Lighting (Exterior; Ref: DR 7.2.6)

- 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.
- Athletic field lighting shall be provided around the perimeter of the playing fields to provide adequate lighting of the field for safe playing. It also may be utilized in the design of site security lighting as appropriate for the safe passage of students and staff and to deter theft and vandalism. Lighting design shall minimize light trespass from the site, reduce sky glow, improve nighttime visibility through glare reduction and reduce development impact on nocturnal environment.

4.4 Related Work

4.4.1 Architectural/Structural

Identify any requirements for mounting or support of light fixtures on walls and/or ceilings. With light fixture replacements, document the conditions of existing ceilings and supports or suspension systems. Also, include any impacts to existing ceiling and/or wall finishes.

4.4.2 HVAC

Identify any impacts to existing HVAC items including, but not limited to Motor replacements, Variable Speed Drive installation and demand response programming. With ceiling-mounted lighting replacements, coordinate layouts with existing HVAC devices.

4.4.3 Plumbing

Identify any impacts to existing Plumbing or Fire Protection systems. With ceiling-mounted lighting replacements, coordinate layouts with existing Fire Protection/Sprinkler Systems (if any). Coordinate minimum fixture clearance requirements with existing piping systems.

4.4.3 Electrical

Identify any impacts to existing electrical items to remain in place and/or other new electrical system components, which may be included in the scope of the project.



4.5 Design

4.5.1 Interior Lighting

Upgrade the lighting system in the required areas to provide the required illumination levels and controls in accordance with the current SCA specifications and design standards. At interior lighting replacements, provide Architectural Reflected Ceiling Plans to indicate dimensioned layout of fixtures and coordination with all trades.

4.5.2 Athletic Field Lighting

- 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. This is essential as the athletic turf manufacturer does not permit driving on their installations, and driving on sod damages the field. Fixtures shall be selected for superior photometry, minimizing the number of required fixtures and ease of fixture replacement.
- Lighting design shall minimize light trespass from the site, reduce sky glow, improve nighttime visibility through glare reduction and reduce development impact on nocturnal environment.
- Provide computer generated exterior lighting calculations.

5.0 EMERGENCY LIGHTING SYSTEMS AND FIRE SAFETY RETROFITS

Nodes: Nodes for Emergency Lighting Systems and Fire Safety Retrofits can generally be found under specific room types such as Classrooms, Administration Areas, Corridors, Gymnasiums, etc. One or more of the following nodes may be included:

- Emergency Lighting (Battery Pack, Connected to UPS inverter system, Connected to Emergency Generator System, Connected to Emergency Light/Exit Light Panel or Relay Test Switch)
- Exit Light (Battery Pack, Connected to Emergency Generator System, Connected to UPS Inverter System, Connected to Emergency Light/Exit Light Panel or Relay Test Switch)
- Emergency Light/Exit Light Panel
- Emergency DC Standby Battery Power

Design Requirements: Refer to SCA Design Requirements under Section 7.1, Power Distribution, Section 7.2, Lighting Systems, and other relevant sections for further design and technical requirements.

Deep Carbon/Energy Master Plan: Refer to DC/EMP if available for this building for carbon reduction and energy conservation requirements.

5.1 General

- Check if existing Emergency lighting is provided for all areas listed in Design Requirement 7.1.2.



- Check if Illumination levels required for emergency lighting correspond with SCA Design Requirements. Upgrade the Emergency Lighting under the scope of work of this project to be functional and in compliance with codes and SCA standards.
- Emergency Lighting that is in operating condition and that relies on obsolete technology, does not conform to the current SCA and DOE requirements and is not compliant with code requirements when it was installed should be replaced.
- Lighting replacements should be with the current most efficient lighting technologies and fixtures.

5.2 Emergency Lighting (Ref: DR 7.2.3)

- In major modernizations, or where an emergency generator is being provided, provide power for Emergency Lighting through the Emergency Systems automatic transfer switch.
- In buildings not provided with an emergency generator, emergency luminaire shall be connected to a power source recognized by the NYC Electrical Code Section 700-12 or to integral battery backup.

5.3 Exit Lighting (Ref: DR 7.2.4)

- Exit signs shall be in accordance with NYC Building Code and NYC Energy Conservation Code (NYCEEC).
- Exit signs placement shall be such that no point in an exit access corridor is more than 100 feet or the UL1 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.
- Battery units shall be used only in limited quantities for existing facilities without emergency generators. In general, emergency power for existing schools without generators was via a tap ahead of the main switch. Battery packs or inverters were used as a supplement to that system for egress from places of assembly
- For all newly installed exit signs, provide maximum 5W LED per face exit sign with battery backup.

5.4 Emergency Light/Exit Light Panel (Ref: DR 7.2.3 & 7.2.4)

- For buildings with generator, exit signs shall be connected to the emergency lighting panel through transfer switch.
- For buildings without generators, exit signs shall be provided with battery packs or inverters and connected to an Emergency Lighting Panel, which is connected to an Emergency Service Switch tapped ahead of the Main Service Switch.

5.5 Emergency Standby Battery Power (Ref: DR 7.1.2)

- Inverter systems are made up of a set of batteries and electronics that can convert the DC power from the batteries into an AC power source needed for the emergency lighting loads. While normal AC power or utility is present, the inverter is in the standby mode. During standby, the batteries are being charged as needed and AC power is supplied through the inverter from the utility to power the emergency lighting loads that are normally on.
- Emergency inverter systems will provide at least the code required 90 minutes of egress lighting.



5.6 Related Work

5.6.1 Architectural/Structural

Identify any requirements for mounting or support of fixtures and equipment. With ceiling mounted items, document the conditions of existing ceilings and supports or suspension systems. Also, include any impacts to existing ceiling and/or wall finishes.

5.6.2 HVAC

Identify any impacts to existing HVAC items. With ceiling-mounted lighting replacements, coordinate layouts with existing HVAC devices. Provide cooling as required in spaces with inverters.

5.6.3 Plumbing

Identify any impacts to existing Plumbing or Fire Protection systems. With ceiling-mounted lighting replacements, coordinate layouts with existing Fire Protection/Sprinkler Systems (if any). Coordinate minimum fixture clearance requirements with existing piping systems.

5.6.4 Electrical

Identify any impacts to existing electrical items to remain in place.

5.7 Design

- Provide new Emergency Lighting in accordance with the current SCA design standards for all areas listed in Design Requirement 7.1.2.
- Emergency luminaires shall be connected to an Emergency Generator or other power source recognized by the NYC Electrical Code Section 700-12.
- Locations of exit signs shall be designated on the Contract Drawings by the Architect of Record.

6.0 LOW VOLTAGE ELECTRICAL SYSTEMS

Nodes: *The Low Voltage Electrical Systems capital category may include one, two or all of the following nodes:*

- *Public Address System (Sound Intercommunication and Teacher Activated Security System)*
- *Clock System*
- *Fire Alarm System*
- *Auxiliary Signal/Bell System*
- *Intrusion Alarm (Covered under Section 9, School Safety Systems)*

Design Requirements: *Refer to SCA Design Requirements under Section 7.3, Low Voltage Systems, and other relevant sections for further design and technical requirements.*



6.1 General

When scoping any individual Capital Plan assigned low voltage system project, the designer is to also investigate the other low voltage systems and provide findings and recommendations for each, if any, under *SCA Additional Recommended Items*. The designer is to provide a complete assessment of the existing Public Address and/or existing Clock System. The designer is required to complete a thorough assessment of the existing Fire Alarm System and include a copy of the FDNY letter of approval. .

6.2 Public Address System (Sound Intercommunication and Teacher Activated Security System) (Ref: DR 7.3.8)

- The designer is required to complete a thorough assessment of the existing Public Address System and present justification for the recommendations. The Scope Report should include:
 - Condition and operation status
 - Meeting SCA standards and requirements
 - Manufacturer's name
 - Approximate date of installation
 - Location and condition of Central Control Rack and description of the equipment in the rack
 - Quantity, type and condition of classroom speakers
 - Quantity, type and condition of speakers in corridors, play yards, mechanical rooms and large storage spaces
 - Quantity, location and condition of combination speaker/clock assemblies
 - Quantity, location and condition of Privacy Switches
 - Quantity, location and condition of Administrative Control Stations (ACS)
 - Quantity, location and condition of Volume Control for Speakers
 - Quantity, location and condition of the Local Sound Systems (including quantity and location of speakers, microphones and amplifier cabinet)
 - Quantity, location and condition of Audio Amplification System for the Hearing Impaired
 - Condition of Roof Antennae
- In most cases, an integrated Public Address and Clock Systems should be designed. If only one of the two systems is required to be replaced, the new system should be integrated with the existing system.

6.3 Clock System (Ref: DR 7.3.9)

Perform a complete assessment of the existing Clock System in the Scope Report including:

- Condition and operation status
- Meeting SCA standards and requirements
- Manufacturer's name
- Approximate date of installation
- Location and condition of Master Program Clock
- Quantity, location and condition of single-faced and double-faced clocks
- Quantity, location and condition of combination speaker/clock assemblies
- Quantity, location and condition of time clocks



6.4 Fire Alarm System (Ref: DR 7.3.1, DR 7.3.13, & DR 7.3.15)

The designer is required to complete a thorough assessment of the existing Fire Alarm System and present justification for the recommendations. The Scope Report is to include the following information:

- Verification that there is existing Fire Alarm system approval by the Fire Department, either by an FDNY Letter of Approval or if the C of O specifically includes the Fire Alarm.
- Indicate the condition and operation status
- Indicate if the system meets the NYC Building Code and SCA standards and requirements
- Indicate if the current system has central station monitoring (Typically only for projects filed with the 2008 NYC Building code and after)
- Indicate if any violation or FDNY Letter of Defect
- Building occupancy and height (Indicate High Rise if $\geq 75'$?)
- Manufacturer's name and date of installation
- Location, type and condition of Main Fire Alarm Control Panel
- Location and condition of Sub-System Panels (e.g. Sprinkler Alarm Panel, Smoke Detector Panel)
Indicate if subsystem panels are integrated with the existing Fire Alarm system
- Indicate if operation is a master coded individually addressable system or individually coded addressable system
- Indicate if there is an emergency generator back-up
- Indicate if Fire Pump has an FDNY Letter of Approval
- Verification that actuation of the Kitchen Hood Fire Suppression system (Ansul system) causes the activation of the Fire Alarm System
 - Is the ansul system wet or dry? If dry, a new ansul system must be recommended to be replaced as an additional recommended item.
 - Verification that the appliance is interlocked with the fan and filed. If not, recommend replacement as an additional recommended item
 - Verification that the gas valve shutoff has been filed.
 - Verification that all appliances under the hood are connected to the shut down.
- Indicate if the kitchen will be converted to all electric due to Ansul system issue or removal of gas from facilities (typical for a boiler conversion upgrade)
- Indicate quantity, location, condition and height of pull stations
- Indicate quantity, location, and condition of magnetic door holders
- Indicate quantity, location, condition of bells, strobes and horns
- Indicate condition and location of printer or punch register
- Indicate quantity, location and condition of annunciators
- Indicate location and condition of Smoke and Heat Detection System (area smoke detectors, duct mounted smoke detectors, heat detectors and elevator smoke detectors)
- Indicate if elevator recall is working
- Indicate location, size and condition of sprinkler booster or fire pump
- Indicate condition of the Sprinkler System. Indicate if tamper switches, water pressure switches, or water flow detectors are existing or not, and if existing, the ability to be tested and to meet the 30-second time delay and activation times required by code and FDNY.
- Indicate location and condition of Deluge System
- Indicate if Holding Rooms and Fire Rescue Area have duct mounted smoke detector
- Indicate which PA spaces, if any, have a presignal system and if they are the size that requires such system



- Indicate the type of carbon monoxide detection system and if connected to the existing Fire Alarm System
- Mechanical Subsystems
 - Indicate number of Supply Units with over 2000 CFM
 - Indicate number of Exhaust Units with over 2000 CFM
 - Indicate number of Return Units with over 15000 CFM
 - Indicate condition of Fan Shutdown/Starters for units
 - FSD (Locate and verify operation)
 - Post Fire Smoke Purge (verify if existing and if so, is it integral with the existing or stand-alone, is it approved and sequence of operation)

6.5 Auxiliary Signal (Bell) System (Ref: DR 7.3.12)

The designer is required to complete a thorough assessment of the existing Auxiliary Signal System and present justification for the recommendations. The Scope Report should include:

- Condition and operation status
- Meeting SCA standards and requirements
- Manufacturer's name
- Approximate date of installation
- Location and condition of Control Panel/Bell Transformer
- Quantity, location and condition of Indicator Panels
- Existence and location of sump pump high level alarm signal
- Existence and location of sewage ejector pump high level alarm signal
- Existence and location of gas/carbon monoxide leak detection alarm signal
- Existence and location of oil leak detection alarm signal
- Existence and location of chiller refrigerant monitor
- Existence and location of RPZ leak detection alarm signal
- Quantity, location and condition of pushbuttons stations (entrance door pushbuttons, entrance door pushbuttons)
- Existence and location of low voltage vibrating bells

6.6 Related Work

6.6.1 Architectural/Structural

Identify any requirements for mounting or support of equipment. With ceiling mounted items, document the conditions of existing ceilings and supports or suspension systems. Also, include any impacts to existing ceiling and/or wall finishes.

6.6.2 HVAC

Identify any impacts to existing HVAC items. With ceiling-mounted equipment, coordinate layouts with existing HVAC devices.



6.6.3 Plumbing

Identify any impacts to existing Plumbing or Fire Protection systems. With ceiling-mounted equipment, coordinate layouts with existing Fire Protection/Sprinkler Systems (if any). Coordinate minimum fixture clearance requirements with existing piping systems.

6.6.4 Electrical

Identify any impacts to existing electrical items to remain in place.

6.7 Design

6.7.1 Sound, Intercom, and Teacher Activated Security System

- Replace the existing Sound System with a new Sound, Intercom and Teacher Activated Security System in accordance with the current SCA specifications and design standards.
- The new system will function as a public address, intercom and program sound system. The new Sound System will be integrated with the new Clock System by the common use of the master clock located in the new main sound system rack.
- The new main system rack will be installed in the Main Telecommunications Room where the LAN head-end equipment is located.
- New loudspeakers will be provided in each classroom, offices and other areas. In classrooms and other areas the new loudspeakers will be part of a clock/speaker enclosure assembly. New loudspeakers will also be provided in corridors.
- New privacy switches will be provided in each classroom and other rooms of instruction.
- Administrative control stations will be provided in designated rooms (Principal's Office, Assistant Principal's Office, General Office, Custodian's Office) in accordance with the SCA design standards.
- New local sound systems including amplification systems for the hearing impaired is to be provided in the Auditorium, Gymnasium and Cafeteria. The new local sound systems shall be fully integrated with the main sound system to allow emergency announcements in the places of public assembly by having the main sound system be able to override the local sound systems. New loudspeakers will also be provided in these places of public assembly. See Section 10.0 below for further information on Local Sound Details.
- Each capital project with an estimated baseline construction cost of \$950,000 or more involving the construction or reconstruction of one or more assembly areas shall be designed and constructed to include in at least one assembly area the installation of an induction loop assistive listening system (Preferably in the cafeteria for induction loop.)
- New microphone outlets are to be provided in the places of public assembly (Auditorium, Gymnasium and Cafeteria).
- While the new system is installed, the existing system will remain operational. Upon completion of the new Sound, Intercom and Teacher Activated Security System and its acceptance by the SCA, the existing system equipment and devices are to be removed, along with its related surface mounted raceways and cabling. The concealed raceways and cabling will be abandoned in place



6.7.2 Clock System

- Replace the existing Clock System with a new Clock System in accordance with the current SCA specifications and design standards.
- The new Clock System shall be self-corrective type. The new Clock System is to be integrated with the new Sound System by the common use of the master clock located in the new main sound system rack.
- The new secondary clocks will be low voltage devices.
- New secondary clocks shall be provided in all classrooms, offices, corridors, mechanical spaces and places of public assembly (Auditorium, Gymnasium and Cafeteria). In classrooms and other areas, the secondary clocks will be part of a clock/speaker enclosure assembly.
- Where combination analog clock/speakers are not required, single faced clocks will be provided. Double-faced clocks shall be provided in corridors.

6.7.3 Fire Detection and Alarm System

When the building is equipped with a Sprinkler Booster Pump/Fire Pump, the Sprinkler Booster Pump/Fire Pump shall be monitored by a Fire Department approved central supervisory station, as designated by DOE. When there is no Sprinkler Booster Pump/Fire Pump in the fire protection system, the sprinkler system via water pressure or water flow detectors shall send a signal to the fire alarm system within a 30-second time delay after the activation of a single sprinkler head. The fire alarm system shall be monitored by a central supervisory station.

- Replace the existing Fire and Sprinkler Alarm System with a new Fire Detection and Alarm system in accordance with the New York City Building Code, New York City Fire Department regulations, SCA specifications and design standards. If existing water pressure switches or water flow detectors on the sprinkler/standpipe system do not meet the required delay/activation times or mechanical delay adjustment, either add retarding chambers if possible or replace with water flow control devices. If there are no existing tamper switches, pressure switches and flow switches, provide new as the final system must be building code compliant.
- The new fire alarm system will be microprocessor based addressable, multiplex type. Each automatic and manual alarm initiation device will be individually annunciated at the fire alarm control panel. The evacuation alarm will be master coded using audible and visual annunciators. All filing and legal approvals will be obtained from the Fire Department before equipment installation.
- The fire detection and alarm system for low-rise school buildings (buildings less than 75 feet in height as defined by the 2014 NYC Building Code) shall be a Manual and Automatic Fire Alarm System connected to a central station. The manual and automatic fire alarm system shall operate as a "Temporal 3" Coded System.
- Pre-signal Event/Non-Event mode capabilities must be provided for A-3 occupancies with 1,000 or more occupants or have a stage with 75 or more occupants. Refer to DR 7.3.1 and 7.3.15.
 - Emergency power for the pre-signal system is required to be by an emergency generator.



- Verify if there is central station connection. If there is no central station connection, verify if there are copper lines in the building. If not, fiber-optic will be required with battery back-up.

The fire alarm system main components will be:

- Fire Alarm Control Panel located in the main entrance vestibule.
- Remote annunciator located in the General Office to provide visual indication of the floor, location and type of device in alarm.
- Smoke control panel integrated with the Fire Alarm Control Panel.
- Printer located in the Custodian's Office, capable of printing alarm reports individually for each addressable device.

The fire alarm peripheral devices are to include the following:

- Addressable manual pull stations
- Visual Annunciators (Strobes) to be 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 at no higher than 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.
- addressable area smoke detectors in electrical and mechanical rooms
- addressable heat detectors in the Boiler Room
- addressable duct mounted smoke detectors for the large air handling equipment
- addressable monitoring modules for sprinkler water flow or pressure switches and tamper switches
- addressable control modules for fan shutdown, smoke damper control (if required) and electromagnetic corridor door holders
- Elevator recall smoke detectors.

For projects that may require the addition of devices to the existing Fire Alarm system, such as an HVAC or boiler upgrade, where coordination with other trades:

- The Designer must first obtain a copy of the letter of Fire Department Approval of the existing Fire Alarm System. Work can be performed only on approved Fire Alarm Systems and will require FDNY inspection and approval.
- The Designer must contact the Fire Alarm Vendor (contact found on panel or as-built riser) to determine if the existing Fire Alarm system has the capacity to install the new devices. If the existing panel to be modified has errors or violations, this must be cleared prior to the addition of new devices.
- In the case where the FA system will require replacement, a discussion with the FA vendor shall be made to determine if the upgrade can be made by replacing only the head end (Fire Alarm Control Panel) and reconnecting the existing devices. If feasible, this head end replacement shall be filed with FDNY as a technological upgrade. Coordinate with CM for



phasing and add notes to ensure that this replacement can be done in such a manner as to minimize Fire Watch duration.

For fuel burning equipment, a stand-alone CO detection system connected to the Central Station can be provided to avoid alteration to the existing system (see below). If the CO detection system can be connected to the existing panel, it must be connected.

6.7.4 Carbon Monoxide Detection

Carbon monoxide detectors/sensors shall be installed and connected to the Fire Detection and Alarm System (see DR 7.3.1 and DR 7.3.15) 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. Provide carbon monoxide detectors in Auto Shops, Indoor Loading Dock, and rooms with gas clothes Dryers.

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.

Stand-alone carbon monoxide systems can be used where new CO producing equipment is installed that does not trigger a fire alarm upgrade or cannot be connected to an existing panel. The system must be connected to central station. For stand-alone Carbon Monoxide systems, verify if there is copper lines in the building for central station connection. If not, provide fiber-optic lines with battery back-up.

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.

Operation: Upon detection of carbon monoxide, the detectors/sensors shall send a supervisory signal to the fire alarm control panel and shall electrically shut down all boilers and gas-fired hot water heaters.

7.0 NEW/RETROFIT TELEPHONE/INTERCOM SYSTEM

Nodes: *The New/Retrofit Telephone/Intercom System capital category may include one or more of the following nodes:*

- *PBX /Intercom*
- *Standard Telephone*

Design Requirements: *Refer to SCA Design Requirements under Section 7.3, Low Voltage Systems, and other relevant sections for further design and technical requirements.*

7.1. General

The designer is required to complete a thorough assessment of the existing and present justification for the recommendations. Include the age and operational status of the existing systems.



7.2 PBX/Intercom Systems & Standard Telephone Systems (Ref: DR 7.3.4)

- Desk telephone outlet shall be provided in all administrative areas, offices and security desk.
- Wall telephone outlet in lock box shall be provided in every room of instructions and Places of Assembly.
- 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.
- Dedicated phone lines (not through the PBX) shall be provided for the Intrusion Alarm System, Fire Pump, and Elevator Intercom System

7.3 Related Work

7.3.1 Architectural/Structural

Identify any requirements for mounting or support of devices and equipment. With ceiling mounted items, document the conditions of existing ceilings and supports or suspension systems. Also, include any impacts to existing ceiling and/or wall finishes.

7.3.2 HVAC

Identify any impacts to existing HVAC items.

7.3.3 Plumbing

Identify any impacts to existing Plumbing or Fire Protection systems.

7.3.4 Electrical

Identify any impacts to other new or existing electrical items.

7.4 Design

The Contract Documents shall provide for the cabling infrastructure including wiring, raceway, boxes, outlets, patch panels, cabinets and racks.

8.0 TECHNOLOGY

Nodes: *The Technology capital category may include one or more of the following nodes:*

- *Local Distribution Frame (IDF)*
- *Main Equipment Rack/Main Distribution Frame (MDF)*

Design Requirements: *Refer to SCA Design Requirements under Section 7.3, Low Voltage Systems, and other relevant sections for further design and technical requirements.*



8.1. General

The designer is required to complete a thorough assessment of the existing systems and present justification for the recommendations. Include the age and operational status of the existing systems.

A Main Telecommunications Room shall be able 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

8.2. Local Distribution Frame (IDF; Ref: DR 7.3.5)

The intent is to provide high-speed data network-cabling infrastructure for administrative and instructional use. The Local Area Network and the Telephone System cabling shall be integrated as much as possible in common raceway.

8.3. Main Equipment Rack (MDF; Ref: DR 7.3.5)

- Data-Main Distribution Frame (MDF) shall be an open type.
- Patch panels shall be housed in the MDF room, IDF closets and at the High Density Room wall cabinet and provide cross connection between the MDF and IDFs. Patch Panels have to provide physical connectivity from the Main Telecommunications Room and Intermediate Telecommunication Closets (IDF) to the data outlets. The patch panels shall be sized to account for the port count plus 20% spare.
- The designer shall modify the standard locations provided on the Room Planning Standards with the revised locations as recommended by the Computer Systems Integrator.

8.4. Related Work

8.4.1. Architectural/Structural

Identify any requirements for mounting or support of devices and equipment. With ceiling mounted items, document the conditions of existing ceilings and supports or suspension systems. Also, include any impacts to existing ceiling and/or wall finishes.

8.4.2. HVAC

Identify any impacts to existing HVAC equipment capacity and size new equipment to meet existing and proposed new loads.



8.4.3. Plumbing

Identify any impacts to existing Plumbing or Fire Protection systems. Drain for condensate for HVAC.

8.4.4. Electrical

Identify any impacts to other new or existing electrical items. Refer to DR 7.3.5 and latest DIIT Standard for power and outlet requirements.

8.5 Design

The Contract Documents shall provide for a Local Area Network (LAN) cabling infrastructure including wiring, raceway, boxes, outlets, patch panels, cabinets and racks.

9.0 SAFETY SYSTEMS (School Safety and Security)

Nodes: *The Safety Systems capital category may include one or more of the following electrical nodes. The Safety Systems capital category may also include architectural nodes related to exterior doors, window guards, and other physical security barriers.*

- Exterior Security Lighting
- Security (Intrusion Alarm System)
- Intercom System (For Elevator & Wheelchair Lift or Holding Areas & Areas of Rescue Assistance)

Design Requirements: *Refer to SCA Design Requirements under Section 7.2, Lighting Systems, Section 7.3, Low Voltage Systems, and other relevant sections for further design and technical requirements.*

9.1 General

See below the scope of work requirements to be completed by designer for the associated nodes.

9.2 Exterior Security Lighting System (Ref: DR 7.2.5)

The designer is required to complete a thorough assessment of the existing Exterior Security Lighting System and present justification for the recommendations. The Scope Report should include:

- Condition and operation status
- Meeting SCA standards and requirements
- Approximate date of installation
- Adequacy of lighting levels
- Location and condition of Lighting Panel(s) where the fixtures are connected
- Quantity, type, location, condition and wattage of each lighting fixture
- Quantity, location and condition of fixture brackets
- Quantity, location and condition of astronomical time clock
- Quantity, location and condition of photo cells
- Accessibility for re-lamping of fixture



- Type, location and condition of roof conduit system
- Energy Efficiency - LED lighting

9.3 Security (Intrusion Alarm System) (Ref: DR 7.3.10)

The designer is required to complete a thorough assessment of the existing Intrusion Alarm System and present justification for the recommendations. The Scope Report should include:

- Condition and operation status
- Meeting SCA standards and requirements
- Manufacturer's name
- Approximate date of installation
- Location and condition of Main Control Panel and description of the equipment mounted with the Main Control Panel
- Location, quantity, type and condition of detectors
- Location, quantity, type and condition of magnetic contact switches and panic switches
- Location, quantity, type and condition of consoles
- Location, quantity, type and condition of exterior alarm devices and interior alarm devices
- Dedicated telephone line and monitoring by DOE

9.4 Intercom System (Holding Areas/Areas of Rescue Assistance) (Ref: DR 7.3.6)

The designer is required to complete a thorough assessment of the existing intercom system and present justification for the recommendations. The Scope Report should include:

- Condition and operation status
- Meeting SCA standards and requirements
- Manufacturer's name
- Approximate date of installation
- Location and condition of each station.

9.5 Related Work

9.5.1 Architectural/Structural

Identify any requirements for mounting or support of fixtures, devices and equipment.

9.5.2 HVAC

Identify any impacts to existing HVAC items.

9.5.3 Plumbing

Identify any impacts to existing Plumbing or Fire Protection systems.



9.5.4 Electrical

Identify any impacts to other new or existing electrical items.

9.6 Design

9.6.1 Exterior/Site/Security Lighting

- 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.
- In general, site lighting luminaires shall be wall-mounted. If the existing lighting is parapet mounted, it can remain only per school request. The light source shall be high efficiency LED luminaires and shall have a minimum of 50,000 hours of operation and shall be connected to photocell and time clock.
- 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.
- Provide computer generated exterior lighting calculations
- In general, lighting levels shall be per Design Requirements Section 7.2.5
 - Main Entrance
 - Walkways and Building Perimeter
 - Site (playgrounds, yards, and athletic fields)
- Indicate dimensioned locations and mounting details.

9.6.1.1 Luminaires

Luminaire selections shall be coordinated with the architect to complement and accent architectural features. Wall mounted luminaires shall be provided, mounted 15 feet AFG (maximum). Where necessary, Luminaires for perimeter lighting shall be yoke-mounted on the parapet for ease of lamp replacement. All fixtures shall be suitable for exterior use with a hinged and gasketed diffuser/door. Diffusers shall be mechanically affixed to the doorframe. Diffusers affixed solely by mastic (adhesive) are not acceptable. Lexan vandal shields or wire guards shall be provided as necessary and only on wall-mounted luminaires.

9.6.1.2 Poles

When parapet-mounted or wall-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 criticism of light pollution from neighbors. 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 hand-hole and grounding lug. Plug fusing shall be provided on each circuit phase leg



within the hand-hole. The usage and quantities of poles shall be limited and may be used only with the written approval of the SCA Design Manager.

9.6.1.3 Lighting Control

All site security lighting shall be master controlled either by a combination standard time clock and photocell (PEC) or where required by time clock, photocell and multipole lighting contactor.

9.6.1.4 Design Parameters

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. Raceway shall be run on the inside face of the parapet, and for SHPO eligible buildings, concealed in the building interior for non-parapet mounted lights.

9.6.2 Intrusion Alarm

Follow DR 7.3.10 for location of devices and clearly show on drawings.

9.6.3 Intercom System

- A dedicated two-way voice communication system shall be provided to connect Holding Areas or Areas of Rescue to the General Office and Custodian offices + an additional location adjacent to the fire alarm panel.
- Connect the automatic dialing, hands-free station in the elevator car and/or the wheelchair lift (hands-free, furnished under Specifications Division 14) to a dedicated telephone line. The elevator car station in elevator and hands-free station in the lift shall automatically dial a programmed number connecting the passenger to the DOE Alarms Central Station to alert the security personnel that there is a problem in the elevator or on the lift and identify visually which elevator is initiating the call.

10.0 LOCAL SOUND SYSTEMS & SCOREBOARDS

Nodes: *When the Capital category is not for replacement of the entire PA system, project may only involve specific local systems. Nodes for Local Sound Systems and Scoreboards are typically found under specific room types such as Auditoriums, Gymnasiums, Pools, Cafeterias, Cafeteria/Multipurpose Rooms, Athletic Fields, etc. One or more of the following nodes may be included:*

- *Local Sound System*
- *Scoreboard*

Design Requirements: *Refer to SCA Design Requirements under Section 7.3, Low Voltage Systems, and other relevant sections for further design and technical requirements.*



10.1 General

Upgrade the low voltage systems under the scope of work of this project that have not been upgraded that are not fully operational, rely upon obsolete technology, do not conform to current SCA and DOE requirements and/or are not compliant with applicable code requirements

10.2 Local Sound System

The designer is required to complete a thorough assessment of the existing Local Sound System and present justification for the recommendations. Refer to Section 6 above for further details on Local Sound System requirements. The Scope Report should include:

- Condition and operation status
- Meeting SCA standards and requirements
- Manufacturer's name
- Approximate date of installation
- Manufacturers name
- Location and condition of Sound System Control Rack and description of the equipment in the rack
- Quantity, type, location, and condition of speakers
- Quantity, type, location and condition of microphones
- Connection to the school wide Sound System
- Location and condition of Audio Amplification System for the Hearing Impaired

10.3 Scoreboard

The designer is required to complete a thorough assessment of the existing Scoreboard (if any) and associated wiring and equipment. Indicate if there is a wireless access point in the area and if there are spare power circuits.

10.4 Related Work

10.4.1 Architectural/Structural

Identify any requirements for mounting or support of devices and equipment. With ceiling mounted items, document the conditions of existing ceilings and supports or suspension systems. Also, include any impacts to existing ceiling and/or wall finishes.

10.4.2 HVAC

Identify any impacts to existing HVAC items.

10.4.3 Plumbing

Identify any impacts to existing Plumbing or Fire Protection systems.

10.4.4 Electrical

Identify any impacts to other new or existing electrical items.



10.4 Design

10.4.1 Auditorium, Gymnasium and Cafeteria Local Sound System

New local sound systems including amplification systems for the hearing impaired will be provided in the Auditorium, Gymnasium and Cafeteria. The new local sound systems will be fully integrated with the main sound system to allow emergency announcements in the places of public assembly by having the main sound system be able to override the local sound systems. Refer to Section 6.7.1 above for requirements as to when an Induction Loop system is required. New loudspeakers will also be provided in these places of public assembly. See more Local Sound Details above.

10.4.2 Scoreboard and Shot Clock/Game Timer

- Provide Scoreboard of 8'-0" x 6'-0" x 6" to 8" deep in Gymnasium/gymnasium.
- Provide wireless scoreboard controller with keyboard. All conduit, wiring, junction boxes and components shall be furnished and installed under Div. 16 - Electrical.
- Power requirements for scoreboard and keyboard as per manufactory requirements. Provide two (2) Shot clock/game timers. Shot clocks shall be controlled by the wireless controller system. Shot clock/Game Timers shall be mounted to the backboards.

11.0 AUDITORIUM UPGRADES

Notes: An Auditorium Upgrade may include one or more of the three following electrical nodes. The Auditorium Upgrade capital category may also include architectural nodes.

- *Lighting-Stage Theater/Dimming System*
- *House Lighting*
- *Local Sound System*

Design Requirements: Refer to SCA Design Requirements under Section 7.2, Lighting Systems, Section 7.3, Low Voltage Systems, and other relevant sections for further design and technical requirements.

11.1 General

Upgrade to dimming system shall be provided for auditorium stage/platform lighting under the scope of work if they have not been upgraded in many years, are only partially in operating condition, rely on obsolete technology, do not conform to the current SCA and DOE requirements and are not compliant with present code requirements.

11.2 Lighting-Stage Theater/Dimming System (Ref: DR 7.2.2)

The designer is required to complete a thorough assessment of the existing Auditorium Stage/Theater Lighting and Dimming Systems and present justification for the recommendations. The Scope Report should include:

- Condition and operation status



- Meeting SCA standards and requirements
- Manufacturers name
- Approximate date of installation
- Quantity, type, location and condition of the spotlights and border lights
- Type and condition of stage control panel and /or a remote portable control console.

11.3 House Lighting (Ref: DR 7.2.1)

The designer is required to complete a thorough assessment of the existing Auditorium House lighting and present justification for the recommendations. The Scope Report should include:

- Condition and operation status
- Meeting SCA standards and requirements
- Manufacturers name
- Approximate date of installation
- Quantity, type, location and condition of the spotlights and border lights
- Type and condition of controls.

11.4 Auditorium Local Sound System

The designer is required to complete a thorough assessment of the existing Auditorium Local Sound System and present justification for the recommendations. The Scope Report should include:

- Condition and operation status
- Meeting SCA standards and requirements
- Manufacturer's name
- Approximate date of installation
- Location and condition of Auditorium Sound System Control Rack and description of the equipment in the rack
- Quantity, type, location, and condition of speakers
- Quantity, type, location and condition of microphones
- Connection to the school wide Sound System
- Location and condition of Audio Amplification System for the Hearing Impaired.
- Meeting requirements (stage and/or occupancy of more than 1000) for a voice/alarm communication Event/Non-Event mode pre-signal system.

11.5 Related Work

11.5.1 Architectural/Structural

Identify any requirements for mounting or support of fixtures and equipment. With ceiling mounted items, document the conditions of existing ceilings and supports or suspension systems. Also, include any impacts to existing ceiling and/or wall finishes.

11.5.2 HVAC

Identify any impacts to existing HVAC items.



11.5.3 Plumbing

Identify any impacts to existing Plumbing or Fire Protection systems.

11.5.4 Electrical

Identify any impacts to other new or existing electrical items.

11.6 Design

11.6.1 Auditorium Lighting and Control

- Upgrade the auditorium lighting system to provide illumination levels and control performance in accordance with the current SCA specifications and design standards.
- Replace Auditorium lighting panel LP-AUD.
- Remove all existing stage lighting (border lights and spotlights) and related branch circuit wiring. Provide new stage lighting in accordance with the current SCA specifications and design standards. The stage lighting fixtures will be supplied by dimmer branch circuits originating from the new Auditorium dimming rack DR-AUD. Emergency lighting is not part of the dimming system and shall not be dimmed. Provide three rows of border lights above the stage, including the mounting hardware in accordance with the SCA specifications. Each border light will be wired for three colors (red, amber and blue) on three alternating circuits. Provide two sets of spotlights in front of the stage, including the mounting hardware in accordance with the SCA specifications. Coordinate exact location and mounting height of all fixtures with the Architect.

11.6.2 Auditorium Sound System

- Local Sound Systems shall be provided in Places of Assembly (Auditorium, Gymnasium, Gymnasium, Cafeteria/Lunchroom, Cafetorium, Multi-purpose room) and Dance Studio/Classrooms. The amplifiers shall be installed in a secure area not readily accessible to the public. The Auditorium and auditorium portion of the Gymnasium/Cafetorium sound system shall be provided with four microphone outlets mounted in front of the stage at 18" A.F.F. Refer to Section 6.7.1 above as to when an induction loop system is required.