



GUIDANCE DOCUMENT FOR TECHNICAL PROJECT REVIEW

Referenced Codes Rules and Regulations:

- UCS:** 2016 Uniform Code Supplement
IBC: International Building Code 2015
IFC: International Fire Code 2015
IMC: International Mechanical Code 2015
IPC: International Plumbing Code 2015
IGC: International Fuel Gas Code 2015
IEBC: International Existing Building Code 2015
ECCC: 2016 Supplement to the New York State Energy Conservation Construction Code
MPS: Manual of Planning Standards (1998)
155: 8 NYCRR 155 Regulations of the Commissioner of Education

1. SED PROJECT SUBMISSIONS:

a. COMPLETE, COORDINATED, CODE COMPLIANT

COMPLETE: The project design documents, plans and specifications, must include all design information and details required to determine code compliance. Missing information is not acceptable:

- Rated walls, rescue windows, travel distance to exits;
- Fire dampers, smoke dampers;
- Electric circuits, emergency lighting, exit signs, fire alarm devices;
- Sizes and ratings of materials and equipment, such as wire, conduit, fuses, circuit breakers, pipes, ducts, strobe candela, etc. must be indicated; and
- Specification sections must be complete/

If you believe you have a set of plans that are not complete, and not reviewable, stop review and contact SED.

COORDINATED: The project design documents, plans and specifications, must be fully coordinated among all trades. Fire rated construction shown on architectural drawings must be coordinated with mechanical drawings such that required fire dampers are shown. Smoke barrier construction shown on architectural drawings must be coordinated with mechanical and electrical drawings such that required smoke dampers are shown. Secondary (emergency) roof drains must be coordinated between the architectural, civil, and plumbing drawings. Site features, shown on civil drawings which require power, such as pumps and signs, must be coordinated with electrical drawings such that required electrical circuits are shown. Electrical requirements for equipment provided by the mechanical contractor must be coordinated with the electrical drawings.

CODE COMPLIANT: The project design documents, plans and specifications, must conform to all applicable provisions of the New York State Uniform Fire Prevention and Building Code (UFP&BC), the New York State Energy Conservation Construction Code, and the building standards of the New York State Education Department. Design documents must clearly indicate code compliant Building Areas, Fire Areas, Smoke Zones, fire rated construction, means of egress, areas of refuge, fire hydrants, fire apparatus access roads, handicap accessibility, fire alarms, fire sprinklers, standpipes, fire pumps, emergency lighting, exit signs, generators, kitchens, pools, elevators, etc. Site/civil, structural, architectural, mechanical, electrical (power, lighting, systems), plumbing, fire protection, etc. design documents must comply with all applicable requirements.

GENERAL CHECKLIST

- Watch new construction blocking an existing exit;
- Various standards are as referenced in the current UFP&BC. If a more current edition of a standard is used, it is OK as long as it is more restrictive;
- Code Compliance Checklist – check structural if additional equipment loads on floors/roofs. Check building occupancy type, if not clear it is an “E” occupancy;
- Code Review Drawings;
 1. Fire Walls, Fire Barriers, and Fire Partitions;
 2. Location of Smoke Barriers / Smoke Partitions;
 3. Sprinkler requirements (Over 12,000 SF Fire Area);
 4. Basement sprinklers; and
 5. Egress routes and changes due to construction (Impact means of egress, emergency and exit lights).
- Check Seismic Design Category. Seismic Design Category C requires seismic restraints – life safety systems – gas, oil, sprinkler piping, electrical panels and HVAC equipment.
 1. Additional requirements for seismic design categories with greater risk (Examples “D” and “E”)
- Structural Drawings – Check additional structural support members for new equipment on the roof.
- Architectural Drawings Check Demolition and New work drawings.
 1. Where windows and natural ventilation are removed, check for mechanical ventilation - Section IMC 403
 2. Make sure work is picked up on MEP drawings. (ex: ceiling removal – lights, removal of mechanical equipment – need to replace).

SPECIFICATION CHECKLIST

Cover

- Certification Statement must be signed sealed: Certification statement: “The design of this project conforms to all applicable provisions of the New York State Uniform Fire Prevention and Building Code, the New York State Energy Conservation Construction Code, and the building standards of the New York State Education Department.”
- If project includes asbestos abatement: Cover stamped and signed by Certified Asbestos

Designer. Certification on cover of drawings or Code Compliance Sheet or cover of specifications that they conform to all codes and Industrial Rule 56.

Front End Specification (items need to be paper-clipped in spec book)

- Prevailing Wage Rates or Dept. of Labor Prevailing Rate Case number specific to project must be provided;
- Equivalents and Substitutions – paragraph included to state that equivalents must be determined before contract signed (cannot require equivalents prior to bid receipt);
- Non-Collusion Statement provided; and
- SED Construction Safety Standards (Commissioner's Regulations 155.5).
 - A/E must provide a plan to maintain the means of egress for occupants during construction; and
 - A/E must provide a plan to maintain ventilation for occupants during construction.

Asbestos

- Current NYS DOL License in project folder or specification book with picture bearing designation "I" for Asbestos Project Designer with expiration date. Designer must also be a Professional Engineer or Registered Architect in NYS.
- Drawings stamped by asbestos designer.
- Watch removal of ceilings – coordinate with light fixtures.
- Watch removal of pipe/equipment insulation – re-insulation is required, compliant with Energy Code.
- Required Mandatory:
 - Code Rule 56 compliance
 - EPA Title 40 CFR, Part 763, AHERA regulations for removal of asbestos in schools (specific subpart is E)
 - NYS DOL Code Rule 56, Asbestos Licensing and Handling
 - OSHA Title 29 CFR, Part 1910 (Specific Sections, 1001 asbestos, 134 Respiratory Protect, 1926.2, and 1926.1200)
 - EPA Title 40 CFR, Part 61
 - NYS DEC, Title 6, Part 364 (for collector registration, transportation, and landfill disposal)
 - NYS DOH, Title 10, Part 73 (Asbestos Safety Program, Environmental Lab Approval Program)
- Air Monitoring Clearance:
 - Interior work - comply with AHERA (TEM or PCM) and DOL (PCM).
 - Exterior work comply DOL (PCM).

Elevator

- Standards: ASME A17.1, ICC/ANSI A117.1 (407), NEC, and ADA;
- Hoist way pit shall be provided A2.2.1;
- Provide provision to prevent groundwater in pit (when pit is below grade) A2.2.2.3, A2.1.2.2;
- Drain and sump pump (comply with Plumbing Code – prevent water/gas/odors) A2.2.2.4;
- Drain and sump pump required when Firefighters Emergency Operation Provided. A2.2.2.5;
- Sumps and pumps must be covered. A2.2.2.6 Sump pumps cannot tie directly into sanitary, discharge must be visible over floor drain, mop sink etc. ANSI and comply w/ municipal requirements. Can use oil sensor or oil separator if required by municipal. Indirect

- connection – IBC3002.9; and
- Hoist way, where required by building code, shall be provided means to vent smoke/hot gases. A2.1.4

Energy Code

- All information required by Energy Code must be provided.
- Path for compliance must be identified on Code Compliance Sheet. If not they must provide. Prescriptive/performance (2015) IECC as supplemented. Prescriptive/performance (2013) ASHRAE 90.1 as supplemented
- All equipment, controls, and commissioning in accordance with path selected.

Firestopping

- Fire stopping – each trade - ASTM E-814 or UL 1479 Standards.

Food Service Equipment

- Watch for proprietary specifications and/or requirement for equivalents prior to bidding
- Standards: NSF, AGA, UL, Department of Health NYS
- Grease Hood, ductwork, and fire suppression system per Building Code, Fire Code, and Mechanical Code
- Dishwashers – Type II hood or UL Listed and Labeled assembly – IMC507.3
- Fire Extinguisher – Type K where required – Commercial Kitchen.

Hardware

- Check Finish Hardware Specification - All hardware manufacturers must be able to bid, no proprietary specs - specification cannot say " no substitutions" or have that intent.

Lab Casework

- Check valves on gas cocks; add check valves when in vicinity of water and compressed air outlets. S711.h

Lead

- Lead based paint removal – Compliance with EPA, OSHA, and HUD

Maintenance Items

- Some districts try to purchase maintenance equipment buried in various specification sections within a capital project. Occasionally we also see long term maintenance contracts or multi-year service agreements as well. This is inappropriate in a capital project and must be identified as ineligible for aid.
- Specifically, turf field projects may include a tractor, sweeper attachment and grooming attachment for the proper maintenance of the field. These items must be removed from the specifications.
- Equipment such as man lifts/scissor lifts used to reach high bay HVAC or light fixtures etc. have been included in specs. These are pieces of equipment used for maintenance and not

part of the project. Over the years there have been the trucks, plows, band uniforms, musical instruments etc. These items must be removed from the specifications.

Standardization

- If specification limits/restricts products - need District Resolution - General Municipal Law 103 - See Newsletter #85

Synthetic Turf

- Statement in the specifications - Certification from the manufacturer that lead or lead chromate is not used in the manufacture of the Turf.
- Building aid paid on original installation - replacement field subject to pro-rated reduction in aid for service below 15 yrs.

CIVIL REVIEW CHECKLIST

Site Features Required to be Shown:

- Property line locations fully dimensioned
- Locations of all existing structures, existing roads and parking, new roads, new parking, existing topography, new topography
- Drawn to scale
- All new storm drainage shown
- Electric services are required to be buried
- New driveway entries from public streets must be noted in the Highway Letter and fully dimensioned on Site Plans

Bleachers

- IBC §1025.1.1 - Bleachers. Bleachers, grandstands, and folding and telescopic seating shall comply with ICC 300.
- IBC §1108.2.2 - Wheelchair spaces. In theaters, bleachers, grandstands, stadiums, arenas and other fixed seating assembly areas, accessible wheelchair spaces complying with ICC/ANSI A117.1 shall be provided in accordance with §1108.2.2.1 through §1108.2.2.3.
- IFC §304.1.3 - Space underneath seats. Spaces underneath grandstand and bleacher seats shall be kept free from combustible and flammable materials. Except where enclosed in not less than 1-hour fire-resistance-rated construction in accordance with the Building Code of New York State, spaces underneath grandstand and bleacher seats shall not be occupied or utilized for purposes other than means of egress.
- If new bleachers constructed or added to existing - fixture quantity to comply with code IBC §2902.1 & Table 2902.1. Need to provide at least 30% required fixtures as permanent within 500' of new bleachers per IPC §403.3.3 - either in school building or in another permanent facility - additional quantity to satisfy IPC §403 may be supplemented with portable toilet facilities. If portable facilities are provided to satisfy Code, need a designated area including handicap facilities.
- If replacement "in kind" with like quantities - do not need new toilet facilities

Fire Apparatus Access Roads

- IFC §F503 - provide for every building or portion of building hereafter constructed or moved into
- Extend to within 150 feet of all portions of facility - see exceptions 2016 Code Supplement
- If bldg fully sprinklered not required
- If approved alternative fire protection is provided – not required

Handicap Accessibility

- ADA 2010
- IBC §1104 Accessible Route: Provide accessible route from HC parking or curb ramp to building entry, to all newly constructed or renovated sports fields, recreational features or playgrounds
- IBC §1106 Parking and passenger loading facilities: provide parking spaces and drop off aisles per code (8ft x 18ft min) Check all cross walks for curb ramps and wheelchair access through parking lots, across roads and onto all sidewalks.
- Van parking spaces that are angled shall have access aisle on passenger side per ICC A117.1-2009 502.4.1

Press Box

- IBC §1104.3.2 - Press boxes. Press boxes in assembly areas shall be on an accessible route - EXCEPT - An accessible route shall not be required to press boxes in bleachers that have points of entry at only one level, provided that the aggregate area of all press boxes is 500 square feet (46 m2) maximum.
- See FacPlan web site for requirements - The primary exit from an enclosed press box shall be a conventional stair or access to a noncombustible bleacher or grandstand in which case the egress path from the press box must connect with a bleacher aisle. A safe remote (second) means of egress shall be provided from each floor level. The second means of egress may be through a window or panel with a minimum clear opening area of six square feet and a minimum dimension of 24 inches which opens onto the bleachers. Vertical ladders to grade or access directly to bleachers or grandstands may be used as the second means of egress. Exit stairs need not be enclosed, however, consideration should be given to local concerns for the prevention of vandalism.
- The primary exit from a useable (Press Box) roof with an area of 250 square feet or less and a maximum occupancy of 5 persons may be a ship's ladder. For roofs greater than 250 square feet or with more than 5 occupants a conventional stair is required. Maximum occupancy signs shall be posted at the roof level and inside the press box."

ARCHITECTURAL REVIEW CHECKLIST

Level I Alterations

- Required Information:
 - Overall Floor Plan at acceptable scale with work areas indicated.

Level II Alterations

- Required Information:
 - Overall Floor Plan at acceptable scale with work areas indicated.
 - Rated walls indicated: fire walls, fire barriers.
 - Corridor travel distances.
 - Occupant Loads for new/altere spaces
 - Door swings, door sizes, windows (including Rescue Windows).

Additions / New Buildings

- Required Information:
 - All information required for Level I & II Alterations above.
 - Addition locations designated.
 - Key Plan with Fire Areas indicated
 - Construction Classification.
 - Occupancy Classifications.
 - Key Plan with Building Areas indicated. Include calculations for Allowable Building Area (Tabular and Increase for frontage).
 - Indication if Sprinkler System is provided.
 - Structural information required by IBC §1603
 - Site Plan with roads, parking, walks, fire apparatus access roads and hydrants indicated.
 - Structural Drawings should be included in full set of documents.
 - Energy Code compliance path and chart to show compliance if Prescriptive Method used. Provide ComCheck or other program documentation if Prescriptive Method not used
- IEBC §1102 - Area Limitations: No addition shall increase the area of an existing building beyond that permitted under the provisions of Chapter 5 of the IBC for new buildings unless fire separation as required by the IBC is provided.
- IEBC §1102.2, Exception: Infilling of floor openings and nonoccupiable appendages such as elevator and exit stairway shafts shall be permitted beyond that permitted by the IBC.
- Building Areas:
 - IBC §506.1 General §506.2 Allowable (Building) Area determination
 - §506.2.1 - Single occupancy – one-story building
 - §506.2.2 - Mixed occupancy-one story building
 - §506.2.3 - Single Occupancy - Multi-story Building
 - §506.2.4 - Mixed Occupancy - Multi-story Buildings: each section has different provisions, account for sprinklers and use New Table 506.2 - need to determine allowable building area of existing buildings if there is an addition and also for new buildings.
 - IBC §506.3 Building Frontage Increase (See code for new formula for W (width of frontage). Increase for Frontage formula same as in 2010 code ($I_f = [F/P - 0.25]W/30$))

Doors

- Check Manual of Planning Standards S106-3 for Door requirements, fire ratings, hardware, etc. See S203 for fire rated construction requirements which will require opening protectives (rated doors and windows)
- IBC Table §716.5 Fire rated doors and glazing in doors shown in table:
 - 1 HR corridor walls need 1/3 HR (20 min) rating
 - Interior exit stairways with 1 hr enclosure need 1 hr rated doors

- Fire Walls, fire barriers 1-1/2 and 2 hr enclosures need 90 min doors
- 1 Hr fire barriers need 45 min doors
- See 716.2 for fire resistive glazing requirements
- See Table 716.6 for Fire Window Assembly Fire protection ratings
- If new door is being installed (where none existed) (Level II Alteration, New Addition or New Building):
 - Determine required width for occupant load of space to be served
 - See IBC §1005.3.2 capacity of means of egress components other than stairways
 - Check Code Compliance drawing for occupant loads
 - Check width of door shown on door schedule
 - IBC §1006 Number of exits: Two exit doors from space are required if occupant load of space > 49
- Check door schedule including hardware sets for means of egress requirements, size, locksets & panic devices, door swing, etc.
- Check if door is ADA compliant (floor plan for approach clearances and door schedule for width). Level landing on each side of door at same elevation (required at all doors) Exterior door landing can pitch 1/4" per foot for drainage.
- Check door schedule against door locations
 - check finish hardware spec section and review all hardware sets/groups
 - closers required at smoke doors and fire rated doors
 - panic bars at assembly spaces (rooms with more than 49 occupants)
 - lockset functions at all other doors to allow free egress without special knowledge
- Panic Hardware
 - IBC and IFC §1010.1.10 panic and fire exit hardware
 - Doors serving a Group H occupancy and doors serving rooms or spaces with an occupant load of 50 or more in a Group A or E occupancy shall not be provided with a latch or lock other than panic hardware or fire exit hardware
 - Check hardware set used for exit doors on door schedule
- Fire ratings & glazing requirements per IBC §716 OPENING PROTECTIVES
 - determine wall type (fire wall, fire barrier, fire partition, type of assembly (ex: exit enclosure, corridor wall, exit passageway)
 - determine fire rating then find minimum door or window fire rating (Table 716.5)
- IBC §716.5.5 Doors in interior exit stairways and passageways:
 - Fire Door assemblies in interior exit stairways and ramps and exit passageways shall have a maximum transmitted temperature rise of not more than 450F above ambient at the end of 30 mins of standard fire test exposure. Exception: building sprinklered throughout.
 - §716.5.5.1 Fire protection rated glazing in excess of 100 square inches is not permitted. Fire-resistance rated glazing in excess of 100 sq. inches is permitted fire doors (shall meet temp rise requirements above and NFPA 252 or UL 10C.)
- FRP doors made with plastic foam insulation - must comply with IBC §2603.4.1.7 or have special approval per IBC §2603.9. Interior face sheet Class A.
- GLASS: IBC §2406.4 Hazardous locations. IBC §2406.2 comply with CPSC 16 CFR 1201 - check door schedule, interior windows, door types and glazing specification for compliance
- HC accessibility - Check HC door approach clearances - comply w/ ICC A117.1 2009 if door clearances can't be attained use electric door operator

Exit Discharge

- IBC §1028.1 Exit Discharge: exit discharge cannot re-enter the building - See section for

restrictions and exceptions

Fire Area

- IBC §903.2.9.1 - BUS GARAGES - Repair Garage S-1 Occupancy - max 12,000 SF without sprinkler.
- IFC §903.2.2 Educational (E) Occupancy: maximum 12,000 SF (2016 Code) - if max fire area is exceeded then sprinkler required. Need to divide building into smaller fire areas using fire barriers to preclude sprinkler requirement.

Fire Protection / Water Supply

- IFC §507, §507.1 Type of Water Supply: A water supply shall consist of reservoirs, pressure tanks, elevated tanks, water mains or other fixed systems capable of providing the required fire flow.
- IFC §507.5.1 Where Required: Where a portion of the facility constructed or moved into ... is more than 400 feet from a hydrant on a fire apparatus access road...on site fire hydrants shall be provided and mains shall be provided where required by the fire code official.

Fire Wall

- In accordance with IEBC §1102 and IBC §506 - determine if new addition needs to be separated from existing Building Area.
- Check for new and/or existing fire walls to separate new and/or existing Building Areas.
- New Addition area must not increase Existing Building Area beyond that permitted by IBC.
- Check Fire Wall structure and vertical and horizontal terminations IBC §706.2, §706.5, §706.6

Roofs

- Ballasted – Low Slope
 - IBC §1504.4 Ballasted low-slope roof systems. Ballasted low-slope (roof slope < 2:12) single-ply roof system coverings installed in accordance with §1507.12 and §1507.13 shall be designed in accordance with §1504.8 & ANSI/SPRI RP-4.
- Coated Foam:
 - Must show that coated foam roof has exceeded its original warranty or no aid
 - Will allow 10 yr warranty on coated foam roofs for re-coating / New coated foam - need 15 yr warranty
- Drainage
 - Positive Drainage: IEBC §706.1 Exception: Reroofing shall not be required to meet the minimum design slope requirement of one-quarter unit vertical in 12 units horizontal (2-percent slope) in §1507 for roofs that provide positive roof drainage.
 - Secondary (Emergency) Roof Drains: IPC §1108 - secondary drainage (emergency overflow) roof drains or scuppers shall be provided where the roof perimeter construction extends above the roof in such a manner that water will be entrapped if the primary drains allow buildup for any reason.
- Edge Securement:
 - IBC §1504.5 Edge securement for low-slope roofs. Low-slope membrane roof systems metal edge securement, except gutters shall be designed & installed in accordance with Test Methods Re-1, RE-2 & RE-3 of ANSI/SPRI ES-1, except the basic wind speed shall be determined from Figure 1609.3(1), 1609.3(2), 1609.3(3).
- Insulation

- (2016) Energy Code Supplement §C106.2 - Types of roofing work where the 2016 International Energy Code does NOT apply: Construction where the existing roof, wall or floor cavity is not exposed; reroofing for roofs where neither the sheathing nor the insulation is exposed; However roofs without insulation in the cavity and where the sheathing or insulation is exposed during reroofing shall be insulated either above or below the sheathing
- (2016) International Energy Code Chapter 4 Prescriptive Compliance Path: R value method, minimum thermal resistance (R-value) of the roof insulating material installed either between the roof framing or continuously on the roof assembly shall be as specified in the 2015 IEC Table 402.1.3 Zones 4-6 Insulation entirely above the deck R-30 - Metal Buildings R19 & R11 LS (Liner System) Zone 4 & 5 - Attic = R-38, Zone 6 = R49
- Pitch
 - NEW: IBC §1507.10.1 for built-up & §1507.12.1, 1507.13.1 for single-ply - 1/4" per ft min., §1507.14.1 Spray Polyurethane Foam roofs - 1/4" per ft, §1507.15.1 Liquid applied roofs - 1/4" per ft
 - EXISTING: 2016 IEBC §706.1 Provide positive drainage. (No minimum pitch required) look for tapered insulation @ 1/8" per foot or existing sloped structure
- PV Panel Installation
 - Sign off on the SED structural responsibility checklist and certification - A/E takes responsibility for the analysis and design for the solar PV roof loads. Certification statement from the design professional demonstrating that they have analyzed the roof where the PV system will be located for compliance with requirements of the Building Code, and that the roof structure will adequately support the additional load.
 - Certify that the PV system was analyzed to withstand anticipated wind loads.
 - Provide a statement that asbestos containing materials will not be disturbed as a result of work.
 - Verify condition of the existing roof - whether is covered under warranty, and its anticipated useful life remaining (will it last 10 - 20 years?).
 - The school district and the contractor shall comply with OSHA & PESH requirements for fall protection for employees working in the vicinity of the PV system.
 - Walkway pads recommended (if membrane roof) be provided for access to and around the array.
- Radiant Barrier
 - §1509.1 - roof covering must comply with FM 4550 or UL1256
- Recovering
 - IEBC §706.1 General: Materials and methods of application used for recovering or replacing an existing roof covering shall comply with the requirements of Chapter 15.
 - IEBC §706.3 New roof covering shall not be installed without first removing all existing roof coverings down to the roof deck where any of the following conditions occur: where roof is water soaked (deteriorated and not adequate as a base); where the existing roof is wood shake, slate clay, cement asbestos cement tile; where the existing roof as two or more applications of any type of roof covering; EXCEPTIONS (See Existing Building Code).
- Re-Roofing
 - IEBC §707 Structural: verify structure reviewed for added loads
 - IEBC §707.3.1 Bracing of Parapets
- Skylights
 - IECC §402.4.1 Skylights. Skylights located in the building envelope shall be limited to 3 percent of the gross roof assembly area and shall have a maximum thermal transmittance (U-factor) of the skylight assembly as specified in Table E402.4 (.50 U

Factor Climate Zones 4 - 6).

- Thermal Barrier
 - §2604.4.1.5 - a thermal barrier is not required for foam plastic insulation (between insulation and metal roof deck) that is a part of a Class A, B or C roof-covering assembly that is installed in accordance with the Code and the manufacturer's instructions and is either constructed as described in Item 1 or tested as described in Item 2: 1 (see Code not less than .47 inch thick wood), 2 (see Code - tested per NFPA 276 or UL 1256)
- Wind Uplift Resistance
 - §1510 - rooftop structures
 - Chapter 16 - §1609.5.1 uplift resistance - must meet pressures designed in accordance with ASCE 7
 - Pressures should be determined by A/E and put on documents for contractor to meet.

Sprinklers

- IBC §903.2.3 – Sprinkler required throughout building in E Fire Area greater than 12,000 SF. (previously §903.2.3 - 2010 Building Code permitted a maximum 20,000 sf fire area.)
- IBC §903.2.3 - Sprinklers also required throughout every portion of educational buildings below the lowest level of exit discharge serving that portion of the building. (Exception: where every classroom in building as exit door to exterior at ground level.)
- IFC §903.2.11.1 Stories and basements without openings. An automatic sprinkler system shall be installed throughout every story or basement of all buildings where the floor area exceeds 1,500 square feet (139.4 m²) and where there is not provided at least one of the following types of exterior wall openings:

Windows

- IBC §2603.4 - need 1/2 inch gypsum board (thermal barrier) on interior - EXCEPT 1-story buildings w sprinkler per §BC2603.4 & §2603.5.21.4 - OR - EXCEPT if has special approval per §2603.9
- §11, 2016 Energy Code Supplement - Amendments to Table C402.4, U Factor Fixed Fenestration: .38 for Climate zone 4, 5 - .36 for Zone 6, Operable Fenestration: .45 for Zone 4, 5 - .43 for Zone 6. SHGC .40
- MPS - S104-7 - window hardware (operating mechanism) shall be a maximum of 54" above finished floor. Minimum clear opening area = 6 SF, Min. clear opening dimension = 24". Provide required Rescue Window Label(s) see MPS for more info.

MECHANICAL REVIEW CHECKLIST

Mechanical Code

- General regulations Chapter 3
- Refrigeration Chapter 11
- Fuel oil piping and storage for heating fuel: Chapter 13, including referenced sections of Fire Code.
- Hydronic piping Chapter 12

General

- Look for control valves on equipment piping connections for HVAC equipment details and economizers for controls.
- Gas fired heating equipment not allowed in student occupied spaces.
- State Industrial Code Rule 4 in specifications.
- Check for missing sections MEP
- Ductwork – Ref. Mech. Code - not NFPA 90A and B
- Mercury Thermometers not allowed.
- All devices, including control devices must meet Energy Code.
 - Sequence of Operations.
 1. Boiler controls per Energy Code change HW pump flow as outside air temperature varies or change boiler water temperature.
 2. AHU Provision for ventilation for all times when spaces are occupied.
 3. Provide minimum ventilation for unoccupied spaces.
 4. Check schedules for missing items.
 5. AHU ventilation sufficient for ventilation requirements of spaces served? For replacement. Are AHU units less than original design?
 6. Occupied times – Fan operates continuously. Dampers and fan speed(s) to modulate to position(s) to provide at least the minimum, required, volumetric of flow rate of outside air, during all occupied times.
 7. When an education space requires cooling and the conditions in the outside air are acceptable to provide natural cooling; outside air shall be provided at volumetric flow rates up to the maximum limit of the equipment for supply air.
 - When mechanical cooling is provided, provide “economizer controls” where required by the Energy Code.

Boiler Room

- (2) Low water cut-offs required. Lowest boiler shut down with manual reset. See specifications. - S602-3, IMC1004.1 Ref. ASME CSD-1;
- Provide combustion air per Mechanical Code, or Fuel Gas Code, depending upon fuel;
- Provide clearance around boilers and room for tube pulls - IMC 1004.3;
- Type of flue/vent/chimney is correct for fuel being burned and flue cleanouts provided;
- Add, remove, or replace equipment into existing vent/flue/chimney. Comply with applicable provisions for existing in accordance with Mechanical Code or Fuel Gas Code;
- Electronic Flame safeguards. See Specifications – S602-3, S155.2 (d)(1);
- Comply NYS Industrial Code Rule 4;
- Emergency shutdown at each exit. (Note: "glass break" stations are not recommended);
- Controls safety devices required for boilers - IMC1004.1- Ref. ASME CSD-1;
- Gas Trains Listed by Listing Agency S602-3;
- Independent relief vents for gas trains - IGC410.3;
- Boilers to be ASME Construction - IMC1003, IMC1004, S602-1;
- 120 volt Controls – S155.3 (d)(2);
- RPZ for boiler make-up water. Maximum 5'-0" above finished floor - Minimum 30" – IPC608.16.2;
- Boilers meet Energy Code;
- Discharge from boilers to sanitary maximum 140 degrees – IPC702.5;
- Tie in to existing chimneys/vents to comply with IGC, or IMC, depending upon fuel source(s); and
- Combustion/ventilation air to comply with IGC, or IMC, depending upon fuel source.

Duct Systems

- Opening protectives: Identify from Architectural plans: Separate buildings, separate fire areas, separate smoke zones for smoke zone exiting, locations of fire partitions, locations of fire barriers, locations of smoke barriers, locations of smoke partitions.
- General: Comply with Section 717 of Building Code.
 - Caution: Any use of an exception must comply with all required provisions for allowance of exception.
- Separate buildings (structures separated by fire walls) must be protected from the spread of fire and smoke from one to another.
- Separate fire areas (whether vertical or horizontal separations (structures separated by fire barriers) must be protected from the spread of fire and smoke from one to another.
- Spaces separated by fire barriers, within the same fire area (examples, storage rooms greater than 100 square feet, labs, shops, etc.) must be separated from all other spaces from the spread of fire. (Note: There are no exceptions for opening protectives in fire barriers.)
- Spaces separated by fire partitions must be protected from the spread of fire. There are some cases where a reduced protection is allowed. However, all provisions of exception must be met, before reduced protection is acceptable.
- Note: Fire barriers are not fire partitions. Where a room such as a science lab is separated from a corridor, the separation is a fire barrier, not a fire partition. Still a common error.
- Shafts: Comply with Building Code Section 717
- Spaces separated by smoke barriers and smoke partitions must be protected from the passage of smoke from one to another.
- Corridors (Provisions for smoke protected corridors apply regardless of whether there is sprinkler coverage or not) See Building Code Section 717 and Newsletters:
 - All corridors with smoke or draft control doors must be protected from the passage of smoke from adjacent spaces.
 - All corridors providing separate smoke zone exiting must be protected from the passage of smoke from adjacent spaces including corridors in separate smoke zone exits.
 - All corridors on separate floors must be protected from the passage of smoke from adjacent spaces including corridors in separate smoke zone exits, and separate floors
 - There are many existing buildings with no fire or smoke separation between the corridors and adjacent spaces. These may continue under the present Code, as long as they met the Code/standard at the time. If smoke zone exiting is created, or doors are provided to create smoke/draft control, consistent revisions must be provided to meet intent of planned revisions.
- Exterior opening protectives: Review architectural drawings for locations where openings to the exterior must be protected from the passage of fire. (Typically shows up in areas where penetrations through horizontal fire assemblies rather than vertical assemblies are provided to protect one floor level from another.)
- Smoke damper actuation in accordance with Building Code Section 717
- Recommend: Seal return air or outside air ductwork running through areas where they may pick up contaminants such as crawl spaces, boiler rooms, etc.
- Provide smoke duct detectors on return ductwork to AHU's over 2,000 CFM, serving multiple spaces to shut down unit and alarm fire alarm system.
 - Exception: Full coverage of smoke detectors of all areas served by AHU, and units shut down upon activation of fire alarm system.
- Duct smoke detectors on supply ducts for gas and electric heated units.
 - Exception. Full coverage of smoke detectors of all areas served by AHU, and units shut

down upon activation of fire alarm system.

- AHU > 15,000 CFM over 2 stories – ductwork smoke detectors on supply and return and fire dampers at unit.
- Duct smoke detectors for smoke dampers at smoke walls. IBC717.5.5 IBC907.3.1

Exhaust

- Independent Systems - Watch for mixed exhaust of cafeteria and classrooms or classrooms and home economics or Science labs and classrooms;
- Ensure local exhaust for storage rooms with chemicals, or potential for odors, based upon use (custodial closets, chemical storage, gym storage) ;
- Kitchen Exhaust Hoods: Design in accordance with equipment, heat, odors, humidity, fumes, etc. See various Code sections;
- Chemistry science rooms to be negative compared to corridors with the preparation or storage rooms for chemistry rooms to be exhausted and negative compared to the science rooms - S606-4;
- Chemical Storage Rooms – 6 air changes per hour. – Chemical Storage Guidelines 4 -12 ACH For HS Chemistry;
- Labs, Shops, Art rooms, Sports locker rooms, dressing rooms – Exhaust in accordance with IMC;
- Toilet/Locker/Janitor Closets – separate exhaust – S707.6
 1. Toilet rooms require separate exhaust. Can be combined with locker room exhaust. Gym Locker room exhaust rate - 0.5 CFM / square foot. Can take makeup air from gym.
 2. Locker rooms with water closets/urinals/showers. Calculate exhaust for each program area (toilet rooms and locker rooms calculate exhaust separately)
 3. PE storage notoriously smelly – pull air from gym and exhaust to exterior.
- Hazardous exhaust systems – Exhaust in accordance with IMC;
- Kitchen hood - maintain fire rating of space; and
- Generator Exhaust – whether locating air intakes, potential points of air intake (doors, operable windows), or locating generator. Maintain Code required distance separations.

Kitchen Equipment

- Cooking hood specs – Kitchen Hood – UL 710 – Type 1 Hood, fire protection.
- Dishwasher Type II hood.

Motor Fuel Dispensing Facilities and Garages

- Comply with Chapter 23 of IFC

Spray Rooms

- Spray Rooms IBC416
- Any duct from room enclosed in 1 hour rated construction to the exterior.
- Air velocity – 100'/minute.
- Fire suppression in room and duct system B416.5 IFC903.2.11.6
- Exhaust fan must be on roof and duct under negative pressure through the adjacent room so that it does not leak hazardous exhaust into the adjacent room.
- Sprinkler spray room rated unless entire building is sprinkled.
- Makeup air to spray room with fire damper at wall or transfer grill.

- Spray booth – Call SED

Ventilation

- Ventilation air in vs. exhaust fan out. Ventilation rates (relief air) on Schedule drawing for all Air Handling Equipment;
- Ventilation and exhaust air requirements for rooms. Ventilation and exhaust air in accordance with Mechanical Code;
- Calculations: All (full) calculations for ventilation air and exhaust air must be provided.
- Size equipment to serve standard classroom at 30 occupants including teacher. For smaller classrooms provide maximum occupant load at 40 occupants per 1000 square feet. – IMC403.3 ok Table IMC403.3.1.1;
- Corridors minimum ventilation - 0.06 CFM / square foot, or the rate of air required to satisfy the makeup air requirements for spaces served by the corridor, plus an additional quantity to keep the corridor positive with respect to adjoining spaces;
- Until determined otherwise, the “zone air distribution effectiveness” of a system where outside air is provided by unit ventilators will be a factor of 0.9 ($E_z = 0.9$) ;
- If addition, or changing program use, HVAC system must meet new code for ventilation.
- Multiple spaces calculate with VAV at minimum to determine ventilation rates. Design must provide minimum required ventilation air at all VAV positions;
- If unit for unit replacement of existing ventilation equipment, engineer to certify that ventilation provided is not less than original design, and original design met code/standard at time;
- Ventilation to occupied spaces cannot be shut down during periods of construction. This would be picked up in specifications or phasing plans. Phasing is generally reviewed by Architectural. - S155.2(1);
- Demand control ventilation CO2 systems refer to new MPS Appendix J;
- Watch that separate heat and cooling controls do not fight or negate each other;
- If rooms are increased in size, check if there is a negative impact on ventilation for the room;
- Provision for independent ventilation systems, for spaces with potential to generate odors/dusts/fumes, etc. See MPS. (Examples: Science rooms, shops, home and careers, art (dependent upon age level);
- Kitchen Exhaust Hoods: Design in accordance with equipment, heat, odors, humidity, fumes, etc. See various Code sections;
- Gas fired RTU's with variable speed drive fans: Minimum fan speed cannot result in hazardous heating conditions, or unit kicking out on safety as part of normal operation.
- Natural cooling: Outside air and relief up to supply air capacity of unit required for spaces with no mechanical cooling. Where mechanical cooling is provided, economizer in accordance with Energy Code;
- Mechanical cooling required for certain interior, educational spaces where there are no operable windows;
- Use of heat recovery or energy recovery units: Check for provision to provide for natural cooling, if no mechanical cooling available;
- Bus Garage Maintenance Bays including pits comply with Mechanical Code and Fire Code;
- (UV) intakes within 2 feet of grade require hard surface, well drained area – 3 feet wide by 3 feet past ends of intake – SED Newsletter 16; and
- Coordinate louver locations with Architectural and Structural lintel locations.

FIRE REVIEW CHECKLIST

Fire Service

- Fire Hydrants – IFC507.5
- Fire hydrants – new hydrants must address backflow requirements IPC608

Fire Protections Systems

- Sprinklers and standpipes
 1. All fire areas > t 12,000 SF requires sprinklers – IFC903.2.3 IBC903.2.3
 - Additions to existing fire area. Check square footage. If total fire area (existing plus new) is > 12,000 SF, then sprinkle entire fire area IBC1102.3.
 2. Every portion of educational buildings below the level of exit discharge requires sprinklers
 3. Exception to Items 1 and 2. Where each classroom has at least one exterior exit door at ground level.– IBC903.2.2
 4. All Buildings:
 - Sprinklers: Windowless stories
 - Sprinklers and standpipes if top floor is > 55' above lowest point of fire department access. IBC903.2.11.3
 5. Stages – >1,000 SF - sprinklers and Class III standpipes - IBC410.7 Table B903.2.11.6
 6. Stages - >1,000 SF or > 50' High, Heat Detectors and smoke hatches
 7. Atriums – sprinklers –Table IBC903.2.11.6
 8. Dust collection Systems w/ > 10" diameter ducts sprinklers (or other fire suppression system) required - IBC903.2.11.4
 9. Exhaust of dust collector min. 10' from windows or above highest portion of roof within 30 feet IMC511.1.1
 - Caution tie in to Domestic service: Valve requirement.
 10. Repair Garages
- Commercial kitchen Type I Hood Fire Suppression system:
 - Automatic shutdown of Electric or gas appliances. - IBC904.2 IMC509.11FC904.2.2IFC904.12
 - Initiation device for fire alarm system
 - Manual release
 - Fire Department Connection required w/in 100' of nearest fire hydrant for standpipe systems - NFPA 14 6.4.5.4
- Atriums can require smoke purge systems.

MEANS OF EGRESS CHECKLIST

- **Lighting:**
 1. The design must provide light levels that meet at least the minimum required for the means of egress along the entire path of the means of egress. Where the means of egress starts at any point that is occupied in the building, and continues out to the public way.
 2. Potential problems include control devices that will result in the reduction of lighting levels below minimum required.

- **New Buildings**

- 1. Stairways – vertical exit enclosures - separate air handling systems - IBC1023.6

- **Area of Refuge (not required for reconstruction projects)**

- 1. Area of Refuge IBC1009.6 - size based upon percentage of school population and location checked by Architects
 - Usually adjacent to stairway with exit to grade or on large stairway landing.
 - Smoke proof area.
 - Check level below grade based on number of occupants for building by Arch.

PLUMBING & GAS REVIEW CHECKLIST

General

- Piping support if new construction over existing site storm or sanitary piping, is the existing material proper for below the slab construction? – IPC702.2
- Relocate tanks and piping as required for new construction.
- Locate inverts of piping passing through foundation walls and provide proper sleeves to protect piping
- Removal of transite pipe is considered Asbestos removal - Industrial Rule 56.
- Condensate disposal – Check condensate piping and plumbing drains for any HVAC units with cooling – IPC802.1.5, IMC307
- Self-closing faucets - NYS Conservation Law .5 GPM self-closing or .25 GPM per cycle. S706-6.d
- ADA ANSI 117.1 Requirements for fixtures.
- Separate bowl for bubblers. S706-9.d, S706-9.e
- Federal Public Law 111–380 ANSI 372 to amend the Safe Drinking Water Act to reduce lead in drinking water. “(B) not more than a weighted average of 0.25 percent lead when used with respect to the wetted surfaces of pipes, pipe fittings, plumbing fittings, and fixtures.
- Demonstrate compliance with Department of Health Lead in water regulation (10 NYCRR 67-4) Sediment traps – Art rooms - S707-2a
- Water Heater –
 - Comply Energy Code
 - ASME construction tanks.
- Gas test pressures per SED – 15 PSI for 1 hour

Fixtures/Faucets/Fittings/Valves

- Fixture Adequacy – base fixture count on square footage of classrooms = Occupancy Load - 1 Water Closet /50 students –Table IPC403
- 6” separation between classroom sink and drinking fountain with basin – S706-9e
- Floor drains required for gang toilets and showers – S706-1.e, IPC Chapter 44
- ADA compliance
- Faucets, fittings, valves meet NSF/ASME 372 Lead Percentage

Gas

- Pressure regulator and venting Comply IGC 410
- Gas entrance below grade and seals
- Gas piping installation: Comply IGC 404
- If gas piping in crawl space – natural ventilation to exterior required. Recommend gas detectors. Caution LPG in spaces below grade
- Vehicle impact protection around Gas meters and regulators
- Fuel supply to emergency generator shall be connected ahead of gas supply to the building with separate valve and signage NFPA110
- CSST Bond gas piping to electrical ground
- Interlock gas equipment under kitchen hoods. Temperature sensor alternate.
- Gas test pressures per SED – 15 PSI for 1 hour.

Pools

- Comply with requirements of Virginia Graham Baker Act (Consumer Product Safety Commission)
- Area or main drains to prevent entrapment
- Vacuum shutdown valve on main drains
- Pool covers if required by Energy Code
- Maintain potable water
- Separation storage of chemicals

Sanitary Drainage

- Question for additions and infill areas: What utilities are you constructing over? No negative impact on existing utilities. – IPC702.2

Storm drainage

- Roof Scuppers not over means of egress doorways
- Storm drains – check location of roof drains and parapets as well as requirement for secondary roof drainage – IPC1108
- DEC requirements of Storm Water management retention and detention. Local requirements of Storm Water management retention and detention.
 - Generally no more water flowing offsite than existing
- Provide site drainage catch basin when U-shaped building becomes an enclosed courtyard - IPC1101.2
- Required exit doors and stairs located below grade to occupied spaces. Comply with Code

Traps / Interceptors / Separators

- Sediment trap for Art Room sinks. S707-2.a

Vents

- Check limitations of air admittance valves. – IPC918.3
- Vents
- Point of discharge

- All equipment connected

Water Heaters

- Storage Water Heaters and expansion tanks ASME even if instantaneous with small tank - S707-4.a
- Fuel fired heaters:
 - Fuel supply and venting in accordance with Fuel Gas Code or Mechanical Code.
 - Vent: Tie into or removal from existing chimney. Comply with existing chimney/vent requirements
- Non-fired Heat exchanger: Double wall use with potable water system
- Electric Booster water heaters for dishwashers are not required to be ASME
- Hot water temperature - comply with Property Maintenance Code and Energy Code.
- Hot water temperature 140 degrees to kitchen with booster to 180 degrees for dishwasher - S707-1a.

Water Supply and Distribution

- Protect Water Quality – 10' minimum spacing between water and sewer lines – Water and sewer crossing detail
- Protect potable Water systems (P608): Backflow prevention/RPZ/air gap/vacuum breakers required to protect potable water include but are not limited to
- HVAC systems
- Exterior Hose bibs
- Field irrigation.
- Corrosion protection change of materials

ELECTRICAL REVIEW CHECKLIST

General

1. NEC (NFPA 70 - National Electrical Code)
2. Electric Work - Check for reference to currently referenced edition (2014)
3. Electrical devices, materials, and packaged equipment shall be listed and labeled by a Nationally Recognized Testing Laboratory (NRTL) such as Underwriters Laboratories Inc. (UL), for the intended use, and shall bear its label. Note that NRTL approval of individual components of packaged equipment does not constitute approval of the entire package.
4. Provisions shall be made in accordance with manufacturer's recommendations for adequate ventilation in rooms with transformers or other heat producing equipment.
5. Lightning protection systems, where provided, shall conform to the requirements of the most current edition of NFPA 780, UL96A, UL96, and other associated UL standards.
6. Electrically driven fire pumps shall be provided with a standby power supply in addition to the normal electrical power source. Normal power sources will not be considered reliable when evaluating need for alternate power source in accordance with NFPA 20.
7. Specify that new circuit breaker(s) to be added to existing panelboard(s) shall be listed/labeled for use with the existing panelboard(s). Match AIC ratings.
8. The short-circuit ratings of all protective devices shall be equal to or exceed the available short-circuit current. Indicate all AIC ratings

9. When new panelboard interiors are retrofitted into existing enclosures (back boxes) the architect/engineer shall determine if the box wiring space is adequate for the installation. Panelboard interiors not marked for use in the existing enclosures revert to a short-circuit current rating of 10,000 AIC. If a short-circuit current rating above 10,000 AIC is required, a Field Evaluation shall be performed by UL (or other NRTL) to determine the actual short-circuit current rating of the new panelboard interior and existing enclosure combination.
10. When the buss of an existing panelboard or switchboard is tapped the architect/engineer shall determine if the box wiring space is adequate for the installation.
11. Clearly indicate the specific locations where plenum rated cable is required or specify that plenum rated cable be used throughout the building. Simply stating that plenum rated cables shall be used in plenum spaces is not adequate.
12. Provide vehicle impact protection for equipment in accordance with the Fire Code (transformers, generators, switchgear, inverters, etc)
13. No penetrations into vertical exit enclosures (stairways) except for those required for the enclosure.
14. Through Penetration Firestopping.
15. Overhead electric lines are typically not allowed on the site. Underground Electric service.
16. Site Lighting – Pole base design with circuiting, conduit and wire sizes.
17. Working space for electrical equipment as required by NEC
18. Dedicated equipment space as required by NEC [Area above equipment reserved for conduits etc][up to 6' above equipment or structural ceiling][Foreign systems above dedicated equipment space – provide guards from leaks]
19. Door(s) swing in direction of egress with panic hardware for electric rooms (working space) as required by NEC [Equipment $\geq 1200A$ and door less than 25' from working space]

- **Lighting**

1. Illumination levels in accordance with MPS
2. Caution for Energy Performance Contracts, which may under-illuminate spaces to save energy. Required Statement that A/E is not reducing lighting levels below SED Standards.
3. Pools (Natatoriums) – Illumination levels and quality of lighting must comply with NYS Department of Health regulations (Sanitary Code 6-1).
4. Interior mercury vapor and metal halide lamps must be of the safety type or self-extinguishing upon the breaking, cracking or removal of the outer shield protecting the lamp. If a safety type or self-extinguishing lamp is not available, each lamp or its fixture shall be equipped with a shield adequate to protect against and absorb ultraviolet radiation if the lamp were to break or become defective.
5. Verify lighting fixtures are clearly indicated in a light fixture schedule or other list
6. Light fixtures to have substantial covers in gymnasiums to prevent breakage upon impact of basketballs etc.
7. Corridor smoke doors, new security vestibule doors, alterations, and additions – Potential negative impact on means of egress lighting.

- **Lighting Controls**

1. Switching of electrical lighting circuits shall be so arranged that certain windowless areas with student occupancy shall either be circuited for some continuous lighting (night lights) directly from the lighting panel or shall be on key operated switches mounted on

the wall. Occupancy sensors shall not shut off all the lighting in the space. Such interior spaces may include, but are not limited to, classrooms, large group instruction areas, libraries, study halls, music rooms, gymnasiums, and gang toilets. All natatorium (swimming pools) shall have some continuous lighting whether or not natural light is provided.

2. Automatic lighting controls in the means of egress: The means of egress illumination level shall not be less than 1 foot-candle at the floor level at all times the building space served by the means of egress is occupied. Light fixtures shall be arranged such that failure of any single lamp does not result in an illumination level of less than 0.2 foot-candle in any space.
3. Automatic lighting controls serving light fixtures in electrical equipment rooms shall have a manual means for overriding such controls.
4. Automatic lighting shutoff and daylight zone control shall be provided when 50% or more light fixtures in a space are replaced in accordance with the Energy Code.
5. Exterior lighting – Automatic lighting shutoff in accordance with Code)

▪ **Emergency Lighting**

1. Emergency Lighting required for spaces that require multiple exits (typically 50 occupants or more), corridors, stairwells, exterior areas at exit doors, elevators, windowless/interior student occupied spaces, gang toilet rooms, shops, labs, home economics, etc.
2. Doors shall be presumed closed for layout of emergency lighting.
3. Identify if the emergency lighting is UL 924 battery backup unit equipment, or battery ballasts, or fixtures supplied by a generator or storage battery emergency power system, or other technology.
4. Minimum 90 minutes emergency lighting capacity after loss of normal power.
5. Emergency lighting circuit connections must be clearly indicated.
6. Emergency lighting level - Average 1 foot-candle - Minimum 0.1 foot-candle.
7. Emergency lighting dual lamps to prevent blackout due to a single lamp failure.
8. Emergency lighting systems shall be arranged such that failure of a normal area lighting circuit shall cause the emergency lighting system to automatically energize, within 10 seconds, or maintain energized emergency lighting in the area at all times (24 hours/day, 365 days/year) whether the building space served by the means of egress is occupied or not occupied.
9. New or modified emergency lighting circuits cannot be connected to existing generator and storage battery emergency power systems that do not comply with current code requirements. Generator and storage battery emergency power systems and emergency lighting circuiting shall be made to comply with current code requirements when new or modified emergency lighting circuit connections are installed.
10. When replacing or adding exterior lighting at exterior exits, exterior exit areas shall be equipped with emergency lighting such that failure of the normal lighting circuit serving the exterior exit area shall cause the emergency power system to automatically energize or maintain energized emergency lighting serving the exterior exit area. Exterior emergency lighting shall be provided for new ramps and stairs when constructed. Exterior exit area is defined as the exterior landing and the ramps and/or stairs serving the landing.
11. SED considers program spaces with hot equipment, open flame, welders, kilns, rotating equipment and/or use of potentially hazardous chemicals to be in the same category as shops (ie. art, home economics, etc) for purposes of retroactive emergency lighting requirements.

12. Where emergency power for emergency lights in an area is supplied by an emergency generator, some lighting (normal lighting) in the area shall be supplied from a panelboard that is not supplied by the load side of the emergency generator transfer switch and other lighting (emergency lighting) in the area shall be supplied from a panelboard that is supplied by the load side of the emergency generator transfer switch. The normal lighting and the emergency lighting each, separately, shall provide illumination levels equal to or greater than the levels required by the Code for emergency lighting.
13. Where emergency power for emergency lights in an area is supplied by a central storage battery system, some lighting (normal lighting) in the area shall be supplied from a panelboard that is not supplied by the central storage battery system and other lighting (emergency lighting) in the area shall be supplied from the central storage battery system. The normal lighting and the emergency lighting each, separately, shall provide illumination levels equal to or greater than the levels required by the Code for emergency lighting.
14. Where UL 924 Automatic Load Control Relays or UL 1008 Transfer Devices are used to energize or maintain energized emergency lighting in an area upon loss of the normal lighting supply in the area, wiring diagrams shall be provided.
15. Battery backup unit equipment emergency lighting shall be circuited in accordance with NEC Article 700.12 (normally connected to the normal light circuit in the area served ahead of switches)(unless exception taken for three or more normal light circuits in an area and dedicated circuit for unit equipment from same panelboard with lock-on feature provided).
16. Corridor smoke doors, new security vestibule doors, alterations, and additions – Potential negative impact on emergency lighting.
17. If the normal light fixture is metal halide or high pressure sodium or similar provide a delay for the emergency light such that the emergency light remains illuminated until the normal light warms up and comes on.

▪ **Exit Signs**

1. Exit signs required for spaces that require multiple exits (typically 50 occupants or more), corridors, stairwells, exit doors, exit access doors.
2. Exit signs shall be readily visible from any direction of egress travel.
3. Exit sign placement shall be such that no point in a corridor is more than 100' from a visible exit sign (if listed viewing distance is less, comply with listing).
4. Doors shall be presumed closed for layout of Exit Signs.
5. "EXIT" face(s) and directional arrows shall be clearly indicated on the drawings.
6. Identify if the exit signs are UL 924 battery backup unit equipment or non-battery exit signs supplied by a generator or storage battery emergency power system.
7. Minimum 90 minutes exit light capacity after loss of normal power.
8. Battery backup unit equipment exit signs shall be circuited in accordance with NEC Article 700.12 (normally connected to the normal light circuit in the area served ahead of switches)(unless exception taken for three or more normal light circuits in an area and dedicated circuit for unit equipment from same panelboard with lock-on feature provided).
9. Corridor smoke doors, new security vestibule doors, alterations, and additions – Potential negative impact on exit signs.

- **Emergency Standby Power**

1. Emergency and Legally Required Standby and Optional Standby Power Systems – NEC 700, 701, 702; NFPA 110
 - a. Clearly indicate if generator systems are separately derived or not separately derived.
 - 4-Pole or 3-Pole Transfer Switch (3-Phase Systems)
 - Provide appropriate grounding/bonding.
 - b. Clearly indicate NFPA 110 Level, Type, and Class for systems.
 - c. Emergency Generator –NFPA 110 Level 1, Type 10 (10 second requirement for emergency lighting), Class XX (Minimum time required to operate)
 - d. Clearly indicate all loads connected to emergency and standby power systems. Clearly indicate if the loads are emergency or legally required standby or optional standby loads.
 - e. Separate Automatic Transfer Switches (ATS) for standby and emergency loads.
 - f. Panel schedules showing connected emergency and standby loads.
 - g. Emergency power system equipment (up to and including the load terminals of the transfer equipment) cannot be located in same room with the building service equipment where the service equipment is rated over 150 volts to ground (example: 277/480V) and equal to or greater than 1000 amps.
 - h. Emergency/Standby Generator – Inside Building – 2 Hour Fire Rated Room
 - i. Emergency Generator (Level 1) – Inside Building – Separate/Dedicated Room
 - j. Remote Manual Stop Switch with Label – NFPA 110 Section 5.6.5.6
 - Generator Inside Building – Located Switch Outside Room
 - Generator Outside Building – Locate Switch External to Enclosure
 - k. Battery backup unit equipment emergency lighting, connected to the load side of the transfer switch, at the generator location (exception: outdoor generators without walk in enclosures)
 - l. Signage at the service entrance equipment identifying the location and type of the onsite power source.
 - m. Circuits for engine block heater, battery charger, and other support equipment.
 - n. Fire Protection requirements for emergency feeder-circuit wiring and equipment for buildings with a population > 1,000 people (sprinklers, fire rating, concrete embedded).
 - o. Natural gas emergency generator – Where the generator gas supply is connected to the building gas supply system, the generator gas supply shall be connected on the supply side of the main building gas shutoff valve and marked as supplying an emergency generator. The building's main gas shutoff valve shall be marked to indicate the existence of the separate emergency generator gas shutoff valve. NFPA 110 Sections 7.9.7 and 7.9.8
 - p. Generator exhaust termination must, at a minimum, be located such that the design complies with the Code required minimum distance from operable openings and air intakes for the building.

- **Grounding and Bonding**

1. Coordinate with the electric utility company, regarding service entrance grounding, as required. Submit the design to the electric utility company for review and approval, as required. (SED will approve based on a copy of the transmittal letter to the utility.)
2. Provide detailed grounding design including locations/configurations/sizes of all grounding electrodes, sizes of grounding electrode conductors, and neutral to ground

bonding requirements. Simply specifying compliance with Article 250 of the NEC is not adequate.

3. Connect to all available grounding electrodes (metal underground water service pipe, building steel, ground rods, ground rings, concrete encased electrodes). Provide concrete encased electrode for new building construction.
4. Grounding for separately derived systems (transformers, some generators, etc) NEC 250.30
5. Feeders or Branch circuit supply to Building/Structure – Grounding Electrode Conductors routed to Grounding Electrodes NEC 250.32
6. Parallel sets of conductors in multiple raceways or cables – Parallel EGC sized per NEC Table 250.122 shall be routed in each raceway or cable NEC 250.122(F) NEC310.10(H)(5)
7. GEC routed through metallic conduit must be bonded at each end to the conduit NEC 250.64(E)
8. GEC must be continuous (unbroken) or irreversibly spliced

▪ **Services**

1. Coordinate with the electric utility company, as required.
2. Typically only one service is allowed to supply a building (up to six grouped disconnects are allowed).
3. Electrical Service 277/480V equal to or greater than 1000 Amps requires ground-fault protection of equipment.
4. Neutral conductor brought to service disconnect NEC 250.24(C)
5. Service conductors shall not be routed in the same raceway with feeders and branch circuits NEC 230.7 [Service conductors shall not be routed through feeder sections of switchgear]
6. Where conductors are tapped from conductors in parallel, the tap connection must include all the conductors in parallel for that particular phase. All sets of paralleled tap conductors must be connected to all sets of paralleled conductors to be tapped – applicable to each phase and neutral [example: if two parallel 2/0 to be tapped from five parallel 500 kcmil – the two parallel 2/0 A-phase conductors must be connected to all five of the parallel 500 kcmil A-phase conductors and so on] NEC310.10(H)

▪ **Power Distribution and Branch Circuits**

1. One-Line Diagrams
2. Verify panels shown on plans are coordinated with the one-line diagram
3. Overcurrent protection ratings
4. Conduit and conductor sizes and quantities for all circuits (verify adequate)
5. Upsize conductors for voltage drop. Verify equipment grounding conductors are upsized also.
6. Mechanical equipment schedules compare to Electric equipment schedules and/or panel schedules and conduit/conductor designs
7. Panel schedules and all circuits identified
8. GFCI protected 125-volt, single-phase, 15- and 20-ampere receptacles required for bathrooms, rooftops, exterior locations, kitchens, water cooler, vending machine, receptacles within 6' of any sink, elevators (see below), pools (see below), commercial repair garages (see below),etc
9. Serving areas for kitchens and cafeterias shall be considered a "kitchen" (per the NEC) for the purposes of providing GFCI protection for all 125-volt, single-phase, 15- and 20-

ampere receptacles.

10. Weather proof GFCI protected 125-volt, single-phase, 15- and 20-ampere receptacles required within 25' (and on same level) of rooftop HACR units for convenience (not for exhaust fans).
11. Kitchen – Automatic shutdown of power to electrical equipment located under the Type I kitchen exhaust hood upon operation of fire suppression system.
12. Provide disconnect in/within sight of HVAC and other equipment.
13. Outlets for ceiling projectors, etc – flexible cords and cables not allowed in concealed ceilings or holes in ceilings.
14. Feeders 277/480V and equal to or greater than 1000 Amps requires ground-fault protection of equipment. Note that the load side of a feeder supplied transformer is not protected by GFP at the Service Entrance.
15. Adjustment factors for conductor ampacity conductors exposed to sunlight on rooftop

▪ **Areas of Special Electrical Needs**

1. Spray Rooms, Spray Booths – Explosion proof areas
2. Swimming Pools – NEC 680
3. Fire Pumps – NEC 695
4. Solar PV Systems – NEC 690, 705

▪ **Vocational Technology and Shops**

1. Shop emergency shutdown stations are required. The emergency shutdown stations shall be red Emergency Stop mushroom pushbuttons. One (1) shall be located on each wall of the room. The emergency shutdown stations shall be provided in locations with a clear unobstructed access that is minimum 36" wide. The emergency shutdown stations shall be configured to de energize the power panel(s) supplying shop equipment in emergencies.
2. Automotive repair areas shall be designed in accordance with the NEC 511 requirements for Motor Vehicle Repair – Commercial Garages.

▪ **Elevators**

1. Standards: ASME A17.1, NEC
2. Separate elevator main power supply disconnecting means with over-current device capable of being locked in open position located in machine room NEC 620.51 Separate branch circuit required for car lights, receptacles, and ventilation with disconnecting means and over-current device capable of being locked in open position located in machine room. Lighting shall not be connected to load side of a GFCI protected circuit. NEC 620.22(A), 620.53
3. Separate branch circuit required for air conditioning and heating for each car with disconnecting means and over-current device capable of being locked in open position located in machine room NEC 620.22(B) , 620.54
4. Separate branch circuit required for machine room lighting and receptacles. Lighting shall not be connected to load side of a GFCI protected circuit. NEC 620.23(A) Lighting switch for machine room shall be located at point of entry to machine room. NEC 620.23(B)
5. Provide at least one duplex receptacle (GFCI) in machine room. NEC 620.23(C), 620.85
6. Separate branch circuit required for hoist way pit lighting and receptacles. Lighting shall not be connected to load side of a GFCI protected circuit NEC 620.24(A) Lighting switch for pit shall be readily accessible from access door. NEC 620.24(B)
7. Provide at least one duplex receptacle in the hoist way pit (GFCI). NEC 620.24(C), 620.85

8. Light fixture in hoistway pit – Guard bulb(s) ASME 2.2.5
 9. Each 125-volt, single phase, 15- and 20-ampere receptacle installed in pits, in hoistways, on elevator car tops, in machine shall be GFCI type. EL620.85
 10. Each 125-volt, single phase, 15- and 20-ampere receptacle installed in machine rooms and machinery spaces shall have GFCI protection. EL620.85(NEC)
 11. Two-way communication system between car and an appropriate location in the building that is readily accessible to emergency personnel
 12. Two-way communication system automatically directed within 30 seconds to a location staffed 24/7
- **Motor Fuel Dispensing Facilities**
 1. Comply with NEC Article 514.
 2. Provide connection such that an approved supervising station monitors the fire suppression system.
 3. Provide emergency disconnect switches at the fueling island and also between 20' to 100' away from the fueling island. Specify the conductors to be disconnected (including the grounded conductor - neutral).
 4. Locate the overfill alarm panel such that it can be seen from the fill port location.
 5. Provide design that is compliant with NEC Article 514 regarding conduit seals for conduits that pass through classified areas (at dispensers, light fixtures, tank, building, etc).
 6. Also see Petroleum Tanks Section below.
 - **Motor Vehicle Repair – Commercial Garages**
 1. Comply with NEC Article 511.
 2. Provide design that is compliant with NEC Article 511 regarding conduit seals for conduits that pass through classified areas.
 3. Pull down reel electric outlets – minimum 18" above finished floor or explosion proof outlets where area is classified.
 4. GFCI protection for 125-volt, single-phase, 15- and 20-ampere receptacles.
 - **Petroleum Tanks (Gasoline, Diesel, Kerosene, Fuel Oil) (DEC 613) (IFC)**
 1. Above Ground Tank – Overfill prevention and alarm – Typically an audible and visual alarm signal at 90% of tank capacity and automatic fuel flow shutoff at 95% of tank capacity. DEC 613-4
 2. Above Ground Tank – Typically continuous automatic electronic tank gauging and leak detection monitoring. DEC 613-4, NFPA 30
 3. Underground Tank – Overfill prevention and alarm – Typically an audible and visual alarm signal at 90% of tank capacity and automatic fuel flow shutoff at 95% of tank capacity. DEC 613-2,
 4. Underground Tank – Typically continuous automatic electronic tank gauging and leak detection monitoring. Typically also monitor interstitial space of double wall tanks for leaks. DEC 613-2
 5. Underground Piping – Typically continuous electronic monitoring for leaks DEC 613-2, 613-4
 - **Swimming Pool and Spa Alarms**
 1. ASTM F 2208 pool alarm
 2. Detect entry into water any point on surface – Multiple alarms
 3. Sound poolside and inside the building
 4. Exception: Spa safety cover; Swimming pool with automatic power safety cover; ASTM F

- **Electrically Operated Partition Safety Systems**
 1. Comply with the Regulations of the Commissioner of Education Part 155.25
 2. Show Device locations on plans
 3. (2) Key Operated Constant Pressure Switches on opposite sides and ends of the partition
 4. Detection devices provide adequate coverage to stop partition motion
 5. Requirements for signage
 6. Sequence of Operation

- **Security**
 1. Lock people out but not lock people in.
 2. Magnetic locks, delayed egress, devices that require request to open devices are non-compliant.
 3. Exit devices with a manual panic bar on the inside.

- 1. **Area of Refuge**
 1. Illuminated signage at access door
 2. Two-way communication to a central control point
 3. Controlled access to a public telephone system
 4. Communication system includes audible and visual signals and instructions
 5. Emergency lights

FIRE ALARM SYSTEMS

- **General**
 1. NFPA 72, NEC
 2. Listing and label
 3. A manual and automatic fire alarm system shall be installed.
 4. Initiation of the fire alarm system shall result in general evacuation of all building occupants.
 5. Fire alarm system shall be monitored by an approved supervising station.
 6. Motor Shutdown: Operating fans in air handling systems and exhaust systems, serving multiple spaces, assembly spaces or corridors, having fan capacities of greater than 1000 CFM, shall be interconnected to the fire alarm system to shut down such motors when the fire alarm is activated. **Note** that there may be special circumstances where shutdown of fans is not desirable (examples: certain commercial kitchen exhaust hoods with extinguishing systems that require the exhaust fans to operate; certain laboratory fume hood exhaust systems where it would not be prudent to allow the vapors of hazardous chemicals used in experiments to escape into the laboratory; smoke control systems; etc).
 7. The Fire Alarm Annunciator Panel (FAAP) must have graphic plans, which indicate the location(s) of the activated initiation device(s), mounted immediately adjacent to the panels. The graphic plans shall be protected from damage. FAAP and graphic plans must be located at the normal fire department entrance, near a window so that they may be read by firefighter personnel without entering the building.
 8. FACP Replacement Only: Provide a FACP that complies with the listing/labeling requirements of the current Code and the Manual. Provide a FACP that is capable of, or can be readily expanded to be capable of, accommodating the future installation of all initiation devices, notification appliances, and other equipment, required by current Code

and this Manual, throughout the building. The fire alarm equipment shall be protected in accordance with current Code and this Manual.

9. FACP and Device/Appliance/Equipment Replacement: This is considered a replacement of the fire alarm system. The entire fire alarm system shall comply with current Code and the Manual. All devices and appliances shall be installed in accordance with their listing/labeling and the requirements of Code and this Manual. (For Example: any existing pull station locations that are not located within the height and distance requirements of current Code and this Manual can't be reused.)
 10. Renovated areas must comply with new FA requirements
 11. Automatic Fire Sprinkler/Extinguishing/Suppression systems shall tie into fire alarm system.
 12. Clearly indicate the locations of all flow switches and valve tamper switches
 13. Fire pumps shall tie into the fire alarm system
 14. New devices must be compatible with the existing fire alarm system.
 15. Clearly indicate the specific locations where plenum rated cable is required or specify that plenum rated cable be used throughout the building. Simply stating that plenum rated cables shall be used in plenum spaces is not adequate.
 16. Specify equipment required such that the fire alarm system will be monitored by an approved supervising station.
 17. Clearly indicate power and fire alarm connections for smoke dampers
 18. Fire Safety Functions
- **Manual Fire Alarm Boxes (Pull Stations)**
 1. Pull station wire guards – listed and labeled with instructions
 2. Pull stations within 5' of all exterior doors.
 3. Pull stations within 5' of each exit at each level.
 4. Pull station maximum travel distance is 200' (exception: sprinkler system).
 - **Automatic Fire Detection – Smoke Detectors and Heat Detectors**
 1. Heat detectors may be substituted for smoke detectors if the environmental conditions in a particular area hinder the proper operation of smoke detectors.
 2. Clearly indicate the type of smoke or heat detector on the construction documents. Clearly indicate the temperature classification of heat detectors on the construction documents. Clearly indicate the listed spacing required for the smoke and heat detectors on the construction documents.
 3. Doors shall be presumed closed for layout of detectors.
 4. Smoke detectors are required at places of assembly, corridors, stairwells, elevators, interior (windowless spaces),
 5. Smoke detector spacing - Typically 900 square foot (30' x 30' Coverage) [Corridors 10' wide – Up to 41' spacing (20' to end of corridor)].
 6. Door hold open devices – Appropriate smoke detector coverage
 7. Smoke dampers – Appropriate smoke detector coverage
 8. Provide smoke detector in the vicinity of Fire Alarm Control Panel (FACP) to provide protection of the panel.
 9. Duct smoke detectors in return ductwork that is greater than 2,000 CFM and serves multiple spaces. Fire alarm system shall shut down unit. Exception: Where all portions of building served have area smoke detection and the unit is shut down upon activation of the fire alarm system.
 10. Duct smoke detectors in supply and return ductwork for gas and electric heated air handling units. Fire alarm system shall shut down unit. Exception: Where all portions of building served have area smoke detection and the unit is shut down upon activation of

the fire alarm system.

11. Duct smoke detectors in return ductwork greater than 15,000 CFM and serving two or more stories. Fire alarm system shall shut down unit.
12. Duct smoke detectors shall initiate an alarm at the fire alarm system.

▪ **Alarm Notification Appliances**

1. Audible and visual notification is required.
2. Visual notification appliances: Public and Common (Space made available for the shared use of 2 or more people) areas include, but are not limited to: corridors, lobbies, assembly spaces (50 occupants or more) and associated surrounding spaces, music rooms, practice rooms, stages, platforms, various types of classrooms, cafeterias, ganged toilet rooms, toilet rooms accessible to the public, single water closet ADA toilet rooms, dressing rooms, locker and shower areas, team rooms, libraries, meeting and conference rooms, common areas of office suites, offices, filing and photocopy rooms, employee break rooms, common areas of nurse suites, examination and treatment rooms, and courtyards.
3. Doors shall be presumed closed for layout of notification appliances.
4. Clearly indicate the candela rating/setting of each visual notification appliance on the construction documents.
5. When an existing fire alarm system is upgraded or replaced, or a new fire alarm system is installed, visual notification appliances shall be provided throughout the entire building.
6. Synchronize strobes as required
7. Strobes to meet NFPA-72 requirements and be visible or reflected from surfaces to all locations within room.
8. Corridor strobes (15 cd) are typically spaced such that there is a strobe within 15' of the end of the corridor and a maximum of 100' spacing between strobes. Note that changes in direction constitute the end of the corridor.

▪ **Elevators (Fire Alarm)**

1. Elevator Recall: Clearly indicate which floor level is the designated recall floor level. Clearly indicate which floor level is the alternate recall floor level. Clearly indicate which detectors initiate elevator recall including which floor level the elevator shall recall to.
2. Elevator Recall smoke detector on each floor adjacent to the elevator
3. Elevator Recall smoke detector in elevator machine room
4. Elevator Recall smoke detectors installed in sprinklered hoistways or hoistways with smoke relief equipment
5. Smoke detectors should not be installed in unsprinklered elevator hoistways unless they are installed to activate the elevator hoistway smoke relief equipment
6. Elevator Shutdown – Sprinklers in hoistway and/or machine room
 - a. Smoke detector initiates elevator recall prior to shutdown
 - b. Heat detector initiates automatic shutdown of elevator power
 - c. Heat detector – lower temperature rating and higher sensitivity as compared to the sprinkler

CARBON MONOXIDE DETECTION

- Comply with Section 12 of Chapter 7 in UCS

SOLAR PV PROJECTS

- **Drawings required for each facility (site) must indicate the following:**
 1. Stamped/Signed
 2. Scaled Plans and Layouts
 3. Building/Roof Plans and Site Plans as required - Roof plans shall include all existing structures and equipment – RTU, EF, roof drains, vents, hoods, hatches, ladders, etc, all items which could interfere with either the solar panels or existing equipment.
 4. Roof plans shall indicate designated paths for access to existing structures and equipment that require maintenance.
 5. Structural analysis shows roof capable of handling additional load from solar system-
 6. Equipment Layout details – Panels, Racks, Combiner Boxes, Inverters, Disconnects, Utility Disconnect, Meters, Conduit Routing, Tie In – Supply/Load Connection
 7. Service Disconnects/Building Breakers – Bus Bar Ratings
 8. Bus Bar Taps
 9. Conduit/Wires Quantity/Size, Overcurrent Protection, GFP as required, etc.
 10. Equipment that impacts NEC required working spaces and dedicated equipment spaces – Show NEC required working spaces and dedicated equipment spaces for new and existing equipment.
 11. Grounding/Bonding – AC/DC Grounding Electrodes, Grounding Electrode Conductors w/ Sizes, Equipment Grounding Conductors w/ Sizes, Existing AC Service Entrance Grounding Electrode Conductors w/ Sizes, Location(s) and Type(s) of existing AC Service Entrance Grounding Electrodes, etc
 12. One-Line or Multi-Line Diagrams
 13. NEC Signage
 14. Roof Attachment details/Ballast/Roof Pads/etc
 15. Fencing/Protection as required

- **Additional details for ground mount:**
 1. Poles/Foundations (w/ reinforcement)

- **Specifications – Site Specific Products – CSI format:**
 1. Technical – General, Materials, Methods, Execution, Testing/Inspection
 2. Codes, Listing/Labeling by NRTL, PSC, UL 1741, IEEE 1547, etc
 3. Product Data – Panels, Racks, Inverters, Anti Islanding, etc
 4. Firestopping as required

- **Additional information:**
 1. Supply side taps that occur inside the building require the PV service disconnect to be located inside the building near the tap
 2. Supply side connections – Disconnect suitable for use as service equipment
 - a. Adding an additional service disconnect
 3. AC GFP for load side connections where existing service or feeder has GFP
 4. Load side connection – Utility Interactive Inverter
 - a. 120% Factor – Busbar and Conductor
 - Sum overcurrent device ratings that supply power to busbar or conductor
 - Shall not exceed 120% of the rating of the busbars and conductors
 - Also applies to “PV Combiner Panels”

- If between 100% and 120% of rating of panelboard – locate PV connection at opposite/far end of away from input feeder location
 - Signage – Warning Inverter Output Connection Do Not Relocate This Overcurrent Device
- b. Ground Fault Protection
- c. Circuit breakers suitable for backfeed
- 5. Plaque or Directory – Identifying the location of the utility service disconnect and PV system disconnect
- 6. AC and DC Grounding
 - a. Bond DC GEC to existing AC Service Grounding System
 - b. GEC must be continuous (unbroken) or irreversibly spliced
- 7. Utility Interactive Inverters – Mounted in Not Readily-Accessible Locations
 - a. DC disconnect within sight of inverter
 - b. AC disconnect within sight of inverter
 - c. Additional PV AC disconnect in a readily-accessible location
- 8. DC Conductors inside building – Metal Raceways
- 9. Exterior utility PV disconnect per NYS PSC SIR
- 10. PV source circuit conductor ampacity – 156% rule ($I_{sc} * 1.25 * 1.25$)
- 11. Adjustment factors for conductor ampacity for more than three current carrying conductors in raceway or cable
- 12. Adjustment factors for conductor ampacity conductors exposed to sunlight on rooftop
- 13. EPC with Solar PV – Solar PV work alone must comply with less than 18 year simple payback.
- 14. EPC with Solar PV – Solar PV work and costs associated with roof replacement must be included in the EPC contract where roof will have to be replaced within the simple payback period.