**Notice:** 04/09/2020: The State of Missouri will adopt the 2016 ASME A17.1, effective April 30. 2020. This standard shall apply to all projects, regardless of their phase of design.
Where conflicts may exist between these design guidelines and the 2016 ASME A17.1, the 2016 AMSE A17.1 shall apply.
Other divisions of these guidelines may also be impacted by changes in this new elevator standard. Where this occurs, the 2016 ASME A17.1 shall apply.
This section of the CPDG is currently under review and will be revised in the near future to include necessary updates.

## GENERAL:

To provide minimum standards for Conveying Systems.

## DESIGN GUIDELINES:

1. The design and construction of all conveying systems shall be in complete compliance with the current required Editions of the applicable codes including the ASME A17.1 Safety Code for Elevators and Escalators (hereinafter referred to as the Elevator Code) as per the Missouri Department of Public Safety, Fire Safety, Office of the State Fire Marshal, Division of Fire Safety, Elevator Safety Unit (hereinafter referred to as State of Missouri - Elevator Unit). The conveying system installer shall obtain all necessary permits required for inspection and use of the conveying systems from the State of Missouri – Elevator Unit. All conveying systems shall be inspected by State of Missouri licensed inspectors and certified by the State of Missouri before final acceptance by the University.
2. The conveyance system design shall be such that a minimum of three (3) elevator installers shall be capable of providing a bid to the general contractor for the project. The conveying system installer shall be the original equipment manufacturer, or a licensee of the manufacturer, who has a record of successful experience with the installation of similar conveyance systems. The contractors shall have a minimum of five (5) years successful experience in installing and servicing similar conveyance system installations. The installer shall have installed at least ten (10) completed and accepted conveyance systems of similar size, scope, logic control, and motion control required by Project. The installer shall have an existing in-house administrative and technical organization staffed with competent personnel who are experienced in the elevator related work required to install and service the conveyance system as specified.
3. The appropriate number, capacity and size of elevators shall be installed to serve each building as determined by calculations that represent industry standard. Calculations shall be presented to the PM for review and approval. Each elevator shall have a minimum rated capacity of 2500 lbs. regardless of the style or type. Designer is encouraged to retain the services of an elevator consultant when an elevator is included in the project and shall retain the services of an elevator consultant when it is determined there will be more than one (1) elevator in the building.
4. Where one (1) elevator would normally meet the requirements in a building where elevator service is essential (i.e. patient transfer in medical buildings), the building shall be provided with a minimum of two (2) elevators to insure continuity of service.

5. Conveyance system specifications shall consider the IBC building design requirements and structural engineer's calculations to make a determination on applicable seismic requirements outlined in the Elevator Code.
6. All elevators shall be of the selective collective type operation for single elevators and group operation when two (2) or more elevators work in conjunction within a single group.
7. Elevators shall have front openings only. Rear openings are discouraged unless otherwise approved by PM under special circumstances.
8. Elevators shall be provided with a car structure of a design that includes platform, stiles, and crosshead in which the car enclosure rests. The stiles and crosshead shall not be of a design that is integral with the car enclosure.
9. Conveying system controllers shall be separated into two (2) distinct halves; Motor Drive side and Control side. High voltage motor power conductors shall be routed so as to be physically segregated from the rest of the controller.
10. Conveying system traveling cables shall include the required number of wires plus a minimum of 10% spares between the elevator car and the elevator machine/control room. In addition, three (3) spare sets of spares, shielded communication wires shall also be provided.
11. For each installation, designer will evaluate expected usage of elevator to determine the need for vandalism-resistant construction. Car and Hall button fixtures shall always be vandalism-resistant, unless otherwise approved by PM.
12. All traction elevators shall have an elevator machine room (or control room if machine-room-less elevators is being provided) separate from the elevator hoistway.
13. Minimum suspension rope diameter for traction elevators shall be ½ inch unless non-circular elastomeric-coated steel suspension means is utilized.
14. Counterweights for traction elevators shall be constructed of all steel. Concrete is not acceptable.
15. All hydraulic elevators shall have an elevator machine room separate from the elevator hoistway. No machine-room-less hydraulic elevators shall be provided.
16. On all direct plunger, hydraulic elevators (in ground) the elevator installer shall be responsible for drilling the required well hole; removing any excess excavated material from the site, and installing a steel casing. Additionally, the cylinder shall be equipped with a PVC containment with a capped, watertight, PVC pipe, at least 1inch larger in diameter than cylinder. Construct a PVC flange to create a watertight seal between the PVC casing and the cylinder flange in the hoistway pit. Provide a means of testing the bottom seal and a means of evacuating any material that may enter the containment. The access risers should be capped to prevent water from entering the cavity should flooding occur in the hoistway pit. The area between the steel casing and the PVC inner casing shall be back filled with clean sand. Concrete shall be provided for the final 4 inches and made level, or higher, than the pit floor.
17. Hole-less hydraulic elevators are to be single stage, twin jack type only. Cable assisted hydraulic elevators or telescoping hydraulic elevators are not allowed.
18. On hydraulic elevators, hydraulic supply line piping between remote elevator machine room and elevator hoistways shall not be installed underground. Any piping running between a remote elevator machine room and the respective elevator hoistway shall be threaded and welded. Grooved type fittings are acceptable within the elevator machine room and hoistway areas. No oil line fitting, threaded or grooved, or parts thereof, shall be encased, mudded, mortared, or located within any

wall or building penetration. No pressurized hoses shall be installed on any hydraulic elevator equipment.

19. Hydraulic elevators shall utilize standard industry hydraulic fluid appropriate for hydraulic elevator applications. Vegetable oil blends shall not be utilized.
20. Elevator Control Components
    - Controls - All elevator control systems will be such that any quality elevator repair company is able to troubleshoot, repair, maintain, or adjust the control system. No proprietary software or repair tools will be allowed. When an elevator control system is provided with software and/or repair tools; complete codes, tools, or other necessary means for monitoring, repairing and testing the control system shall be supplied to the Owner at time of installation. When tools are provided there shall be one (1) tool provided per elevator and all elevators under the project shall be capable of working under any of the tools provided for continuity of service. When updates or changes are required, these shall also be supplied to the University at no additional cost.
    - Fireman's Emergency Service Operation: All elevators shall be provided with fireman's emergency service phase I & phase II operation and shall meet Elevator Code requirements. Fireman's phase I instructions shall be engraved on above the key switch on the faceplate of the fixture. Applied or plastic plates shall not be provided.
    - Door Operation and Protection: Door operators shall utilize closed loop door operator drive systems. Proximity type detectors shall be used on all elevator doors.
    - Car Door Restrictors: The car door operating mechanism shall be arranged so that the car and hoistway doors cannot be opened by hand more than four inches from within the elevator car when the car is outside the unlocking zone. Design of door restricting mechanism shall permit opening of car doors from outside of the elevator car without the use of special tools. Only mechanical type door restrictors are permitted.
    - Signal Fixtures: The hall lantern and position indicators shall be of the standard digital type. All other elevator signal fixtures shall be of the vandal resistant type unless otherwise approved by the PM. All newly provided fixtures shall be constructed of stainless steel with a no. 4 satin grain finish. Vandal resistant screws shall be provided for mounting all signal and operational fixture face plates. With exception of the buttons themselves, fixture faceplates shall not contain any plastic or polycarbonate components, labels or frames. The car capacity shall be permanently engraved on the lower portion of the car control station panel, or engraved on an inset panel, at this location. Lettering shall not be less than 3/8 inch high and shall be black filled. When there is more than one elevator within a building, the elevator number shall be permanently engraved at the top of the main car control station panel, or engraved on an inset panel, at this location. Lettering shall not be less than 1/2 inch high and shall be black filled.
    - Telephone: Every elevator shall be provided with a two-way communication System and shall be the requirements of Elevator Code and ADA/accessibility standards. Refer to Division 28 Fire Detection and Alarm systems of the CPDG's regarding the Communicator preferred for each campus. Verify with PM the latest standards for that campus.

21. Elevator Cab & Finishes
    - Standard Passenger Elevator: The elevator cab shall be a steel shell cab with exterior sound deadening mastic. The car side and rear walls shall each consist of formed steel panels, bolted together to form a complete steel shell cab. Cab shell panels shall be a maximum of 24 inches wide and made of a minimum of 16-gauge steel (or, at Contractor's option, provide 14-gauge steel with a maximum panel width of 36 inches). Cab finish to include 5/8-inch minimum pressed wood, plastic laminate-covered panels secured to cab shell. Color of panels shall be as selected by Designer. All vents in the cab walls shall be concealed. Reveals between panels shall be a maximum of 1 inch. Provide stainless steel base on all walls with panels. The minimum clear inside height of the cab shell shall be the manufacturer's standard 8-foot 0-inch cab. Any deviation from these design standards shall be approved by the PM.
    - High Abuse Passenger or Standard Service Elevator: The elevator cab shall be a steel shell cab. The elevator cab side and rear walls shall consist of formed rigidized stainless-steel panels, bolted together to form a complete steel shell cab. Cab shell panels shall be a maximum of 24 inches wide and made of a minimum of 16 gauge rigidized stainless steel (or, at Contractor's option, provide 14 gauge rigidized stainless steel with a maximum panel width of 36 inches). Panels shall be provided with sound deadening exterior matting. Rigidized stainless steel shall have a 5WL pattern with a satin finish. The minimum clear inside height of the cab shell shall be the manufacturer's standard 8-foot cab. Any deviation from these design standards shall be approved by the PM.
    - The elevator cab front return panel shall incorporate an integral entrance column, shall be brushed stainless steel a minimum of 16 gauge, and shall extend from finished floor to underside of fascia. The strike jamb shall also be stainless steel a minimum of 16 gauge. The front return panel shall be arranged for mounting the car control station panel. A full width fascia of brushed stainless steel shall be furnished over the return panel(s) and car entrance.
    - All elevator lighting shall be LED. Elevator lighting and fan shall have a sleep mode which will extinguish the interior lighting and turn off the fan when the elevator is dormant.
    - Designer will evaluate expected use of the elevator when choosing floor covering. In areas with high student use, preferred covering is vinyl tile. When carpet is used, carpet tiles are preferred for ease of replacement.
22. Elevator Entrance Frames shall be of 16-gauge minimum sheet steel material and of 14 gauge minimum when the elevator is to be utilized for high service use. Finish on elevator frames and doors shall be brushed stainless steel unless approved otherwise by the PM. Hoistway access unlocking holes in the door panels shall be provided with a stainless-steel escutcheon protection tube and collar.

23. The following shall apply to the Vertical Platform Lifts.
    - The use of vertical platform lifts is prohibited in new construction. Possible exceptions include access to performing areas in assembly occupancies or to provide access to incidental occupiable spaces and rooms which are not open to the general public and which house no more than five persons.
    - Lifts may be used in existing facilities built prior to 1991 as part of an accessible route and only when the use of an elevator or ramp is not feasible.
    - Lifts shall comply with UM System Adopted Code and Standards including the Safety Standard for Platform Lifts and Stairway Chairlifts.
    - Lifts shall be installed such that all lift enclosure walls are securely attached to adjacent walls, structure, or supplemental structural supports as required for stability and proper operation of the unit.
    - The use of vertical lifts is preferred over the use of inclined (stair) lifts.
    - The lift platform should be fully enclosed whenever possible. The minimum platform size is 36 inches x 54 inches.
    - Lifts shall allow unassisted entry, operation, and exit. Operating controls shall be large push-button or paddle controls.
    - The preferred drive type is recirculating ball screw. The minimum weight capacity is 750 lbs.
24. Conveyance specifications should include that the conveyance system's final acceptance inspection and testing procedure be conducted in the presence of the contractor, architect, University's representative, and elevator consultant (when applicable).
25. A metal certificate frame, of adequate size with a window, shall be provided and mounted on the wall of the elevator machine/control room to house the State of Missouri operating permit.
26. Elevators shall not be utilized during construction unless approved by the PM. When approved, designer shall include the following requirements for temporary construction use of the elevator –
    - Provide car with temporary enclosure, either within finished car or in place of finished car, to protect finishes from damage.
    - Provide strippable protective film on entrance and car doors and frames.
    - Provide padded wood bumpers on entrance door frames covering jambs and frame faces.
    - Provide other protective coverings, barriers, devices, signs, and procedures as needed to protect elevator and elevator equipment.
    - Obtain required permits and provide all necessary "Temporary Construction Use" inspections and testing as required by the State of Missouri – Elevator Unit.
    - Engage elevator installer to provide full maintenance service for elevators used for construction purposes. Include preventative maintenance, repair or replacement of worn or defective components, lubrication, cleaning, and adjusting as required for proper elevator operation at rated speed and capacity. Use parts and supplies as used in the manufacture and installation of original equipment.

- Engage elevator installer to restore damaged work, if any, so that no evidence remains of corrective work. Return items that cannot be refinished in the field to the shop, make required repairs and refinish entire unit, or provide new units as required.

27. Specifications shall include a warranty and maintenance period of one (1) year minimum. Installing vendor will be responsible for all maintenance and service during the warranty period. Response to non-emergency service calls will be within four hours of the call. Response to emergency service calls will be within one-half hour of the call. Vendor will be financially responsible for these calls except those caused by power outages, acts of God, vandalism, and false reports.
28. Specifications shall include language that during the eleventh ($11^{th}$) month of the new installation maintenance service period, a post warranty inspection shall be coordinated by the installing contractor to ensure the elevator is in a good state of maintenance repair and all maintenance manuals, diagnostic tools and "Maintenance Control Program" documents are in place. The inspection shall include the installing contractor, the University's current campus elevator maintenance contractor and the University's representative.
29. The University has a recent history concerning issues with elevator bids. In order to proactively prevent the elevator subcontractors from taking exceptions to elevator specifications the architects shall specifically address the potential elevator bids with the General Contractors at the pre-bid meeting. The following is suggested wording to be included the pre-bid meeting agenda.
    - Note: There have been issues on recent projects where contractors are not providing the elevator product specified resulting in an issue post bid. Please be advised only specified elevator product will be accepted. Any equivalent substitutions for elevator products must go through the appropriate process for consideration prior to the bid and will not be considered after bids are received.

## Engineering items from other Divisions of the CPDG's are referred here to ensure coordination between all disciplines.

1. All elevator control rooms shall have a minimum headroom clearance of 7 feet 6 inches. This means all equipment including, but not limited to, wiring duct and conduit, HVAC units and duct and piping, roof drains, sprinkler piping and heads, drip pans, etc. shall be located above 7 feet 6 inches from the finished floor. When a ceiling mounted HVAC unit or sprinklers are provided within the room these components and their piping or ductwork shall be located such that they are not over any elevator equipment.
2. On standard traction elevator with a machine room above, the elevator machine room shall be located over the elevator hoistway. On machine-room-less traction elevators the control rooms shall be located at the upper most level served by the elevators and adjacent to the hoistway. On hydraulic elevators the elevator machine room shall be located at the lowest level served by the elevator and adjacent to the hoistway. This will allow for convenience in future maintenance and testing of the elevators. The control rooms shall be enclosed and protected with a fire rating equal to that of the hoistway as required by the IBC building code. The doors to the control rooms shall be of the proper fire rating and shall be self-closing and self-locking.
3. For hydraulic elevators there shall be 12 inches by 6 inches access provided from the elevator machine room to the elevator hoistway per elevator. This will allow the elevator installer to put in the supply line pipe and the conduit and wiring from the elevator controller to the elevator hoistway. Upon completion of the installation of the supply line and conduit, the designer shall provide means to seal up the openings in the machine room and hoistway wall penetrations to ensure the fire rating integrity of the areas. All piping shall be installed above ground by the elevator installer through the path as determined by the designer.
4. There shall be no other equipment located in the elevator machine/control rooms or hoistways other than that which is related to the elevator as required by Elevator Code.
5. The elevator machine or control room *s*hall be equipped with an independent means of ventilation or air conditioning to keep the temperature between 40 degrees and 90 degrees Fahrenheit and a relative humidity below 95% for proper operation of the microprocessor control equipment and machine. Where standby power is connected to the elevators, the elevator machine or control room air conditioning shall be connected to the standby power source. HVAC equipment installed in the elevator control room shall be located such that it is not directly over elevator equipment.
6. For hydraulic elevators, the elevator machine room shall be positively vented to the outside to remove normally accumulated hydraulic oil odors. This keeps hydraulic oil odors associated with hydraulic elevators from the inside of the building.
7. Hydraulic elevator drive machines are typically very noisy. When there will be office space located in the near proximity of the elevator machine room location, or the elevator machine room is located adjacent to hollow hoistways, sound deadening material shall be provided for the adjacent machine room walls and/or ceiling to minimize the noise from the elevator.

8. For machine-room-less traction elevators, the machine space in the top of the elevator hoistway shall be equipped with an independent means of ventilation or air conditioning to keep the temperature between 32 degrees and 113 degrees Fahrenheit and a relative humidity below 95% for proper operation of the elevator drive machine. Where standby power is connected to the elevators, the machine space air conditioning shall be connected to the standby power source. HVAC equipment shall not be allowed within the hoistway and shall be supplied through ducts to this area.
9. The Designer shall include a hoist beam located in the top of the elevator hoistway with loading capacity applicable for the elevator installation (normally elevator hoist beam have a live load capacity range of between 5,000 and 10,000 lbs. depending on the elevator size and construction. Verify necessary capacity with elevator designer).
10. Designer shall provide a clear, plumb and substantially flush hoistway with a fire resistance rating as determined by the building code. Necessary elevator hoistway dimensions should be held with variations not to exceed 1 inch at any point. The hoistway shall be substantially flush with no ledges greater than 4 inches. Separator beams should be added when providing group elevator hoistway dimensions and the width of each separator beam must be added when figuring the overall width of the hoistway for a multicar group.
11. Others shall provide support beams at each floor level, in between floors, and at the top of the hoistway to support the guide rails with the loads shown in the table below. Elevator designer should determine maximum bracket spacing on the guide rails and structural designer should include intermediate bracket supports where the floor heights exceed this maximum.
12. After the elevator contractor installs the rail brackets, others shall patch any fire proofing materials that may be required on the building structure to retain the fire rating of the elevator hoistway.
13. Designer shall include cut outs in the hoistway walls for the hall button and hall lantern fixtures as required. Designer shall also include patching and finishing of the lobby walls after the installation of lobby signal fixtures and for fireproof grouting behind the signal fixtures on the inside of the hoistway.
14. Designer shall include a rough opening of approximately 12 inches wider and 6 inches higher than the finished clear opening shall be provided in the front hoistway walls at each hoistway entrance. Upon completion of the elevator installer setting the hoistway door frames the designer shall include providing final construction and finish to the elevator door frames. Door frames shall be anchored to walls and properly grouted in place to retain fire rating integrity of the hoistway. Design floor beams to accept stud type fasteners and supporting loads imposed based on loading of the elevator at the sill. Some elevator installers will require sill supports to be provided by the structural subcontractor and the necessity should be determined by the elevator designer. When sill supports are required, they are typically sill angles which are 4 inches x 4 inches x 3/8 inch for the single speed type door arrangements and 6 inches x 4 inches x 3/8 inch for the side opening type door arrangements.
15. Designer shall stipulate general contractor is responsible for all barricades for protection of the elevator hoistway during construction.

16. When the elevator hoistway is planned to be pressurized a note shall be placed on the drawing that the final designed operation of the pressurization fan shall be coordinated in conjunction with the successful elevator installer to assure disruption of air flow and ductwork location do not interfere with the operation of the elevator.
17. The designer shall provide dry, excavated elevator pits. The elevator pit floor shall be designed to support the elevator loads determined by the elevator designer.
18. For hydraulic elevators the designer shall include providing a 30 inch by 30 inch access hole in the elevator pit floor for the elevator installer to drill the hole for the hydraulic jack unit. After the installation by the elevator installer, the designer shall include the pouring of the concrete pit flooring up to the PVC casing around the elevator's hydraulic jack after the jack unit has been set in place.
19. The designer shall include a ladder in each individual elevator pit within reach of the lowest landing hoistway access door, and on the interlock side, for proper access into the respective pit areas. The ladder shall be a fixed vertical ladder of non-combustible material with the handgrips extending not less than 48 inches above the hoistway access door sill. The ladder rungs shall be 16 inches wide and spaced 12 inches on center. A clear distance of not less than 4½ inches from the centerline of the rung to the hoistway wall shall be provided (Place a note on the architectural drawings to locate this ladder in coordination with the elevator installer to assure no interference with the elevator equipment and code compliance).
20. The designer shall provide three-phase main line fused disconnects of the proper size and type to abide by present day electrical code requirements for each elevator located in the elevator control or machine room. These systems require a four-wire system with a direct ground wire back to the main panel to assure no interference with other building electrical equipment. Some elevator manufacturers may provide regenerative drives for the elevators. When regenerative drives are provided the electrical system in the building shall be designed to accept the generated load from the elevators under normal power conditions and emergency power conditions.
21. When an elevator status panel is being provided in the fire command station, the designer shall provide conduit or a raceway from each of the elevator hoistways to the elevator status panel in the fire command station at the floor location of the fire command station. The elevator installer will be responsible for pulling all wiring from the individual hoistways through the conduits to the elevator status panel.
22. When the elevator control system is being provided with emergency power sequencing operation the electrical designer shall include a signal from the emergency power transfer switch to one elevator controller in each elevator machine/control room to indicate to the elevator control system(s) when the elevators are on emergency power. Provide a time delay of approximately 15 seconds prior to pretransfer signal in either direction. Additionally, provide a 1½ inch conduit between the separate elevator machine/control rooms for communication wires between elevator control systems. The elevator installer will provide the actual wiring between the elevator control systems.
23. When sprinklers are being installed in the elevator control rooms, and/or hoistways, and/or pits, elevator code stipulates a standard sprinkler protection conforming to the requirements of NFPA 13 may be installed in the control room and hoistway spaces subject to the following:

- All risers and returns shall be located outside these spaces.
- Branch lines in the hoistway shall supply sprinklers at not more than one floor level (meaning you can run sprinkler supply lines the length of the elevator hoistway).
- Means shall be provided to automatically disconnect the main line power supply to the affected elevator prior to the application of water. This is normally accomplished by shunt trip type disconnects in the elevator control room activated by heat sensors located adjacent to the sprinkler heads (both top of hoistway and pit) in these spaces set at a temperature below the sprinkler head activation. This means shall not be self-resetting. The activation of sprinklers outside of the hoistway or control room shall not disconnect the main line power supply.
- When a sprinkler is located in the elevator pit or top of hoistway, a smoke sensor must also be installed in the top of the elevator hoistway. Per the code and Section 210100 Fire Protection System Design of the CPDG's, automatic fire sprinklers are not required in elevator machine rooms, elevator machinery spaces, control spaces or hoistways of traction elevators where all the conditions of 8.15.5 of NFPA 13 are met.
- Control circuits to shut down elevator power shall be monitored for presence of operating voltage. Loss of voltage to the control circuit for the disconnecting means shall cause a supervisory signal to be indicated at the fire alarm control panel and required remote annunciators. The monitoring design shall be such that activation of the elevator disconnect for routine elevator maintenance service shall not send a trouble call to the fire alarm panel.

24. The elevator control room lighting shall provide a minimum illumination of 19 foot-candles at the floor level per Elevator Code requirements. The light switch shall be located by the door to the elevator machine/control room.
25. A separate 120-volt, single phase, fused, lockable disconnect shall be provided in the elevator machine/control room for each elevator's car light circuit and shall be a dedicated circuit for each elevator. The circuit fuse shall be 15 amps minimum. A minimum of one (1) duplex receptacle shall also be provided in each elevator machine/control room and all outlets in the room shall be GFCI protected.
26. When machine-room-less traction elevators are provided, a light shall be provided in the top of the hoistway providing a minimum of 19 foot-candles measured at the top of the hoistway door at the uppermost landing. The light switch shall be located within reach of the top landing access door. This is a substantial amount of lighting and usually requires large multi-bulb light fixtures in lieu of single incandescent bulbs. Place a note on the drawing to coordinate exact location with elevator installer to assure no interference with elevator equipment and code compliance is met. A duplex GFCI receptacle shall be provided in the machine space at the top of the hoistway.
27. A pit lighting system shall be provided in each elevator pit with a minimum illumination of 10 foot-candles at the floor level. A pit light switch shall be located adjacent to each pit ladder within reach of the pit access door. The pit lights shall be provided with a guard.

28. A GFCI type duplex receptacle shall be provided in each elevator pit.
29. The elevator cabs will be provided with an ADA compliant speakerphone mounted in the car control station inside the elevator car by the elevator installer. The elevator installer will bring shielded wiring from the phone in the elevator car to the elevator control room. The designer or University is responsible for connections of the phone into the building system. Make final determination with the PM.
30. When the building is high rise, the elevator cars must be provided with a fireman's phone jack and voice/alarm speaker to meet high rise requirements. The elevator installer shall provide shielded wiring from the phone jack and voice/alarm speaker in each elevator car to the elevator machine / control room. The designer shall include requirements for connections of the phone jacks and voice/alarm speakers into the building system.
31. The designer shall include providing a class ABC type fire extinguisher, of proper size for the equipment, permanently mounted in each elevator machine/control room.
32. The designer shall include a proper smoke sensor system installed for each elevator group in the respective elevator control/machine room, lobbies (and when applicable elevator hoistways) to work in conjunction with the elevator control system's fireman's phase I recall operation. When sprinklers are located in the elevator hoistway or pit a smoke sensor must also be located in the top of the elevator hoistway and also made to work in conjunction with the fireman's phase I recall. The smoke sensor system shall be provided with primary and alternate floor designations in addition to a separate signal to indicate that the smoke sensor in the elevator control room or hoistway has been activated for proper operation in conjunction with fireman's recall. Different elevator control systems require different signals and a note should be placed on the drawing assuring coordination of required components between elevator installer and electrical subcontractors.
33. **Note: Plumbing and electrical work from other sections of our CPDG's related to elevator sump pump piping and groundwater collection sump system refers to this page to provide a comprehensive description of the requirements for elevators.** Provide a sump hole and pump in all elevator pits. Design shall include a steel grating cover that is flush with the pit floor level. When pits are shared, one (1) sump hole and pump may be provided. The best location for the sump hole is one of the rear corners of the hoistway away from the counterweight and any other elevator components. Coordinate final location with elevator designer. The pit floors shall be designed with a slight slope so all water drains to the sump hole. Power for the sump shall be hard wired directly to a non-GFCI circuit on an electrical panel, or provide a single, non-GFCI electrical outlet dedicated to the sump pump within the vicinity of the sump hole. Sump pumps for hydraulic elevators shall utilize a pump that stops when sensing oil and provides an alarm to the building system. The minimum capacity *of the sump pump shall be 3000 gal/hr*. The discharge piping within the elevator pit shall be hard pipe (not PVC). This discharge piping shall be separately and directly connected to the site storm water system. Note that the MU campus requires the pump discharge to be routed to a floor drain connected to the sanitary waste system in the nearest mechanical room. The controls for the sump pump shall not be located in the pit and are discouraged from being located in the elevator machine room. The controls may be located in the elevator machine room when it is determined there is no other practical space available and it is approved by

the PM.

34. Elevator Pit waterproofing and groundwater drainage system:
    - All buildings: Install waterproofing on sides and bottom of elevator pits. Waterstop all concrete joints.
    - For buildings without an under slab drainage system: Install the bottom of the groundwater collection sump pit at least 2 feet below the bottom of the elevator sump pit.
    - For buildings with an under slab drainage system: Install the sub-drainage sump collection at an elevation below the elevator pit sump. In other words, all elevators require a second sump lower than the elevator sump pump. All under slab ground water drainage and elevator pit drainage shall be piped separately. The pump discharge lines shall be tied to the site storm drainage system and is not permitted to be tied to the storm drain system within the building. Size of control and pump system to be determined based on ground water conditions.
    - Gravity feed drainage is preferred where feasible.